

PAST PAPERS

<i>Faculty</i>	<i>Department / Section/Division</i>
<i>Not Applicable</i>	<i>Learning Resource Centre</i>

**Past Papers**

Faculty of Humanities & social Sciences  
Department of Logistics & Transportation

**Bsc.(Hons) Logistic & Transportation**  
**(Year 3 – Semester I)**  
**2016 - 2022**

*Document Control & Approving Authority*

*Senior Director – Quality Management & Administration*

*1<sup>st</sup> Issue Date: 2017.011.30*

*Revision No.00*

*Revision Date: 12.01.2022*

*Validated by: Librarian*



Faculty of Management and Social Sciences  
 Department of Logistics & Transport  
 BSc Hons in Logistics and Transportation  
 Course CODE: COM551

Year 3 Semester I  
 SEMESTER END EXAMINATION  
 Transport Planning and Logistics Management – LTTM3208

- This paper consists of SEVEN questions on SIX (06) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2020.09.29

Pass mark: 50%

Time: 02 Hours

**Question 01: (Compulsory)**

- (a) State briefly the role of planning transportation in logistics management. (03 Marks)
- (b) Briefly explain the implication on economic rationality behind choices of freight movement. (06 Marks)
- (c) Define the following terminologies commonly used in transportation network.
- I. Link
  - II. Node
  - III. Flow
  - IV. Path
  - V. Cycle
  - VI. Tree
- (06 Marks)
- (d) Briefly explain the usage of Dijkstra's algorithm in transportation network. (04 Marks)
- (e) Briefly explain the conservation law on transportation network taking into consideration the flows of network. (Hint - both centroid and intermediate nodes have to be considered) (02 Marks)



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- (f) Briefly discuss the term 'generalized cost' in terms of freight transportation that is highly useful for planning trip distribution and mode choice. (04 Marks)

### Question 02

- (a) State each example for the following transportation networks  
 I. Linear network  
 II. Grid network (04 Marks)
- (b) Explain two (02) advantages of hub and spoke network. (06 Marks)
- (c) Describe three (03) indexes that can be used to measure the efficiency of the transport network. (06 Marks)
- (d) Explain how can road pricing be a solution to reduce traffic congestion in cities. (05 Marks)
- (e) Discuss two advantages of having an efficient freight transport systems through railways in Sri Lanka. (04 Marks)

### Question 03

- (a) Assume that the number of truck trips at a given location on an average weekday was 10,000 in 2005 and 15,000 in 2010. Estimate the number of truck trips for the year 2020. (Hint - Use simple growth factor method based on historic traffic trends) (04 Marks)
- (b) Find the total flow through the network shown in Q3-b when the node 1 is the source and node 4 is the sink. Flows between nodes are shown in the figure.



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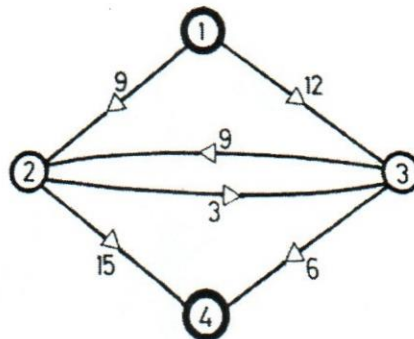


Figure Q3-b: Transportation network flow conservation law to be applied  
 (03 Marks)

- (c) Determine the Minimum Spanning Tree (MST) for the transportation network shown in figure Q3-c.

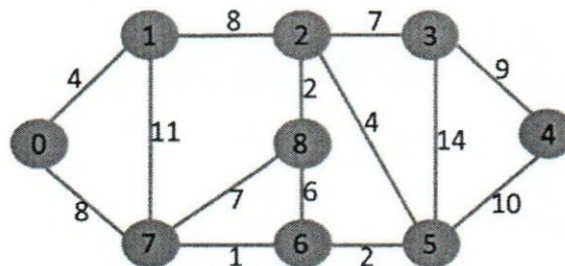


Figure Q3-c: Transportation network to which MST to be found  
 (15 Marks)

- (d) State three practical application of MST.  
 (03 Marks)

#### Question 04

- (a) State two functionalities of transportation in terms of freight movement.  
 (02 Marks)
- (b) Find the shortest route from the origin O to the destination T for the network shown in figure Q4-b using Dijkstra's Algorithm. The travel cost between nodes are stipulated in the figure.



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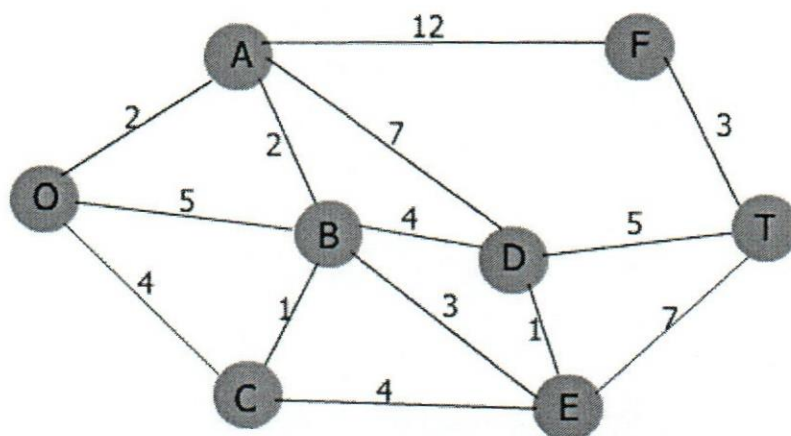


Figure Q4-b: Network to which shortest paths to be found out using Dijkstra Algorithm

- (c) Identify three contributions that containerization has made to the change of era in international trade. (17 Marks)
- (06 Marks)

### Question 05

- (a) Fill the table Q5-a shown below using the modal characteristics of transportation modes.

Table Q5-a: Table to be filled

Mode	Advantage (01)	Disadvantage (01)
Rail		
Highway		
Water		
Pipeline		
Air		

(05 Marks)



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- (b) Determine the maximum flow between node s and node t of the transportation network shown in figure Q5-b. Capacities of individual branches are shown on the figure.

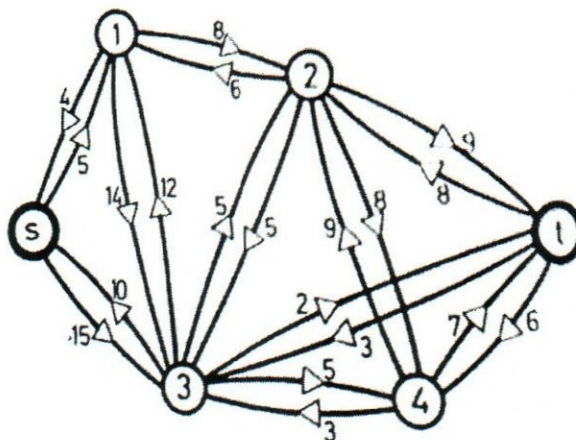


Figure Q5-b: The transportation network for which maximum flow to be found between node s and node t

(20 Marks)

### Question 06

- (a) Identify two factors that contribute for the economic development of a country. (02 Marks)
- (b) Find a tour which starts and finishes at node A using Chinese Postman Problem for an oriented network.



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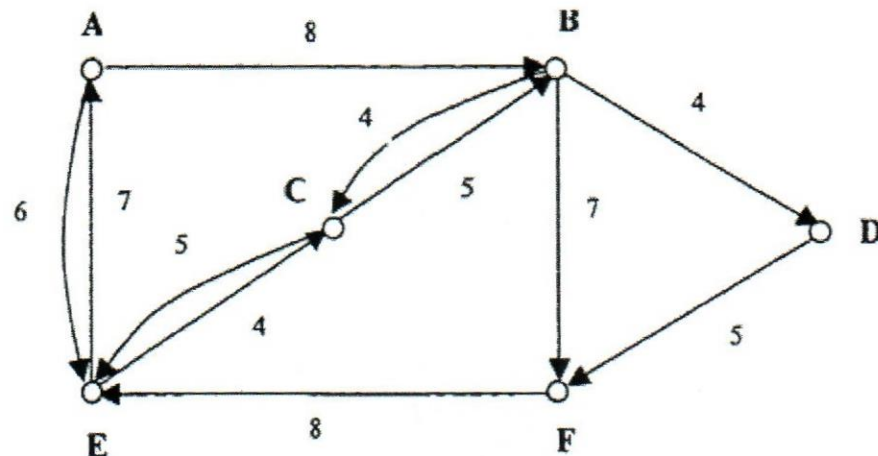


Figure Q6-b: Oriented network for solving the Chinese Postman problem

- (c) State three ways that freight transportation helps for the economic development. (17 Marks)
- (06 Marks)

### Question 07

Briefly describe the practical method of calculating the following transport network cost.

- Fuel cost
- Delay cost due to road condition such as congestion
- Tyre cost
- Vehicle depreciation cost
- Vehicle repair cost

(5X5 Marks)

-----END OF THE QUESTION PAPER-----

**t Table**

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	<b>0.50</b>	<b>0.25</b>	<b>0.20</b>	<b>0.15</b>	<b>0.10</b>	<b>0.05</b>	<b>0.025</b>	<b>0.01</b>	<b>0.005</b>	<b>0.001</b>	<b>0.0005</b>
two-tails	<b>1.00</b>	<b>0.50</b>	<b>0.40</b>	<b>0.30</b>	<b>0.20</b>	<b>0.10</b>	<b>0.05</b>	<b>0.02</b>	<b>0.01</b>	<b>0.002</b>	<b>0.001</b>
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
<b>Z</b>	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	<b>Confidence Level</b>										



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Faculty of Management and Social Sciences  
Department of Logistics & Transport  
BSc Hons in Logistics and Transportation  
Course CODE: COM551

Year 3 Semester I  
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Transport Planning and Logistics Management – LTTM3208

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- (f) Briefly discuss the term 'generalized cost' in terms of freight transportation that is highly useful for planning trip distribution and mode choice. (04 Marks)

### Question 02

- (a) State each example for the following transportation networks  
 I. Linear network  
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### Question 03

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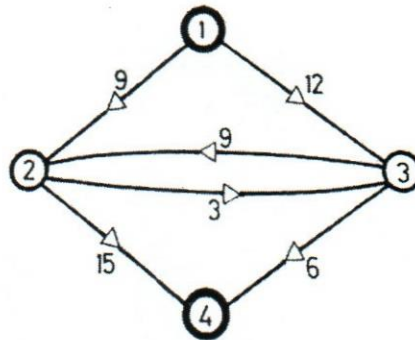


Figure Q3-b: Transportation network flow conservation law to be applied  
 (03 Marks)

- (c) Determine the Minimum Spanning Tree (MST) for the transportation network shown in figure Q3-c.

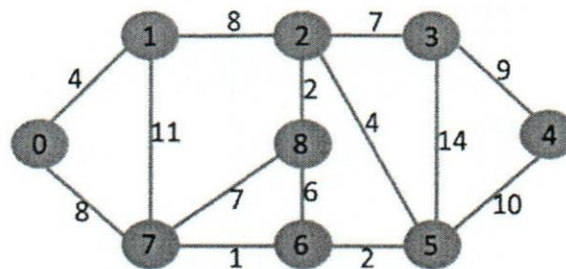


Figure Q3-c: Transportation network to which MST to be found  
 (15 Marks)

- (d) State three practical application of MST.

(03 Marks)

#### Question 04

- (a) State two functionalities of transportation in terms of freight movement.  
 (02 Marks)
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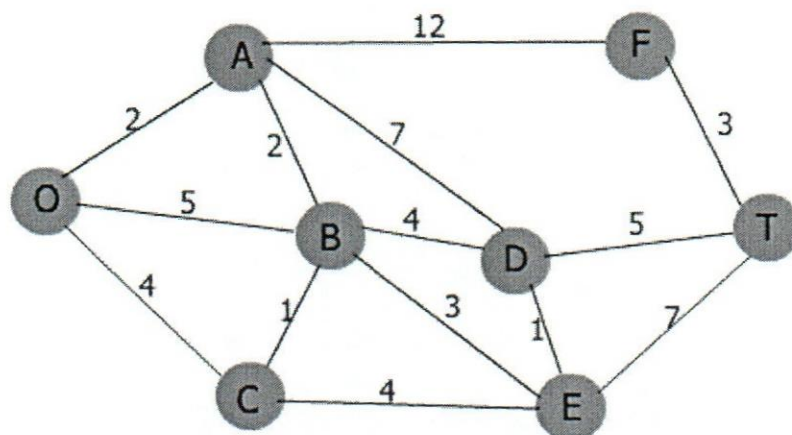


Figure Q4-b: Network to which shortest paths to be found out using Dijkstra Algorithm

- (c) Identify three contributions that containerization has made to the change of era in international trade. (17 Marks)
- (06 Marks)

### Question 05

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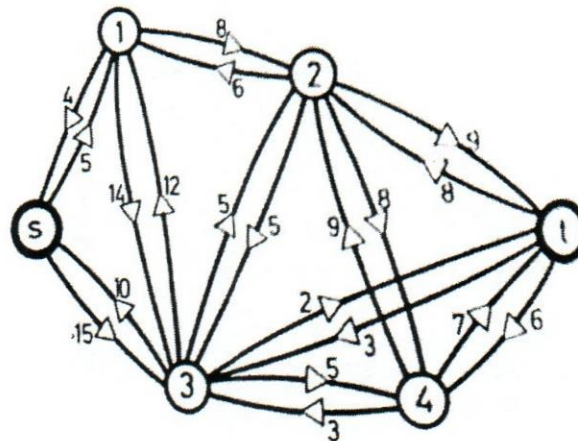


Figure Q5-b: The transportation network for which maximum flow to be found between node s and node t

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### Question 06

- (a) Identify two factors that contribute for the economic development of a country. (02 Marks)
- (b) Find a tour which starts and finishes at node A using Chinese Postman Problem for an oriented network.



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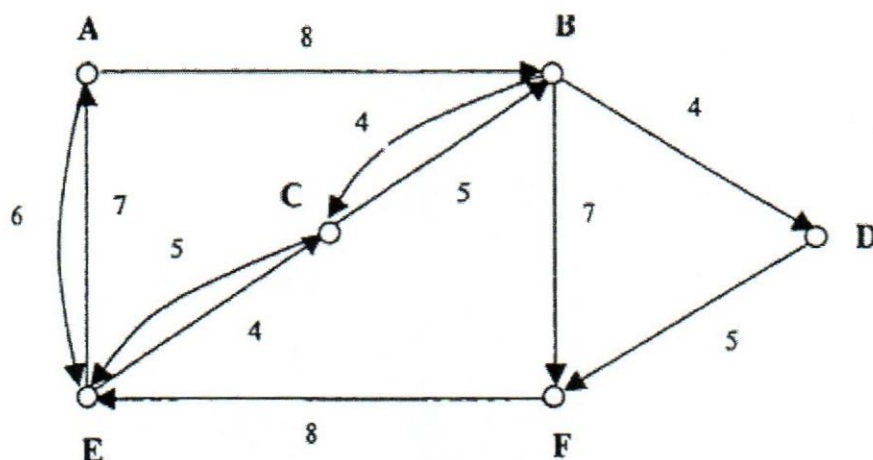


Figure Q6-b: Oriented network for solving the Chinese Postman problem

(17 Marks)

(c) State three ways that freight transportation helps for the economic development.

(06 Marks)

### Question 07

Briefly describe the practical method of calculating the following transport network cost.

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(5X5 Marks)

-----END OF THE QUESTION PAPER-----

**t Table**

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29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
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80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
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<b>Z</b>	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	<b>Confidence Level</b>										



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Year 3 Semester I

SEMESTER END EXAMINATION

Customs and Commodity Inspections Operations – LECO3204

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- Write Legibly.
- Required documents are attached.

Date: 2020.09.27

Pass mark: 50%

Time: 02 Hours

### Question 01 (Compulsory)

Nikko Best (Pvt) Ltd has imported 01 unit of used Toyota Aqua hybrid car (model NHP10) fitted with a 1,490 cc hybrid engine from Japan. The price agreed was JPY 1,400,000 Ex Works. In addition to that Nikko Best (Pvt) Ltd has paid JPY 35,000 as local handling charges to a handling company in Japan. However according to the list of minimum values published by the Sri Lanka Customs the minimum FOB price of Toyota Aqua NHP10 is JPY 1,895,000.

Ms. NYK Line Lanka (Pvt) Ltd has endorsed on the copy of the Bill of Lading that their standard freight cost is USD 65 per CBM. The volume of a Toyota Aqua car is 14.55 CBM.

The marine insurance has been obtained locally from the Sri Lanka Insurance Corporation for Rs. 7,250/=.

According to the Sri Lanka Tariff Guide 2016 the hybrid motor cars having a spark-ignition internal combustion reciprocating piston engine with a capacity less than 1500cc are classified within HS Code 8703.22.51 and the following taxes are payable to Sri Lanka Customs at the time of clearance.





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- |                      |  |
|----------------------|--|
| (A) Customs Duty     | - 25%  |
| (B) VAT              | - 11%  |
| (C) PAL              | - 5%   |
| (D) NBT              | - 2%   |
| (E) Excise (SP) Duty | - 92% or Rs. 1,750/= per cubic centimetre of engine. |

Exchange Rates are Rs. 145.8899 per US Dollar and Rs. 1.2416 per Japanese Yen.

Calculate all five taxes payable for the subject vehicle. Formulas are provided in the attached document to this question paper.

(25 Marks)

### Question 02

Grand International Group is a multinational company based in the USA and the rights holder of several world renowned brands including "Walker" and "Bee" brands.

Great Walker Ltd is a Shoe manufacturing company based in China. They manufacture "Walker" brand Shoes according to the specified quality of Grand International Group and supply the same only to the buyers nominated by Grand International Group. Grand International Group holds 63% of shares of Great Walker Ltd and several Directors of Great Walker Ltd are also Directors of Grand International Group.

Grand Lanka Ltd is a Sri Lankan trading company registered under the Companies Act. However, Grand International Group holds 98% of shares of Grand Lanka Ltd. Several Directors including the Managing Director of Grand Lanka Ltd are also Directors of Grand International Group. Grand Lanka Ltd has been appointed by Grand International as their Sole-Agent in Sri Lanka for the sale of "Walker" brand Shoes. In addition to the Sole-Agency Agreement Grand Lanka Ltd has also entered into an agreement with Grand International Group termed as Royalty Agreement. According to this Royalty Agreement, Grand Lanka has to pay 5% of the Ex-Work price as Royalty to Grand International Group for the "Walker" brand Shoes purchased from Great Walker Ltd.

Grand Lanka has imported a shipment of 01x20' container said to contain 5,000 pairs of "Walker" brand Shoes from Great Walker Ltd. The Ex-Work price agreed is USD 2.50 per pair of Shoes. Grand Lanka has entrusted the transportation of the said



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container from China to the Port of Colombo to a Freight Forwarding company namely Sea-Sky Lanka Ltd. They have issued a quotation containing the following charges.

#### Charges at Origin

Sea Freight	- USD 1285
Packing Cost	- USD 315
Inland Transport	- USD 725
Handling Charges	- USD 165

#### Charges at Destination

Terminal Handling (THC)	- USD 250
Container Deposit	- Rs. 5750
Container Washing	- Rs. 1150

In addition to the above charges the Sea-Sky Lanka Ltd has also charged USD 150 as Bunker Adjustment Fee (BAF) and USD 110 as Currency Adjustment Fee (CAF) on the arrival of the container. The marine insurance has been obtained locally from Sri Lanka Insurance Company on payment of Rs. 16,875/= for the whole shipment. The Exchange Rate is Rs. 135.00 per US Dollar.

- Calculate the **Cost of Transport** of the subject shipment from the warehouse of Great Walker Ltd to the Port of Colombo in **USD** (08 Marks)
- Calculate the amount of **Royalty** payable to Grand International Group by Grand Lanka Ltd against the subject shipment in **USD** (08 Marks)
- Calculate the **Customs Value** of the subject shipment in **Sri Lankan Rupees** (09 Marks)

### Question 03

Write an essay describing the structure, functions, objectives and the legal framework of the Sri Lanka Customs (25 Marks)

### Question 04

- Name the **6 methods** given in the WTO Valuation Agreement to determine the Customs (12 Marks)
- Explain the **method 1** and the adjustments to be made to the value so determined (13 Marks)



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### Question 05

- (A) Name the documents required to clear the imported goods through Customs.
- (B) Explain in details the steps you should follow in clearing imported goods through Customs.

(25 Marks)

### Question 06

Explain in detail the 6 General Rules for the interpretation of Harmonized System (GRI) with suitable examples.

(25 Marks)

### Question 07

Select 05 topics from the following topics and write 05 short essays

- (A) Customs Ordinance
- (B) Imports and Exports (Control) Act
- (C) Methods of payment in international trade
- (D) Bill of Lading/ Airway Bill
- (E) Non-Tariff Barriers
- (F) General Agreement on Tariff and Trade (GATT)
- (G) Section 10 of the Customs Ordinance of Sri Lanka

(25 Marks)

-----**END OF THE QUESTION PAPER**-----

Computation formulae for imported goods

Where

v	=	CIF value in Rupee
c	=	Cess levy under Sri Lanka Export Development Act
d	=	Customs Duty
e	=	Excise (Special Provisions) Duty (ED)
t	=	Value Added Tax (VAT)
n	=	Nation Building Tax
p	=	Port and Airport Development Levy (PAL)
$r_e$	=	Rate of Excise (Special Provisions) Duty (ED)
$r_t$	=	Rate of Value Added Tax (VAT)
$r_n$	=	Rate of Nation Building Tax

- Customs Duty (d) = (CIF value) × (Customs duty rate)  
or  
= (quantity) × (unit rate of customs duty)
- Value Added Tax (t) =  $(v + 10\% \text{ of } v + d + c + p + e) \times r_t$
- Cess Levy (c) =  $(v + 10\% \text{ of } v) \times (\text{Cess levy rate})$   
or  
= (quantity) × (unit rate of Cess levy)
- Port and Airport Development Levy (p) = (CIF value) × (PAL rate)
- Excise (Special Provisions) Duty (e) =  $(v + 15\% \text{ of } v + d + c + p) \times r_e$   
or  
= (quantity) × (unit rate of Excise Duty)
- Special Commodity Levy = (Quantity) × (unit rate of Special Commodity Levy)
- Nation Building Tax (n) =  $(v + 10\%v + d + c + p + e) r_n$

Schedule  
Rates of Exchange Effective From 26.08.2019 to 01.09.2019

	Country	Country Code	Currency	Currency Code	Rate of Exchange (Rs.)
1	Australia	AU	Dollar	AUD	122.5013
2	Bahrain	BH	Dinar	BHD	480.7536
3	Bangladesh	BD	Taka	BDT	2.1472
4	Brazil	BR	Brazil Real	BRL	44.5388
5	Brunei	BN	Brunei Dollar	BND	130.7519
6	Canada	CA	Canadian Dollar	CAD	136.1082
7	China	CN	Renminbi	CNY	25.5432
8	China	CN	Offshore	CNH	25.5238
9	Czechoslovakia	CZ	Koruna	CZK	7.7845
10	Denmark	DK	Kroner	DKK	26.9204
11	Egypt	EG	Pound	EGP	10.9379
12	Euro Zone		Euro	EUR	200.7161
13	Ghana	GH	Cedi	GHS	33.2554
14	Hongkong	HK	Dollar	HKD	23.1213
15	Hungary	HU	Forint	HUF	0.6116
16	India	IN	Rupee	INR	2.5197
17	Indonesia	ID	Rupiah	IDR	0.0127
18	Iran	IR	Riyal	IRR	0.0043
19	Japan	JP	Yen	JPY	1.7013
20	Jordan	JO	Dinar	JOD	255.6300
21	Korea	KR	Won	KRW	0.1492
22	Kuwait	KW	Dinar	KWD	595.8958
23	Macau	MO	Pataca	MOP	22.4448
24	Malaysia	MY	Ringgit	MYR	43.2609
25	Maldives	MV	Rufiya	MVR	11.7233
26	Mauritius	MU	Rupee	MUR	5.0067
27	Myanmar	MM	Kyat	MMK	0.1192
28	Nepal	NP	Rupee	NPR	1.5773
29	New Zealand	NZ	Dollar	NZD	115.8316
30	Nigeria	NG	Naira	NGN	0.5914
31	Norway	NO	Kroner	NOK	20.1745
32	Oman	OM	Riyal	OMR	470.7515
33	Pakistan	PK	Rupee	PKR	1.1363
34	Papua New Guinea	PG	Kina	PGK	53.3757
35	Philippines	PH	Peso	PHP	3.4601
36	Poland	PL	Zloty	PLN	46.0407
37	Qatar	QA	Riyal	QAR	49.7780
38	Russia	RU	Rouble	RUB	2.7635
39	Saudi Arabia	SA	Riyal	SAR	48.3266
40	Seychelles	SC	Rupee	SCR	13.2584
41	Singapore	SG	Dollar	SGD	130.7519
42	South Africa	ZA	Rand	ZAR	11.8970
43	Sweden	SE	Krona	SEK	18.7291
44	Switzerland	CH	Francs	CHF	184.1045
45	Taiwan	TW	Dollar	TWD	5.7701
46	Thailand	TH	Baht	THB	5.8854
47	U.A.E.	AE	Dirham	AED	49.3423
48	United Kingdom	GB	Sterling Pound	GBP	221.7855
49	United States of America	US	Dollar	USD	181.2417
50	Zambia (Old)	ZM	Kwacha	ZMK	0.0349
51	Zambia (New)	ZM	Kwacha	ZMW	13.8247
52	Zimbabwe	ZW	Dollar	ZWD	0.4776



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Year 3 Semester I  
 SEMESTER END EXAMINATION  
 Operational Research – LTOR3206

- This paper consists of SEVEN questions on TWELVE (12) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2020.09.25

Pass mark: 50%

Time: 02 Hours

**Question 01 (Compulsory)**

(a) Hynas International is a firm produces an alloy having the following specifications:

- Specific Gravity  $\leq 0.98$
- Chromium  $\geq 8\%$
- Melting point  $\geq 450^\circ\text{C}$

Three raw materials namely P, Q and R having the properties shown in the table 1.01, can be used to make the alloy.

Property	P	Q	R
Specific Gravity	0.92	0.97	1.04
Chromium	7%	13%	16%
Melting Point	440°C	490°C	480°C

Costs of the raw materials per ton are LKR 900, LKR 2800 and LKR 400 for P, Q and R respectively.

Formulate a LP model to find the proportions in which P,Q and R be used to obtain an alloy of desired properties while the cost of raw materials is minimum.

(10 Marks)



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(b) Answer the MCQ questions given below. Write the correct answer on the answer book (15 Marks)

1. Operations Research approach is .....
  - A. Multi-disciplinary
  - B. Scientific
  - C. Intuitive
  - D. Collect essential data
  
2. A feasible solution to a linear programming problem .....
  - A. Must satisfy all the constraints of the problem simultaneously
  - B. Need not to satisfy all the constraints but only some of them
  - C. Must be a corner point of the feasible region
  - D. Must optimize the value of the objective function
  
3. An optimal solution to a linear programming problem .....
  - A. Must satisfy all the constraints of the problem simultaneously
  - B. Must be a corner point of the feasible region
  - C. Must optimize the value of the objective function
  - D. All of the above.

Consider the LP problem given below. Question 4,5 and 6 based on this LP problem

$$\begin{aligned} \text{Min } Z &= 5 X_1 + 7 X_2 \\ \text{Subject to constraints} \\ 2X_1 + 3 X_2 &\geq 42 \\ X_1 + X_2 &\geq 18 \\ X_1, X_2 &\geq 0 \end{aligned}$$

4. What is the dual objective function of the above primal problem?
  - A.  $\text{Min } Z = 42Y_1 + 18 Y_2$
  - B.  $\text{Max } Z = 7Y_1 + 5 Y_2$
  - C.  $\text{Max } Z = 42 Y_1 + 18 Y_2$



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D.  $\text{Min } Z = 42 Y_1 - 18 Y_2$

5. Consider the statements given below.
- There exit two decision variables in the dual problem
  - One constraint can be written as  $2Y_1 + Y_2 \geq 5$
  - Primal problem can be solved using Dual Simplex algorithm

What is the correct statement/s?

- a. only
  - a. and b. only
  - a. and c. only
  - all of the above
6. Constraints of the dual problem are,
- $2Y_1 + Y_2 \leq 5$  and  $3Y_1 + Y_2 \geq 7$
  - $2Y_1 + Y_2 \leq 5$  and  $3Y_1 + Y_2 \leq 7$
  - $2Y_1 + Y_2 \geq 5$  and  $3Y_1 + Y_2 \leq 7$
  - $2Y_1 + Y_2 \geq 5$  and  $3Y_1 + Y_2 \geq 7$

Table given below is an initial table of a Linear programming problem with maximization objective function and Two-phase method is used to solve the LP Problem. Question 7 and 8 are based on the below table.

BASIC	X1	X2	X3	S1	S2	R1	VALUE	RATIO
S1	2	1	1	1	0	0	2	
R1	3	3	2	0	-1	1	8	
Z	-2	-2	-4	0	0	0	0	
F	3	4	2	0	-1	0	8	

7. What is the entering variable of the above table according to Two-phase method.
- S1
  - X1
  - X2
  - X3





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8. What is the leaving variable of the above table according to Two-phase method?
- X1
  - X2
  - S1
  - R1
9. The purpose of the method of Multipliers is to
- assist one in moving from an initial feasible solution to the optimal solution.
  - determine whether a given solution is feasible or not
  - identify the relevant costs in a transportation problem.
  - develop the initial solution to the transportation problem.
10. An initial transportation solution appears in the table given below.

	C	D	Factory Capacity
A	10	0	10
B	15	25	40
Warehouse			
Demand	25	25	50

Can this solution be improved if it costs \$5 per unit to ship from A to C; \$7 per unit to ship from A to D; \$8 to ship from B to C; and \$9 to ship from B to D?

- Yes, the initial solution can be improved by \$10.
- No, this solution is optimal.
- Yes, this solution can be improved by \$50.
- Yes, this solution can be improved by \$100.



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11. What is the cost of the transportation solution shown in the table?

	W	X	Y	Supply
A	\$3 20	\$5 50	\$9 0	70
B	\$5 0	\$4 30	\$7 0	30
C	\$10 40	\$8 0	\$3 80	120
Demand	60	80	80	220

- A. \$1350
- B. \$1070
- C. \$1230
- D. \$1150

12. In order for a linear programming problem to have a unique solution, the solution must exist .....

- A. at the intersection of the nonnegativity constraints.
- B. at the intersection of two or more constraints.
- C. at the intersection of a nonnegativity constraint and a resource constraint.
- D. at the intersection of the objective function and a constraint.



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13. Unboundedness is usually a sign that the LP problem
- A. has finite multiple solutions
  - B. is degenerate.
  - C. contains too many redundant constraints.
  - D. has been formulated improperly.
14. The transportation method assumes that .....
- A. there are no economies of scale if large quantities are shipped from one source to one destination.
  - B. the number of occupied squares in any solution must be equal to the number of rows in the table plus the number of columns in the table plus 1
  - C. there is only one optimal solution for each problem.
  - D. the number of dummy sources equals the number of dummy destinations.
15. if the feasible region of a LP model is empty, the solution is,
- A. infeasible
  - B. unbounded
  - C. alternative
  - D. degeneracy



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**Question 02**

Use graphical method to solve the following LP model.

(25 Marks)

$$\text{Max } Z = 7X_1 + 3X_2$$

Subject to

$$X_1 + 2X_2 \geq 3$$

$$X_1 + X_2 \leq 4$$

$$X_1 \leq 3$$

$$X_2 \leq 2$$

$$X_1, X_2 \geq 0$$

**Question 03**

Solve below LP model using Simplex method.

(25 Marks)

$$\text{Max } Z = 4X_1 + 3X_2$$

Subject to constraints

$$2X_1 + X_2 \leq 1000$$

$$X_1 + X_2 \leq 800$$

$$X_1 \leq 400$$

$$X_2 \leq 700$$

$$X_1, X_2 \geq 0$$

**Question 04**

Solve below LP Model using Two Phase Method. Clearly mention the Phase I Objective function.

(25 Marks)

$$\text{Min } Z = 5X_1 + 7X_2$$

Subject to constraints

$$2X_1 + 3X_2 \geq 42$$

$$X_1 + X_2 \geq 18$$

$$X_1, X_2 \geq 0$$



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### Question 05

Consider the LP model given below

$$\text{Minimize } Z = 6X_1 + 4X_2$$

Subject to constraints

$$4X_1 + X_2 \geq 2$$

$$3X_1 + 2X_2 \geq 3$$

$$X_1 + 5X_2 \geq 1$$

$$X_1, X_2 \geq 0.$$

- (a) Find the dual problem of this primal problem (05 Marks)  
 (b) Solve the primal problem using dual simplex method. (10 Marks)  
 (c) Solve the dual problem obtained in part (a) using any appropriate method. (10 Marks)

### Question 06

Mr. Silva is the Managing Director of Sewana Cement Manufacturing company is concerned with the problem of distributing the cement from three factories to four distribution centers. The supplies of Cement in each factory is as follows.

Table 6.01

Factory Name	Supply Tonnes per week
Factory 1	20,000
Factory 2	38,000
Factory 3	16,000



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The demand at four distribution centers are as follows

Table 6.02

Distribution Centre	Demand Tonnes per week
A	10,000
B	18,000
C	22,000
D	24,000

The transportation cost is USD 0.5 per tonne per kilometre. The distance between the  
 Factories and the distribution centers is as given below.

Table 6.03

	A	B	C	D
Factory 1	50	60	100	50
Factory 2	80	40	70	80
Factory 3	90	70	30	50

- (a) Find the initial solution using North West Corner Method (05 Marks)  
 (b) Find the initial transportation cost. (02 Marks)  
 (c) Find the Optimal Solution using method of multipliers. (12 Marks)  
 (d) Find the optimal transportation cost (02 Marks)  
 (e) Show the optimal transportation schedule in a diagram. (04 Marks)



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### Question 07

LMS is software solutions that manage administration, monitoring, and reporting of online courses and training programs within an organization. It serves as a **virtual classroom** where teachers can interact with their students and conduct learning activities online.

CINEC LMS had one system administrator and students contact the system administrator to assist their LMS related problems.

Time between students' requests and service time of the system administrator is shown in below tables.

Table 7.1: distribution of time between arrivals (students' requests)

Time between arrivals (in minutes)	Probability
1	0.25
2	0.40
3	0.20
4	0.15

Table 7.2: distribution of service time of System Administrator

Service time (in minutes)	Probability
2	0.30
3	0.28



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4	0.25
5	0.17

During the lockdown period of COVID-19 pandemic in Sri Lanka, CINEC decided to recruit assistant system administrator as one person cannot assist all students' request as LMS was the only one option for staff and students to continue their academic work. Efficiency of the assistant system administrator is not as good as the system administrator, so system administrator is preferred when both of them are available. Service time of the assistant system administrator is given below.

Table 7.3: distribution of service time of B

Service time (in minutes)	Probability
3	0.35
4	0.25
5	0.20
6	0.20





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Consider the following random numbers and simulate the above and discuss the followings;

1. Distribution of each student delay to get the service and the average waiting time of students
2. Probability of waiting time
3. Probability of waiting time for both A and B

Random numbers for arrivals (Students' requests):

89, 24, 56, 60, 34, 92, 45, 40, 8, 73, 15

Random numbers for service time of system administrator:

88, 63, 23, 94, 74, 17, 11, 41

Random numbers for service time of assistant system administrator:

42, 53, 93, 24, 51, 16, 41

(25 Marks)

-----END OF THE QUESTION PAPER-----



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Year 3 Semester I

SEMESTER END EXAMINATION

Production and Operations Management – LTPM3207

- This paper consists of SEVEN questions on NINE (09) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2020.09.21

Pass mark: 50%

Time: 02 Hours

### Question 01 (Compulsory)

Forecasting presents an unresolved philosophical dilemma. While all elements of Operations Management are important, forecasting is one of the key elements in the operations structure.

- (a) Prime Foods Bakery markets its cupcakes through a chain of food stores. It has been experiencing over and under-production due to forecasting errors. Data on Table 1.10 are the demands in dozens of cupcakes for the past four weeks. Cupcakes are made for the following day; for example, Monday's production is for Tuesday's sales. The bakery is closed on Saturday, so Friday's production must satisfy the demand for both Saturday and Sunday.



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Table 1.10: Demands for Cupcakes

Day	4 Weeks ago (doz.)	3 Weeks ago (doz.)	2 Weeks ago (doz.)	Last week (doz.)
Monday	2,200	2,400	2,300	2,400
Tuesday	2,000	2,100	2,200	2,200
Wednesday	2,300	2,400	2,300	2,500
Thursday	1,800	1,900	1,800	2,000
Friday	1,900	1,800	2,100	2,000
Saturday	-	-	-	-
Sunday	2,800	2,700	3,000	2,900

- (i) Forecast the daily demand for this week using a simple four-week moving average **(04 Marks)**
- (ii) Estimate the daily demand forecast for this week using a weighted average of 0.40, 0.30, 0.20, and 0.10 for the past four weeks **(04 Marks)**
- (iii) Prime is also planning its purchase of ingredients for bread production. If bread demand had been forecast for last week at 22,000 loaves and only 21,000 loaves were actually demanded, what would primes forecast be for this week using exponential smoothing with  $\alpha = 0.10$ ? **(03 Marks)**
- (b) Income at the Pearson and Specter Law Firm for the period February to July is denoted in Table 1.20.

Table 1.20: Monthly Income of Pearson & Specter Law Firm

Month	February	March	April	May	June	July
Income (in \$ thousands)	70.0	68.5	64.8	71.7	71.3	72.8

Firm's accountant considers using Trend Adjusted Smoothing to forecast the law firm's August income assuming that forecast for February is \$65,000 and the initial trend adjustment is zero. Use the smoothing constants  $\alpha = 0.1$  and  $\beta = 0.2$  to



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estimate the Firm's income for August. (Give your answer up to 2 decimal places)  
**(08 Marks)**

- (c) Professor Hugh has been intuitively forecasting the number of students who will enroll in his class. Initial enrollment in Fall, 2016 was 70. His forecasts and the actual number enrolled are given in Table 1.30.

Table 1.30: Forecasts and demands of the class

Semester	Forecasted Enrollment	Actual Enrollment
Spring 2017	90	60
Fall 2017	90	70
Spring 2018	100	60
Fall 2018	80	120
Spring 2019	120	80
Fall 2019	150	60

- (i) Use Mean Absolute Deviation (MAD) to find the accuracy of Professor's predictions. **(03 Marks)**
- (ii) What do you expect from a modelling approach to forecasting compared to Professor's intuitive forecasting? **(03 Marks)**
- (Total: 25 Marks)**

## Question 02

- (a) Origins of Operations Management dates back to the Industrial Revolution that began in Britain in the 16th century.
- (i) Define Operations Management. **(02 Marks)**
- (ii) Briefly explain the transformation process of a manufacturing/ service organization of choice. **(04 Marks)**
- (iii) How does the role of Operations Manager get influenced by the other major functions of the organization? **(05 Marks)**
- (iv) Distinguish the manufacturing and service operations. **(04 Marks)**



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- (b) Globalization has taken the global community to a floating market. Worldwide strategy places an added burden to the operations managers. With the differences in economies and lifestyle, designers must target products to each market.
- (i) Name 2 reasons for product/ service redesign? (04 Marks)
  - (ii) How does Quality Functional Deployment offer a strategic advantage for a company? (03 Marks)
  - (iii) What are the consequences of failures in design? (03 Marks)
- (Total: 25 Marks)**

### Question 03

- (a) The strategic implications of capacity decisions can be enormous, impacting all areas of the organization. From an operations management standpoint, capacity decisions establish a set of conditions within which operations will be required to function.
- (i) Give 3 reasons to consider capacity decisions as strategically important (03 Marks)
  - (ii) Differentiate design capacity and effective capacity (04 Marks)
  - (iii) Texas University's business program has the facilities to handle the enrollment of 2,000 new students per semester. However, to limit the class sizes to a reasonable level (under 200), the Dean of the Faculty placed a ceiling on enrollment of 1,500 new students. Although there was ample demand for the course, conflicts in schedules only allow 1,450 new students to take the business course. Calculate the efficiency and the utilization of the system. (06 Marks)
  - (iv) A constraint limits the performance of a process or system achieving its goals. Briefly explain 2 such constraint categories in capacity planning. (04 Marks)
- (b) A stationary manufacturer has fixed costs of \$900, a variable cost of \$4.50 and a selling price for its stationary at \$5.50.
- (i) When is a Cost-Volume analysis used? (02 Marks)



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- (ii) What is the stationary company's Break-Even point? (02 marks)  
 (iii) How many units must be sold for the company to make a profit of \$50,000? (02 Marks)  
 (iv) How many units must be sold to average a profit of \$0.50 per unit? (02 Marks)

(Total: 25 Marks)

#### Question 04

- (a) Briefly explain the factors affect the choice of strategy in aggregation? (05 Marks)  
 (b) Mary Rhodes, operations manager in Kansas Furniture, has received the following estimates of demand requirements.

Table 4.10: Monthly forecasted demand

Month	Jul.	Ag.	Sept.	Oct.	Nov.	Dec.
Demand	1,000	1,200	1,400	1,800	1,800	1,600

Assuming that the regular production costs \$10 per unit, stock-out costs for lost sales of \$100 per unit, inventory carrying costs of \$25 per unit per month, and zero beginning and ending inventory, evaluate the following plans on a cost basis.

**Plan A:** Produce at a steady rate (equal to minimum requirements) of 1,000 units per month and subcontract additional units at a \$60 per unit premium cost.

**Plan B:** Keep the current workforce steady at a level production of 1,300 units per month. Permit a maximum of 20% overtime at a premium of \$40 per unit. Any additional needs are subcontracted at \$60 per unit premium cost.

(20 Marks)

(Total: 25 Marks)



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### Question 05

- (a)
- (i) When is it the most appropriate to use Material Requirement Planning (MRP)? (01 Marks)
  - (ii) What are the benefits of MRP? (02 Marks)
  - (iii) Name 2 benefits of ERP (02 Marks)
- (b) Assume that a company has an item A. One unit of A is made out of one units of B, and one unit of C. B is made of four units of C and one unit of E and F. C is made of 2 units of D and one unit of E. E is made of three units of F. Item C has a lead time of one week; Items A, B, E and F has lead times of 2 weeks; and item D has a lead time of three-weeks. Lot-for-lot lot sizing is used for the items A, D and E; Lots of 50, 100 and 50 are used for items B, C, and F respectively. Items C, D, and E have an on-hand inventories 50, 100, and 10 respectively; all other items have a zero beginning inventory. The company is scheduled to receive 100 units of C in week 1, and 100 units of D in week 3; and there are no other scheduled receipts.
- (i) Draw a product tree structure for the item A.  
*(Hint: Use low-level coding for the subassemblies)* (03 Marks)
  - (ii) Develop a master schedule for item A (01 Marks)
  - (iii) If 50 units of A are required in the 10<sup>th</sup> week use the given information to develop MRP for item E (16 Marks)

**(Total: 25 Mark)**

### Question 06

- (a) A process is any part of an organization which transforms the inputs into outputs which are of a greater value to the organization than the inputs.
- (i) Does process selection has a strategic importance? Justify your answer.  
(03 Marks)
  - (ii) What are the key tradeoffs made in process strategy selections?



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(03 Marks)

- (iii) Identify following occurrences of processing in the product-process matrix, and write short notes on the process types.
- I. A sugar refinery
  - II. A commercial printer repair shop
  - III. A class in a University
- (iv) What are the reasons for redesigning of layouts?

(09 Marks)

(03 Marks)

(b) The model J Wagon is to be assembled on a conveyer belt. Five hundred wagons are required per day. Production time per day is 420 minutes, and the assemble steps and times for the wagon are given in Table 6.10.

- (i) Draw a precedence diagram for the Model J Wagon. (03 Marks)
- (ii) Determine workstation cycle time. (02 Marks)
- (iii) Determine the theoretical minimum number of work stations required for the expected production rate. (02 Marks)

(Total: 25 Marks)

Table 6.10: Assembly steps and times for the Model J Wagon

Task	Task Time (s)	Description	Precedence Task
A	45	Position rear axle support and hand fasten 4 screws to nuts	-
B	11	Insert rear axle	A
C	9	Tighten rear axle support screws to nuts	B
D	50	Position front axle assembly and hand fasten with 4 screws to nuts	-
E	15	Tighten front axles assembly screws	D
F	12	Position rear wheel screw in #1 and fasten hubcap	C
G	12	Position rear wheel screw in #2 and fasten hubcap	C
H	12	Position front wheel screw in #1 and fasten hubcap	E
I	12	Position front wheel screw in #2 and fasten hubcap	E





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J	8	Position wagon handle shaft on front axle assembly and hand fasten bolt and nut	F,G,H,I
K	9	Tighten bolt and nut	J
	195		

### Question 07

The Operations Manager deals with managing the personnel that create a firm's products and services and the diversity among the workforce has been challenging the task recently.

(a)

- (i) What are the 2 approaches for job design? (02 Marks)
- (ii) Name the key aspects considered job design. (04 Marks)
- (iii) What are the advantages and disadvantages of 'Specialization'? (06 Marks)
- (iv) Why are 'Method Studies' performed? (02 Marks)
- (v) Name 3 benefits of motion study. (03 Marks)
- (vi) What is work measurement? (01 Marks)
- (vii) Define 'Standard Time'. (01 Marks)

(b) In an attempt to increase productivity and reduce costs, Rho Sigma Corporation is planning to install an incentive plan pay in its manufacturing plant. In developing standards for one operation, time study analyst observed a worker for 30 minutes. During the time, the worker completed 42 parts. The analyst rated the worker as producing at 130 percent. The base wage rate is \$5 per hour. The firm has established 15 percent as a fatigue and personal time allowance.

- (i) What is the normal time for the task? (02 Marks)
- (ii) What is the standard time for the task? (02 Marks)
- (iii) If the worker produced 500 units during an eight hour week, what wages would the worker has earned? (02 Marks)

(Total: 25 Marks)

-----END OF THE QUESTION PAPER-----



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*Formula Sheet:*

1. *Exponential Smoothing*

$$F_t = F_{t-1} + a (A_{t-1} - F_{t-1})$$

*F<sub>t</sub> = Forecast of period t*

*A<sub>t-1</sub> = Actual demand of period t-1*

*F<sub>t-1</sub> = Forecast of period t-1*

*a = smoothing (or weighting) constant (0 < a < 1)*

2. *Trend Projections*

$$y = a + bx$$

*y = computed value of the variable to be predicted*

*a = y-axis intercept*

*b = slope of the regression line*

*x = the independent variable*

3. *Exponential Smoothing with Trend Adjustment*

$$TAF_{t+1} = S_t + T_t$$

$$S_t = TAF_t + a (A_t - TAF_t)$$

$$T_t = T_{t-1} + \beta (TAF_t - TAF_{t-1} - T_{t-1})$$

*S<sub>t</sub> = Previous forecast plus smoothed error*

*T<sub>t</sub> = Current trend estimate*

*a = Smoothing constant for average*

*β = Smoothing constant for trend*

4. 
$$MAD = \frac{\sum |Actual_t - Forecast|}{n}$$

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BSc Hons in Logistics and Transportation  
Course CODE: COM551

Year 3 Semester I

SEMESTER END EXAMINATION

Airline Business Management – LTAM3202

- This paper consists of SEVEN questions on FIVE (05) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2020.09.18

Pass mark: 50%

Time: 02 Hours

### Question 01(Compulsory)

- (a) "Customer Service is an essential part of the Airline Business." Provide at least four advantages of fulfilling the Customer needs of an Airline. (04 Marks)
- (b) Briefly explain the "EU Regulation" for Airline Passengers and its' applicability to SriLankan Airline? (Note : Elaborate the compensation guidelines ,validity & Extra ordinary Circumstances) (09 Marks)
- (c) In analyzing a firm's marketing environment, it is usual to use the model known as PESTEL analysis. This model categorizes the factors in the marketing environment under the five headings of Political, Economic, Social, Technological, Environmental and Legal. Discuss the impact of each factor to the Airline Industry. (12 Marks)



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 Course CODE: COM551

## Question 02

- (a) Briefly explain the following concepts in Airline Route Network.
- (i) Hub & spoke system
  - (ii) Point to point flights
- (08 Marks)
- (b) "To sustain the growth of an Airline in contemporary aviation industry, it is important to adopt effective commercial strategies such as **Franchising**." Critically evaluate the above statement by providing advantages & disadvantages of Airline Franchising. (at least two for each)
- (08 Marks)
- (c) "Airline schedule is the most important indicator of airline's business strategy."
- (i) What are the four key steps/stages in "**Schedules Planning Process**", Elaborate two of them? (05 Marks)
  - (ii) Constructing a successful "Flight Schedule" for an Airline is always a challenging task. Briefly describe the restrictions in developing an optimized schedule for an Airline. (04 Marks)

## Question 03

- (a) Briefly explain "Schedule Maintenance" by providing at least **three** examples. (05 Marks)
- (b) What are the four pillars of **Inter Personal Communication**? Explain one of them. (08 Marks)



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- (c) Identification & evaluation of "Error Models" is an essential part of Crew Resource Management (CRM).
- (i) Compare the "Constant Error" with the "Variable Error" and describe what is the most easy to control with examples. (04 Marks)
  - (ii) Explain the "Design versus Operator induced Error" model with Examples. (04 Marks)
  - (iii) Differentiate the meaning of "Slips", "Lapses" & "Mistakes" in aviation context. (04 Marks)

#### Question 04

- (a) Briefly explain the "Airline Operations Control Center" concept and name at least two key positions in the operations control environment. (05 Marks)
- (b) Provide a short description about Flight Operation Department & state core functions of the Department. (06 Marks)
- (c) Define the term "Disruption" and classify disruptions according to Location & Time frame. (06 Marks)
- (d) "Flight Dispatcher plays a significant role in aviation business as a frontline staff of Flight Operation Department." Explain the Flight Dispatchers' Job profile in an Airline by stating four key responsibilities of the Position. (08 Marks)

#### Question 05

The emergence of Low Cost Carriers (LCC) has changed the competitive stance in the airline industry across the world. Comparatively a different business model from the Full Service Carriers (FSC), it has created a different market segment of passengers



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whom are willing to fly with no frills and low price across the world, starting from US to EU to Asia.

- (a) Distinguish the main product fractures of Full Service airlines and Low cost airlines (08 Marks)
- (b) How full service airlines can response to the growth of low carriers in terms of airline business model/Product features? explain your answer with examples and justifications (12 Marks )
- (c) Due to high competition in the airline industry, full services airlines are finding new ways of ancillary revenue opportunities. Exam new ways of ancillary revenue opportunities for a full service airline which operate in the south Asian region. (05 Marks)

### Question 06

- (a) Economists describe the airline industry as closely approximating an oligopolistic market structure. Explain the characteristics of an oligopolistic industry related to airline industry. (08 Marks)
- (b) What is Airline market segmentation? Identify market segmentation variable of Airline passenger market and air freight market? (08 Marks)
- (c) Why revenue management concepts are important for airlines? (04 Marks)
- (d) What is meant by Seat Spoilage in the airline revenue management? How do airlines overcome this problem? (05 Marks)



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### Question 07

- (a) Name 2 direct and 2 in-direct airline destination channels. (04 Marks)
- (b) What type of services travel agents are offers to airline passengers? (06 Marks)
- (c) Why frequent flyer programmes are important for airlines? (05 Marks)
- (d) What are the 3 largest passenger airline alliance in the world? List 3 benefits for the airline passengers from airline alliance. (06 Marks)
- (e) Name 2 examples for Global Distribution Systems (GDS) (04 Marks)

-----END OF THE QUESTION PAPER-----

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Year 3 Semester I

SEMESTER END EXAMINATION

Airline Business Management – LTAM3202

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- Write Legibly.

Date: 2020.09.18

Pass mark: 50%

Time: 02 Hours

### Question 01(Compulsory)

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## Question 02

- (a) Briefly explain the following concepts in Airline Route Network.
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  - (ii) Point to point flights
- (08 Marks)
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- (i) Compare the "Constant Error" with the "Variable Error" and describe what is the most easy to control with examples. (04 Marks)
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### Question 07

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-----END OF THE QUESTION PAPER-----

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Year 3 Semester I

SEMESTER END EXAMINATION

Environmental and Social Impacts of Transport and Logistics – LTEL3205

- This paper consists of SEVEN questions on TWO (02) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2020.09.16

Pass mark: 50%

Time: 02 Hours

### Question 01 (Compulsory)

List down 8 threats to the marine and coastal environment you could anticipate upon a spillage of 50% of crude oil cargo from a fully laden ULCC.

(25 marks)

### Question 02

- (a) Give an elaborated and summarized view the on MERPOL Convention.
- (b) How would you describe Greenhouse gases (GHG) of the atmosphere?

(25 marks)

### Question 03

Give a brief introduction to the "Polar Code" with special emphasis to its purpose and the related key areas.

(25 marks)



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#### Question 04

Along with a brief description to below, list down 6 threats each may contribute to damage the marine environment. (25 Marks)

- a) Dry Cargo Ships
- b) Tankers ships
- c) RoRo ships
- d) Passenger Ships

#### Question 05

How would ballast water be of a harm the seas / maritime waters? (25 marks)

#### Question 06

Discuss how sound triggered by maritime transportation could pollute and effect the marine environment? (25 marks)

#### Question 07

Give brief elaborated introductory explanation on the following:

- a) MARPOL
- b) Ballast water management
- c) Polar code

(25 marks)

-----END OF THE QUESTION PAPER-----



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Year 3 Semester I  
 SEMESTER END EXAMINATION  
 Port Planning – LTPP3203

- This paper consists of SEVEN questions on THREE (03) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2020.09.11

Pass mark: 50%

Time: 02 Hours

**Question 01 (Compulsory)**

- (a) List out different state of the art container terminal handling equipments?  
(10 Marks)
- (b) Why SLPA build Colombo South Harbour and what are the saliant features?  
(10 Marks)
- (c) How may container terminals planned in Colombo South Harbour & name?  
(03 Mark)
- (d) What is the depth of Colombo South Harbour?  
(01 Mark)
- (e) What is the draft of Colombo South Harbour?  
(01 Mark)

**Question 02**

You are now an expert in port management, operation & planning filed. Your expertise is required to finalize a master plan for the Port of Hambantota.

- (a) Draw a master plan & zone out areas for differencnt types of cargo handling termnals and industrial areas?  
(15 Marks)
- (b) What is the rationale behind building a new port in the south of Sri Lanka- Hambantota?  
(05 Marks)
- (c) Hambantota Port has a Tank Farm and describe?  
(03 Marks)



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- (d) What kind of business that can be attracted and develop in the Port of Hambantota? (02 Marks)

### Question 03

- (a) List & describe current port challenges to be addressed by Port Planners in port expansion, new port building and managing ports/terminals? (20 Marks)
- (b) What is the maximum draft of Galle Port? (01 Mark)
- (c) What is the maximum depth of Colombo Old Harbour? (01 Mark)
- (d) What is the maximum draft of Colombo Old Harbour? (01 Mark)
- (e) How many harbours are there in the Port of Colombo? (01 Mark)
- (f) Name the three container terminals in the Colombo old Harbour? (01 Marks)

### Question 04

Commercial ports in Sri Lanka are owned by Sri Lanka Ports Authority (SLPA). New port building & port expansion projects should be aligned with the Government Vision to make Sri Lanka a Maritime & Logistic Hub.

- (a) What is SLPA Vision 2020 & Mission (05 Marks)
- (b) What are the aspirations? (05 Mark)
- (c) Name five Global or International Port/Terminal Operators? (05 Marks)
- (d) What are the port development projects planned in Sri Lanka & describe port projects? (10 Marks)

### Question 05

- (a) Draw and describe facilities for an Automobile Handling Ro-RO Terminal aiming mainly to handle transshipments? (20 Marks)
- (b) Port of Trincomalee is one of the deepest natural harbors with lot of Strengths  
 What are your suggestions to develop the port? (05 Marks)





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### Question 06

- (a) List navigational facilities required when building a new port? (10 Marks)
- (b) Name five cargo handling terminals? (05 Marks)
- (c) Select one of the cargo handling terminals and draw and describe a full terminal layout to handle three ships at any given time & name terminal facilities? (10 Marks)
- 1) Liquid Bulk Handling Terminal
  - 2) Dry Bulk Handling Terminal
  - 3) Cruise Terminal

### Question 07

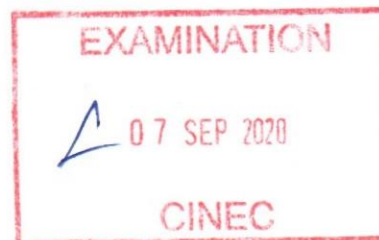
Select two countries and describe the port projects and the impacts to Sri Lankan Ports?

- 1) Indian
  - 2) Singapore
  - 3) Malaysia
  - 4) UAE - United Arab Emirates
  - 5) Oman
- (25 Marks)

-----END OF THE QUESTION PAPER-----



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Year 3 Semester I  
SEMESTER END EXAMINATION  
International Economics – LTIE3201

- This paper consists of SEVEN questions on SIX (06) pages.
- Answer FOUR Questions including Question 01.
- Use MCQ answer sheet provided with the question paper to answer Question 01
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2020.09.07

Pass mark: 50%

Time: 02 Hours

**Question 01: (Compulsory)**

According to the Central Bank Report of Sri Lanka 2019,

- 1) Trade Balance as a % of GDP ,
  - a. -2.2%
  - b. -11.7%
  - c. -9.5 %
  - d. -6.1 %
- 2) Contribution of Industrial exports to total exports
  - a. 78.9%
  - b. 46.9%
  - c. 20.6%
  - d. 5%
- 3) The major export of Sri Lanka under industrial exports is,
  - a. Rubber Products
  - b. Leather, Travel goods and footwear
  - c. Textile and Garments
  - d. Gems Diamonds and jewellery



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- 4) The major imports under the intermediate good of Sri Lanka is,
  - a. Refined Petroleum
  - b. Crude oil
  - c. Textiles and Textile Articles
  - d. Plastic and Articles
  
- 5) The largest Export Destination of Sri Lanka is,
  - a. UK
  - b. EU
  - c. Middle East
  - d. USA
  
- 6) Except China other highest imports by origin Sri Lanka is,
  - a. Singapore
  - b. Middle East
  - c. Singapore
  - d. India
  
- 7) largest market for tourism is,
  - a. UK
  - b. China
  - c. India
  - d. France
  
- 8) Major Lender for establishment of light Rail Transit Project System I Colombo is,
  - a. Government of Japan
  - b. Asian Development Bank
  - c. Export- Import Bank of China
  - d. International Development Association
  
- 9) Number of trading partners consider for calculation of NEER/ REER is,
  - a. 10
  - b. 14
  - c. 24



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d. 30

10) Gross external Debt of Sri Lanka as a percentage of GDP in 2019 is,

- a. 58.7%
- b. 9.0%
- c. 66.6%
- d. 15.3%

(20 Marks)

1) Indo Sri Lanka Free Trade Agreement has largest contribution under the preferential trade agreements of Sri Lanka.

True [ ] False [ ]

2) To measure the export competitiveness of a country REER is better than the NEER.

True [ ] False [ ]

3) Purchasing power of one unit of import in terms of exports is called as terms of trade.

True [ ] False [ ]

4) Income earned from the portfolio investment is recorded in the primary income account of BOP.

True [ ] False [ ]

5) Forward contract for exchange rate is a Hedging activity which is used to manage the risk of foreign exchange risk in the foreign exchange market.

True [ ] False [ ]

(05 Marks)



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### Question 02

Suppose that two countries, the USA and India, can produce two goods: cloth and wheat. Assume that the USA requires 6 workers to produce a one packet of wheat and 3 workers to produce one yard of clothes. India needs 12 workers to produce a one packet of wheat and 4 workers to produce one yard of clothes. Use the Ricardian model of international trade to answer the following questions.

- (a) Draw the Production Possibility Frontiers for both countries. Assume that each country has 120 workers. (05 Marks)
- (b) Under autarky, what are the relative prices of the two goods in the two countries? Explain your answer. (06 Marks)
- (c) How does each country can gain from the trade? (04 Marks)
- (d) What is the way of finding best exchange rate which will be benefited for both countries (04 Marks)
- (e) Illustrate the gain from trade using PPC (hind : exchange rate 1wheat : 2.5 cloth) (06 Marks)

### Question 03

- (a) Explain the term "factor abundance" and "factor intensity" with following Information,

	Japan	China
Capital stock (millions)	40	50
Labour Stock (millions)	10	30



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	Product X	Product Y
No. of Capital hours required	1	10
No. of labour hours required	4	5

(10 Marks)

(b) Illustrate H-O model and H-O-S model with respective to above information.

(15 Marks)

#### Question 04

(a) What do you mean by trade protectionism? (05 Marks)

(b) A small nation has imposed 100% tariff on imported commodity from the rest of the world. explain the economic effects this implication with appropriate diagram.

(15 Marks)

(c) List down five of non-tariff restrictions implemented by a country. (05 Marks)

#### Question 05

(a) Define the term of "Economic Integration" (03 Marks)

(b) Explain the difference between a free-trade area and a customs union.

(06 Marks)

(c) Explain the difference between trade creation and trade diversion. How do they affect welfare? (16 Marks)



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### Question 06

- (a) Explain that ways of the Sri Lankan value of rupee depreciate in foreign exchange market respect to the USD? Use appropriate diagram/s. (15 Marks)
- (b) Explain that,
- Relationship between Inflation and the BOP
  - Relationship between Exchange rate and the BOP (10 Marks)

### Question 07

Write down short note on any five (5) of the following

- Offer Curve
- European Union
- Rate of Protectionism
- Forward Exchange Rate
- Marshall -Lerner condition
- Current account of BOP

(5x5 Marks)

-----END OF THE QUESTION PAPER-----



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 Course CODE: COM551  
 Year 3 Semester I  
**SEMESTER END EXAMINATION**  
**International Economics – LTIE3201**  
**MCQ Answer Sheet**

- Cross (x) the relevant box according to your answer

Date: 2020.09.07

Pass mark: 50%

Time: 02 Hours

**Question 01**

1.  A  B  C  D

11.  T  F

2.  A  B  C  D

12.  T  F

3.  A  B  C  D

13.  T  F

4.  A  B  C  D

14.  T  F

5.  A  B  C  D

15.  T  F

6.  A  B  C  D

7.  A  B  C  D

8.  A  B  C  D

9.  A  B  C  D

10.  A  B  C  D





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## Year 3 Semester I SEMESTER END EXAMINATION International Economics LTIE3201

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- This paper consists of SEVEN questions on Three (03) pages.
- Answer Four Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2016.07.20

Pass mark: 50%

Time: 02 Hours

### Question 01: (Compulsory)

Explain that theory of Absolute Advantage and the Theory of Comparative Advantage in international trade using appropriate diagrams and figures. (25 Marks)

### Question 02

There are two countries namely US and UK and produce two commodities of product X and Y. US can produce product X in lower opportunity cost than country UK while UK can produce product Y in lower opportunity cost than UK. Consider the Ricardian model and derive the Offer curves for the both nations. (25 Marks)

### Question 03

You are given following Information,

	Nation 1	Nation 2
Capital stock (millions)	40	8
Labour Stock (millions)	20	10
Price of Capital (\$)	1	5
Price of Labour (\$)	20	10
	Product X	Product Y
No. of Capital hours required	1	5
No. of labour hours required	5	10



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- (a) Explain the term factor abundance and factor intensity according to above information. (10 Marks)
- (b) Illustrate H-O model and H-O-S model with respect to above information. (15 Marks)

## Question 04

- (a) "There are economic cost and economic benefits of import tariff" explain with appropriate diagrams and figures (15 Marks)
- (b) "Tariff is the only way to restrict international trade by a government, do you agree? explain (10 Marks)

## Question 05

- (a) Different types of economic integration with appropriate examples (10 Marks)
- (b) Discuss the difference between Trade Creating Custom Union and Trade Diverting Custom Union with appropriate examples. (15 Marks)

## Question 06

- (a) Explain the relationship between National Accounting and Balance of payment. (08 Marks)
- (b) Explain the relationship between price of dollar and Balance of payment (06 Marks)
- (c) Explain the term "currency depreciation" and reasons for currency depreciation with appropriate examples (06 Marks)
- (d) Who are the participants in foreign exchange market (05 Marks)



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Question 07

Write down short note on any five (5) of the following

- (a) Factor price equalization theory
- (b) Balance of Payment
- (c) Forward contracts
- (d) Arbitrage opportunity in forex market
- (e) The international product life cycle
- (f) J- curve effect

(25 Marks)

-----END OF THE QUESTION PAPER-----



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Year 3 Semester I

SEMESTER END EXAMINATION

## Transport Planning and Logistics Management LTTM3208

- This paper consists of SEVEN questions on SIX(06) pages.
- Answer Four Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2016.07.18

Pass mark: 50%

Time: 02 Hours

### Question 01: (Compulsory)

- (a) State three factors that could have impact on pricing freight movement services  
(03 Marks)
- (b) The Indian Ocean, the third largest ocean in the world, has now surpassed the Atlantic and Pacific Oceans as the world's busiest and most critical trade corridor. Over 50 percent of the world's container traffic and 70 percent of global energy trade transits the Indian Ocean passing Sri Lanka, relates a paper article. Briefly explain three factors that could affect this freight movement in this ocean.  
(07 Marks)
- (c) Briefly discuss the actors and their roles in the freight movement.  
(05 Marks)
- (d) Identify four difficulties in data collection in planning freight transport systems.  
(03 Marks)
- (e) Assume that the number of truck trips at a given location on an average weekday was 8,000 in 2005 and 10,000 in 2010. Estimate the number of truck trips for the



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year 2020. (Hint - Use simple growth factor method based on historic traffic trends)

(03 Marks)

(f) Identify the weakness in the above mentioned method in modelling freight trip generation.

(02 Marks)

(g) Briefly discuss the term 'generalized cost' in terms of freight transportation that is highly useful for planning trip distribution and mode choice.

(02 Marks)

## Question 02

(a) Fill in the blanks using suitable words related to transportation network.

I. A transport network can be formally represented as a set of ..... and a set of .....

II. A link connects two ..... and a ..... connects two or more links

III. .... is a sequence of distinct nodes connected in one direction by links.

IV. Cycle is a path connected to itself at the .....

V. A ..... is network where every node is visited once and only once.

(07 Marks)

(b) Compare and contrast linear network with grid network in transportation network topologies.

(06 Marks)

(c) Explain three parameters that could be used to measure the efficiency of a transportation network.

(06 Marks)

(d) Compare and contrast point to point network and hub and spoke network with related to economies of scale at hubs.

(02 Marks)

(e) Discuss two advantages of having an efficient freight transport systems.

(04 Marks)

## Question 03

(a) Briefly describe the use of Dijkstra Algorithm commonly used in transportation network.



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(03 Marks)

- (b) Determine the shortest paths between all pairs of nodes on transportation network shown below in Q3-b using Floyd's algorithm.

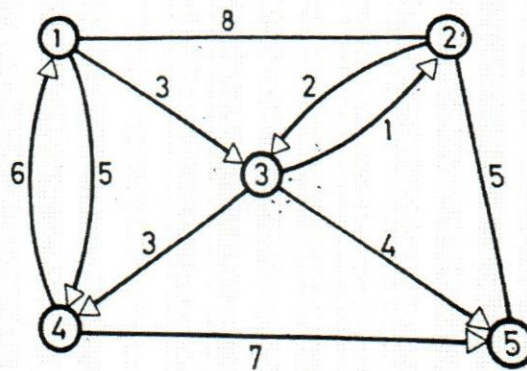


Figure Q3-b: Transportation network to which Floyd's algorithm to be applied.

(08 Marks)

- (c) Briefly explain the conservation law on transportation network taking into consideration the flows of network. (Hint - both centroid and intermediate nodes have to be considered)

(04 Marks)

- (d) Determine the maximum flow between node s and node t of the transportation network shown in Q3-d. The capacity between each branch has been given.

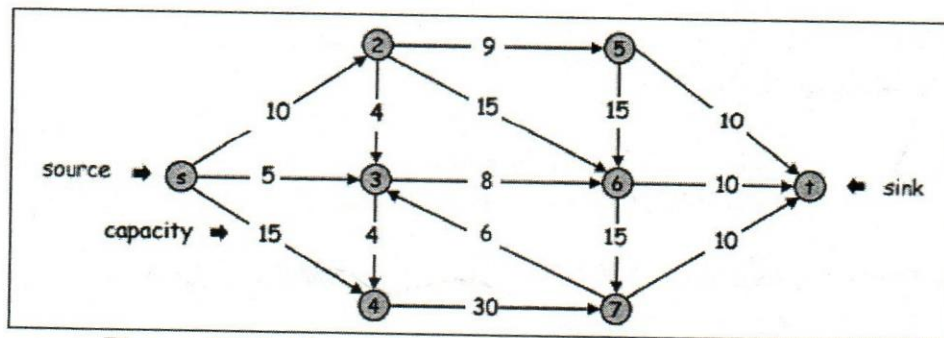


Figure Q3-d: Network for maximum flow to be determined

(10 Marks)



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## Question 04

- (a) State two functionalities of transportation in terms of freight movement. (02 Marks)
- (b) Fill the table Q4-b shown below using the modal characteristics of transportation modes

Table Q4-b: Table to be filled

Mode	Advantage (01)	Disadvantage (01)
Rail		
Highway		
Water		
Pipeline		
Air		

(10 Marks)

- (c) Identify three contributions that containerization has made to the change of era in international trade. (03 Marks)
- (d) Describe briefly three factors that might have contributed to the decline of freight movement by Sri Lanka's Railways during the last three decades. (06 Marks)
- (e) Write a brief report on how existing Sri Lankan modes such as road, rail, waterways and air can be efficiently utilized for the betterment of freight movement in the country stating one real example. (04 Marks)

## Question 05

- (a) Identify two factors that contribute for the economic development of a country. (02 Marks)
- (b) Describe three ways that freight transportation helps for the economic development. (09 Marks)
- (c) Describe three means how freight transportation affect environment. (06 Marks)



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(d) Explain with relevant examples two main aspect of freight transport policy framework.

(04 Marks)

(e) Describe briefly two reasons why government needs to intervene in development of freight transport policy.

(04 Marks)

## Question 06

Write short notes for the following.

- (a) Three costs due to the use of transportation means
- (b) Two implicit freight transportation policies
- (c) Transportation as a means of minimizing temporal, financial and environmental resource cost
- (d) Centripetal networks versus centrifugal networks
- (e) Definition of aggregate freight demand modelling

(05 X 05 =25 Marks)

## Question 07

ABC Company manufactures gloves based in Katunayake and exports their product to solely United Kingdom. The raw materials are imported from China by vessels and brought to Katunayake factory by trailers. The finished products are sent to a container freight station in Wattala using trailers and they are sent to terminal at port of Colombo by trailers. Then they are shipped to the end customer by sea paving the way from Colombo to Dubai and London. The container is then shipped directly to the customer's warehouse through rail from the port and his warehouse is also connected to railways.

- a) Identify the set of nodes, branches, vehicles and the transportation activities involved in this transportation network

(06 Marks)





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b) Briefly describe the possible situation for the application of Dijkstra Algorithm in this transportation network.

(09 Marks)

c) Elaborate four cost factors that can be incurred in this transportation network while maximizing the customer satisfaction at a reduced cost.

(10 Marks)

-----END OF THE QUESTION PAPER-----



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01

## Year 3 Semester I SEMESTER END EXAMINATION Production and Operations Management LTPM3207

- This paper consists of EIGHT questions on Six (06) pages.
- Answer Four (04) Questions including Question No. 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2016.07.14

Pass mark: 50%

Time: 02 Hours

### Question 01: (Compulsory)

- (a) National Scan Inc. sells Radio Frequency Inventory tags. Monthly sales for a seven-month period were as follows:

Month	Sales ('000 units)
February	19
March	18
April	15
May	20
June	18
July	22
August	20

Forecast September sales volume using each of the following

- A linear trend equation (04 Marks)
- A five month moving average (02 Marks)
- The naïve approach (01 Mark)
- A weighted average using 0.60 for August, 0.30 for July and 0.10 for June (04 Marks)

- (b) Company ABC has accumulated the following historical sales data with some missing information, as shown below

Week	1	2	3	4	5	6	7
Actual Sales	220		580			550	
Forecast Sales			600		550	540	



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Use exponential smoothing with  $\alpha = 0.6$  for answering the following questions.

- (i) Find the sales forecasts for Week 4 and Week 7. (04 Marks)
- (ii) Find the actual values for Week 4 and Week 5. (04 Marks)

(c) Estimate quarterly relatives for grain shipments based on the data shown.  
(Quantities are in metric tons)

Year	Quarter			
	1	2	3	4
1	200	250	210	340
2	210	252	212	360
3	215	260	220	358
4	225	272	233	372
5	232	284	240	381

(06 Marks)

## Question 02

- (a) Define the term "Value Added" in operations management. (02 Marks)
- (b) Identify the three major functional areas of business organizations and briefly describe how they interrelate? (06 Marks)
- (b) Contrast applied research and basic research. (07 Marks)
- (c) Identify the three major types of production facilities and describe each of them. (10 Marks)

## Question 03

- (a) Identify the factors that cause organisations to redesign their products or services? (03 Marks)
- (b) Contrast applied research and basic research. (06 Marks)
- (c) Identify the term "Modular Design" and briefly explain the advantages of modular design. (06 Marks)
- (d) Briefly explain the main sources of ideas for product and service design. (10 Marks)



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01

## Question 04

Twelve tasks, with times and precedence requirements as shown in the following table, are to be assigned to workstations using a cycle time of 1.2 minutes. Two heuristic rules will be tried:

1) Greatest positional weight, and 2) greatest number of following tasks.

In each case, the tiebreaker will be shortest task time.

Task	Length (minutes)	Follows Task
a	0.2	–
b	0.5	a
c	1.0	b
d	0.6	c
e	0.2	–
f	0.5	d, e
g	0.4	f
h	0.1	g
i	0.3	h
j	0.1	i
k	0.2	j
l	0.3	k

- (a) Draw the precedence diagram for this line. (03 Marks)
- (b) Assign tasks to stations under each of the two rules. (16 Marks)
- (c) Compute the percentage of idle time for each rule. (06 Marks)

## Question 05

Now juice, Inc., produces bottled pickle juice. A planner has developed an aggregate forecast for demand (in cases) for the next six months.

Month	May	Jun	Jul	Aug	Sep	Oct
Forecast	4000	4800	5600	7200	6400	5000



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Use the following information to develop aggregate plans

Regular Production cost	Rs. 10 per case
Regular Production capacity	5,000 cases
Overtime Production cost	Rs. 16 per case
Subcontracting cost	Rs. 20 per case
Holding cost	Rs. 10 per case per month
Beginning Inventory	0 units

Use a combination of overtime (500 cases per period maximum), inventory, and subcontracting (500 cases per period maximum) to handle variations in demand.

(25 Marks)

## Question 06

- (a) Southern Oklahoma State University's business programme has the facilities and faculty to handle an enrollment of 2,000 students per semester. However in an effort to limit class sizes to a "reasonable" level" (under 200, generally), dean placed a ceiling on enrollment of 1,500 students. Although there was ample demand for business course last semester, conflicting schedules allowed only 1,450 students to take business course. What are the utilization and efficiency of this system? (05 Marks)
- (b) A producer of glass bottles of Mr. Jonathan is considering the addition of a new plant to absorb the backlog of demand that now exists. The primary location being considered will have fixed costs of \$9,200 per month and variable costs of 70 cents per unit produced. Each item is sold to retailers at a price that averages 90 cents.
- (i) What volume per month is requiring in order to break even? (02 Marks)
- (ii) What profit would be realized on a monthly volume of 61,000 units? 87,000 units? (02 Marks)
- (iii) What volume is needed to obtain a profit of \$16,000 per month? (02 Marks)  
What volume is needed to provide revenue of \$23,000 per month? (02 Marks)



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- (c) A product at ABC Company has enjoyed reasonable sales volumes, but its' contribution to profits has been disappointing. Last year, 17,500 units were produced and sold. The selling price is Rs.22.00 per unit. Variable cost and fixed costs are Rs.8.00 and Rs. 80,000 respectively.
- (i) What is the break even quantity? Explain your answer using an appropriate graph. (05 Marks)
- (ii) Management of the "ABC" Company believes that sales can be increased by 30% or that variable cost can be reduced to 85% of its current level. Which alteration will be the best (increasing sales or reducing variable cost) if both alternations are equally cost to implement. (07 Marks)

## Question 07

- (a) Briefly explain the purpose of Methods Analysis in Job Design. (05 Marks)
- (b) Define a "Qualified Worker" and "Standard Performance" according to Work Measurement in Job Design. (06 Marks)
- (c) Time study of a work operation yielded an average observed time of 4.00 minutes. The analyst rated the observed worker at 60%. The firm uses a 8% allowance factor. Compute the standard time. (06 Marks)
- (d) The data in the table below represent time study observations for a woodworking operation. Based on the observations, determine the standard time for the operation, assuming an allowance of 15 percent of job time.

Element	Performance Rating	Observations (Minutes per Cycle)					
		1	2	3	4	5	6
1	110%	1.2	1.17	1.16	1.22	1.24	1.15
2	115%	0.83	0.87	0.78	0.82	0.85	1.32*
3	105%	0.58	0.53	0.52	0.59	0.60	0.54

\*Unusual delay, disregard time.

(08 Marks)

-----END OF THE QUESTION PAPER-----



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## Simple Moving Average

$$F_{t+1} = \frac{D_t + D_{t-1} + \dots + D_{t-n+1}}{n}$$

$D_t$  : actual demand in period  $t$

$n$  : number of periods in the average

### 1. Weighted Moving Average

$$T_{t+1} = W_1 D_1 + W_2 D_{t-1} + \dots + W_n D_{t-n+1}$$

### 2. Exponential Smoothing

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

$F_t$  = new forecast

$F_{t-1}$  = previous forecast

$\alpha$  = smoothing (or weighting) constant ( $0 \leq \alpha \leq 1$ )

### 4. Trend Projections

$$y = a + bx$$

$y$  = computed value of the variable to be predicted

$a$  = y-axis intercept

$b$  = slope of the regression line

$x$  = the independent variable

$$b = \frac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n\bar{x}^2} \quad a = \bar{y} - b\bar{x}$$

### 5. Exponential Smoothing with Trend Adjustment

$$F_t = \alpha (A_{t-1}) + (1-\alpha) (F_{t-1} + T_{t-1})$$

$$T_t = \beta (F_t - F_{t-1}) + (1-\beta) T_{t-1}$$

$$FIT_t = F_t + T_t$$

Library

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Year 3 Semester I

SEMESTER END EXAMINATION

Operational Research LTOR3206

- This paper consists of SEVEN questions on SEVEN (07) pages.
- Answer Four Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2016.07.12

Pass mark: 50%

Time: 02 Hours

## Question 01 (Compulsory)

Logitech has two factories that ship to three regional warehouses. The costs of transportation per unit are as follows.

Table 1.01: Unit transportation cost

Warehouse	Transportation cost (Rs)	
	Factory 01	Factory 02
Warehouse 01	2	4
Warehouse 02	2	2
Warehouse 03	5	3





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Factory 02 is old and has a variable manufacturing cost of Rs. 20/- per unit. Factory 01 is modern and produces for Rs. 10/-. Factory 01 has a monthly capacity of 400 units and Factory 02 has a monthly capacity of 250 units.

The requirement of three warehouses is follows.

Table 2: Demand at three warehouses

Warehouse	Demand (in units)
Warehouse 01	200
Warehouse 02	100
Warehouse 03	250

How should each factory ship to each warehouse in order to minimize the total cost? Formulate this problem as a LP model

(Hint: Total Cost associated in shipping 1 unit from  $i^{\text{th}}$  factory to  $j^{\text{th}}$  warehouse = Unit Variable manufacturing cost of  $i^{\text{th}}$  factory + unit transportation cost from  $i^{\text{th}}$  Factory to  $J^{\text{th}}$  Warehouse)

(25 Marks)

## Question 02

- (a) G-flok is a cloth manufacturer who employs three inputs: man-hours, machine-hours and cloth materials to manufacture two types of dresses. Type A dress makes a profit of Rs. 160/- per dress and type B makes Rs. 180/- per dress. The manufacturer has enough man-hours to manufacture 50 dresses of type A or 20 dresses of type B per day while the machine-hours he possesses suffice only for 36 dresses of type A or for 24 dresses of type B.

Cloth material available per day is limited but sufficient enough for 30 dresses of either type.

- (i). Formulate this a a LP model (05 Marks)  
(ii). Solve the model using graphical method. (15 Marks)



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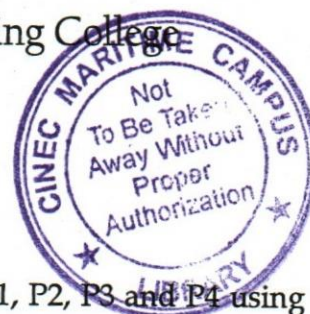
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(b) Roofing Solution Ltd produces four types of roofing sheets P1, P2, P3 and P4 using three kinds of raw materials R1, R2 and R3. The amounts of raw materials used to produce one unit of each type of roofing sheet, availability of raw materials and resulting profits are as follows.

	R1	R2	R3	Profit (USD/unit)
P1	3	1	4	19
P2	2	1	3	13
P3	1	1	3	12
P4	1	1	4	17
Availability	225	117	420	

Consider the final feasible tableau given below.

Basis	Z	X1	X2	X3	X4	X5	X6	X7	Value
Z	1	0	1	0	0	2	1	3	1827
X4	0	0	-1	0	1	-1	-5	2	30
X3	0	0	1	1	0	0	4	-1	48
X1	0	1	1	0	0	1	2	-1	39

(c) Find the optimum solution if the amount of R2 available increases 08 units.

(05 Marks)

### Question 03

A firm produces three products A, B and C each of which passes through three departments: Fabrication, Finishing and packaging. Each unit of product A requires 3, 4, and 2; a unit of product B requires 5, 4 and 4; while each unit of product C requires 2, 4 and 5 hrs respectively in the three departments. Daily capacity of three departments is as follows.



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BSc in Logistics and Transportation

Course CODE: COM551

- Fabrication Department - 60hrs
- Finishing Department - 72hrs
- Packaging Department - 100hrs

The unit contribution of product A, B and C are Rs.5/=, Rs. 10/= and Rs. 8/=.

- (a) Formulate this as an LP model (05 Marks)
- (b) Find the optimum solution using Simplex method. (20 Marks)

## Question 04

- (a) State objectives of Phase I and Phase II, in two phase method. (04 Marks)
- (b) Consider the LP model given below.

$$\text{Min } Z = 40 X_1 + 24 X_2$$

$$20 X_1 + 50 X_2 \geq 4800$$

$$80 X_1 + 50 X_2 \geq 7200$$

$$X_1, X_2 \geq 0$$

- (i) Convert inequalities into equations by introducing slack and artificial variables. (04 Marks)
- (ii) Find the artificial function. (02 Marks)
- (iii) Find the optimal solution for phase I. (08 Marks)
- (iv) Using the above answer find the optimal solution for the given LP model (07 Marks)



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## Question 05

$$\text{MAX } z = 3X_1 + 6X_2 + 4X_3$$

Subject to

$$X_1 + 2X_2 + X_3 \leq 10$$

$$3X_1 + 3X_2 + 2X_3 \leq 10$$

$$X_1, X_2, X_3 \geq 0$$

- (a) Construct the dual problem, for this primal problem. (05 Marks)
- (b) Solve the primal problem using any appropriate method. (10Marks)
- (c) Solve the dual problem using any appropriate method. (10Marks)

## Question 06

A manufacturing firm has three plants A, B and C with daily output of 500, 300, and 200 units respectively. It also has FOUR warehouses P, Q, R and S with daily requirements of 180, 150, 350 and 320 units respectively. Shipping charges on different routes per unit is as given below.

To	P	Q	R	S
From A	12	10	12	13
From B	7	11	8	14
From C	6	16	11	7

- (a) Formulate an LP model for the above transportation model. (05 Marks)
- (b) Construct the transportation tableau. (02 Marks)
- (c) Find the initial solution using North West Corner method. (03 Marks)



Doc 030618 - Toshiba  
Doc 230519 - NEW first process 10  
A3 - A4  
245/

Colombo International Nautical and Engineering College

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- (d) Find the optimal solution using any appropriate method. (12 Marks)
- (e) Depict optimal solution in pictorial form. (03 Marks)

### Question 07

A manufacturing firm manufactures 30 units per day. The distribution of the demand is given in the table below.

Table 7.01: Distribution of sales

Sales (in units)	Probability
27	0.10
28	0.15
29	0.20
30	0.35
31	0.15
32	0.05

Each item has USD 10 profit. Any unsold product is to be disposed off at a loss USD 15 per unit. There is a penalty of USD 5 per unit if the demand is not met. Using the following random numbers, estimate the total profit/loss for the firm for next ten days. (12 Marks)

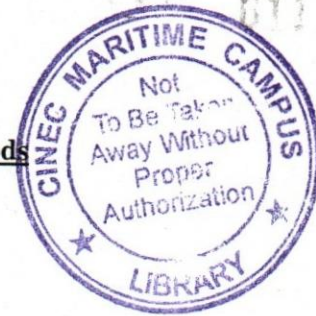
10 99 65 99 95 01 79 11 16 20

If the company decides to produce 25 units per day, estimate the total profit/ loss for the firm. (Run simulation for 10 days using above random numbers.) (12 Marks)

Based on the values calculated above decide the most suitable production plan for the firm. (01 Marks)

-----END OF THE QUESTION PAPER-----

Computation formulae for imported goods



Where

v	=	CIF value in Rupee
c	=	Cess levy under Sri Lanka Export Development Act
d	=	Customs Duty
e	=	Excise (Special Provisions) Duty (ED)
t	=	Value Added Tax (VAT)
n	=	Nation Building Tax
p	=	Port and Airport Development Levy (PAL)
r <sub>e</sub>	=	Rate of Excise (Special Provisions) Duty (ED)
r <sub>t</sub>	=	Rate of Value Added Tax (VAT)
r <sub>n</sub>	=	Rate of Nation Building Tax

- Customs Duty (d) = (CIF value) × (Customs duty rate)  
or  
= (quantity) × (unit rate of customs duty)
- Value Added Tax (t) = (v + 10% of v + d + c + p + e) × r<sub>t</sub>
- Cess Levy (c) = (v + 10% of v) × (Cess levy rate)  
or  
= (quantity) × (unit rate of Cess levy)
- Port and Airport Development Levy (p) = (CIF value) × (PAL rate)
- Excise (Special Provisions) Duty (e) = (v + 15% of v + d + c + p) × r<sub>e</sub>  
or  
= (quantity) × (unit rate of Excise Duty)
- Special Commodity Levy = (Quantity) × (unit rate of Special Commodity Levy)
- Nation Building Tax (n) = (v + 10%v + d + c + p + e) r<sub>n</sub>

Schedule  
Rates of Exchange Effective From 12.12.2016 to 18.12.2016

	Country	Country Code	Currency	Currency Code	Rate of Exchange (Rs.)
1	Australia	AU	Dollar	AUD	112.2677
2	Bahrain	BH	Dinar	BHD	399.4586
3	Bangladesh	BD	Taka	BDT	1.8885
4	Brazil	BRL	Brazil Real	BRL	44.6168
5	Brunei	BN	Brunei Dollar	BND	105.7686
6	Canada	CA	Canadian Dollar	CAD	114.0161
7	China	CN	Renminbi	CNY	21.8279
8	China	CN	Offshore		21.7766
9	Czecholovakia	CS	Koruna	CSK	5.8997
10	Denmark	DK	Kroner	DKK	21.4535
11	Egypt	EG	Pound	EGP	8.3092
12	Euro Zone		Euro	XEU	159.5950
13	Ghana	GH	Cedi	GHC	34.2282
14	Hongkong	HK	Dollar	HKD	19.4159
15	Hungary	HU	Forint	HUF	0.5077
16	India	IN	Rupee	INR	2.2307
17	Indonesia	ID	Rupiah	IDR	0.0113
18	Iran	IR	Riyal	IRR	0.0047
19	Japan	JP	Yen	JPY	1.3159
20	Jordan	JOR	Dinar	JOD	212.6723
21	Korea	KR	Won	KRW	0.1290
22	Kuwait	KW	Dinar	KWD	493.9128
23	Macau	MO	Pataca	MOP	18.8467
24	Malaysia	MY	Ringgit	MYR	34.0425
25	Maldive Island	MI	Rufiya	MVR	9.7668
26	Marutius	MU	Rupee	MUR	4.1951
27	Myanmar	BU	Kyat	BUK	0.1132
28	Nepal	NP	Rupee	NPR	1.3838
29	New Zealand	NZ	Dollar	NZD	107.9981
30	Nigeria	NG	Naira	NGN	0.4938
31	Norway	NO	Kroner	NOK	17.8348
32	Oman	OM	Riyal	OMR	391.1790
33	Pakistan	PK	Rupee	PKR	1.4364
34	Papua New Guinea	PG	Kina	PGK	47.4402
35	Philippines	PH	Peso	PHP	3.0248
36	Poland	PL	Zloty	PLZ	35.9475
37	Qatar	QA	Riyal	QAR	41.3588
38	Russia	SU	Rouble	SUR	2.3800
39	Saudi Arabia	SA	Riyal	SAR	40.1541
40	Seychelles	SC	Rupee	SCR	11.2140
41	Singapore	SG	Dollar	SGD	105.7612
42	South Africa	ZA	Rand	ZAR	10.9898
43	Sweden	SE	Kroner	SEK	16.4733
44	Switzerland	CH	Francs	CHF	148.0792
45	Taiwan	TW	Dollar	TWD	4.7294
46	Thailand	TH	Baht	THB	4.2245
47	U.A.E.	AE	Dirham	AED	41.0019
48	United Kingdom	GB	Sterling Pound	GBP	189.4974
49	United States of America	US	Dollar	USD	150.6039
50	Zambia (Old)	ZM	Kwacha	ZMK	0.0290
51	Zambia (New)	ZM	Kwacha		15.2897
52	Zimbabwe	ZW	Dollar	ZWD	0.3968



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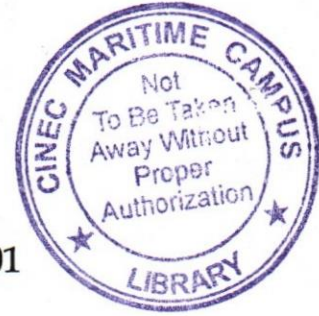
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Faculty of Management and Social Sciences

Department of Logistics & Transport

BSc in Logistics and Transportation

Course CODE: COM551



015

Year 3 Semester I

REPEAT EXAMINATION

**International Economics LTIE3201**

- This paper consists of SEVEN questions on Three (03) pages.
- Answer Four Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2016.12.17

Pass mark: 50%

Time: 02 Hours

### Question 01: (Compulsory)

Explain that theory of Absolute Advantage and the Theory of Comparative Advantage using bellow information.

	output a worker per hour	
country	pens	Pencils
Sri Lanka	8	4
India	7	2

(25 Marks)

### Question 02

1. What are the main assumptions of the H-O theory? Explain (10 Marks)
2. Consider the Heckcher-Ohline model. Suppose County A is capital abundant with respect to County B and both nations produce two products namely X and Y while product X is a capital intensive. illustrate the gain for trade (15 Marks)





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## Question 03

You are given following Information,

	Nation 1	Nation 2
Capital stock (millions)	40	8
Labour Stock (millions)	20	10
Price of Capital (\$)	1	5
Price of Labour (\$)	20	10

	Product X	Product Y
No. of Capital hours required	1	5
No. of labour hours required	5	10

- (a) Explain the term factor abundance and factor intensity according to above information. (10 Marks)
- (b) Illustrate H-O model with respect to above information. (15 Marks)

## Question 04

“There are economic cost and economic benefits of import tariff” explain with appropriate diagrams and figures (25 Marks)

## Question 05

Discuss the difference between Trade Creating Custom Union and Trade Diverting Custom Union with appropriate examples. (25 Marks)



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015

## Question 06

(a) distinguish between currency depreciation & appreciation with diagram  
(10 Marks)

(b) "under the floating exchange rate system, the price for rupee in term of the foreign currency determine according to the supply of rupee & demand of rupee" explain situation where the demand for rupee increases & situation where supply rupee increases  
(15 Marks)

## Question 07

Write down short note on any five (5) of the following (25 Marks)

- (a) H-O-S theory
- (b) Balance of Payment
- (c) Absolute advantage
- (d) The international product life cycle
- (e) J- curve effect
- (f) Term of trade equilibrium

-----END OF THE QUESTION PAPER-----



Library

## Colombo International Nautical and Engineering College

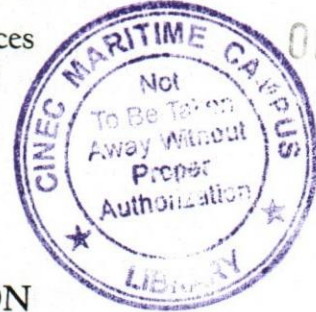
CINEC Campus

Faculty of Management and Social Sciences

Department of Logistics & Transport

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Year 3 Semester I

### SEMESTER END EXAMINATION

#### Environment and Social Impact of Transport and Logistics LTEL3205

- This paper consists of SEVEN questions on FOUR (04) pages.
- Answer Four Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2016.07.28

Pass mark: 50%

Time: 02 Hours

#### Question 01: (Compulsory)

The urban sprawl is advancing at an accelerated speed through the global motorization and the development of motorization brings about many problems which involve the ecological and social aspects.

- Briefly Explain Urban Sprawl with examples (10 Marks)
- Urban Sprawl is associated with many externalities identify these and explain four of these fields citing measurement criteria (15 Marks)

#### Question 02

Climate change is typically associated with carbon emissions and transportation is a major contributor to this impact. Identify two types of climate changes and two each of associated impact on transport operations and infrastructure

- Identify three types of Climate Change (09 Marks)
- Identify two associated impact to the types of climate change identified in 2(a) above with examples (16 Marks)



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## Question 03

Land take is an environmental issue that arises when you build transport infrastructure. Some of Sri Lanka's recent transport infrastructure projects are associated with varying issues such as:

- Conflicts with wild animals
  - Social impacts with community separation
  - Soil erosion etc,
- (a) Explain as to the steps in the Environmental Impact Assessment that has failed in these instances and explain why. (10 Marks)
- (b) What is the possible outcome in the screening step that would have prevented the above issues getting highlighted in the subsequent steps?. (05 Marks)
- (b) Scoping is the key step in EIA process, outline the scoping Process, and identify in your opinion which stake holders would have provided feedback on the above issues as concerns. (10 Marks)

## Question 04

'Peak Oil' is a scenario that is dreaded by almost all, and is expected to create chaos to the very existence of humanity.

- (a) What is Peak Oil? (05 Marks)
- (b) Explain four reasons for the inevitable scenario of Peak Oil (20 Marks)



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### Question 05

During an EIA Process identification of the typology of environmental impacts are vital to determining the impact significance.

- (a) Identify three categories of impacts and associated types of impact for each of these. (20 Marks)
- (b) Explain with examples one of the types of impacts identified above (05 Marks)

### Question 06

Conceptual changes are one way of reducing CO<sub>2</sub> emissions from transport, though operation measures are also required to achieve the same.

- (a) What are the focal points for CO<sub>2</sub> reductions in operational solutions for CO<sub>2</sub> reductions. (06 Marks)
- (b) Road Transportation is one of the highest contributors to CO<sub>2</sub> emissions. Identify five technologies that would help reduce emissions (10 Marks)
- (c) Identify three alternative fuels that are in use today and their sources (09 Marks)



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## Question 07

In today's complex societies, sustainability relates to the actions of individuals or stakeholder groups in dynamic political, social or ecological systems. Such systems are characterized by a large number of influencing factors, which often do not show linear behavior.

- (a) Briefly Explain Sustainability (05 Marks)
- (b) To achieve sustainability if its factors or dimensions should not show linear behavior then what would be the expected behavior to achieve sustainability, and what are those dimensions. (10 Marks)
- (c) For a developing nation such as Sri Lanka what is the impact of this non-linear behavioral requirement. (05 Marks)
- (d) How does the sustainability challenge 'measurability' relate to these three dimensions of sustainability? (05 Marks)

-----END OF THE QUESTION PAPER-----



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000031

Year 3 Semester I

SEMESTER END EXAMINATION

**Customs and Commodity Inspections Operations LTCO3204**

- This paper consists of SEVEN questions on FOUR (04) pages.
- Answer Four Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2016.07.26

Pass mark: 50%

Time: 02 Hours

**Question 01 (Compulsory)**

Bell Lanka is a Sri Lankan trading company registered with Registrar of Companies under the Companies Act of Sri Lanka. However, 98% of shares of Bell Lanka are held by the Bell Group which is a USA based multinational company and the rights holder of several world famous brands of whiskies. Several Directors including the Managing Director of Bell Lanka are also Directors of the Bell Group.

The Bell Group has appointed Bell Lanka as their Sole-Agent in Sri Lanka for the sale of "Bell" brand wine. According to the Sole-Agency Agreement Bell Lanka has to pay Bell Group 3% of retail price from the local sales of the "Bell" brand wine as Royalty.

Bell France is a high quality wine manufacturer based in France. They also manufacture "Bell" brand wine according to the specifications and quality standards of the Bell Group and sell the same only to the buyers nominated by the Bell Group. A 63% of shares of Bell France are held by the Bell Group and several Directors of Bell France are also Directors of the Bell Group.

Bell Lanka has imported a shipment of 01x20' container said to contain 20,000 units of "Bell" brand wine from Bell France. The Ex-Work price agreed is Euro 3.75 per bottle. Bell Lanka has entrusted the transportation of the said container from the warehouse of Bell France to the Port of Paris in France to a Freight Forwarding company namely Sea-Sky Ltd. They have issued an Invoice with the following charges.



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1. Packing Material Cost - Euro 150
2. Inland Transport - Euro 925
3. Inland Handling Charges - Euro 125
4. Terminal Handling Charges (THC) at the Port of Paris - Euro 300

Sea-Sky Ltd has loaded the subject container to a vessel operated by Queen's Line on "Freight Collect" basis. On arrival of the container in Colombo the shipping agent of Queen's Line in Colombo has issued the Delivery Order on recovery of following charges.

1. Sea Freight - USD 1500
2. Bunker Adjustment Fee (BAF) - USD 150
3. Currency Adjustment Fee (CAF) - USD 100
4. Terminal Handling Charges at the Port of Colombo (THC) - USD 250
5. Container Deposit - Rs. 5750
6. Container Washing - Rs. 1150

The marine insurance has been obtained locally from Sri Lanka Insurance Company on payment of Rs. 17,250/= for the whole shipment.

After a careful cost calculation Bell Lanka has fixed the local retail price of a Bell brand wine bottle as Rs. 1,500/=.

The Exchange Rates valid for the period from 25.07.2016 to 31.07.2016 published by the Sri Lanka Customs are provided attached to this question paper.

- (a) Calculate the amount payable as Royalty from the local sales proceeds for the subject shipment in Euro. (05 Marks)
- (b) Calculate the Cost of Transport of the subject shipment from the warehouse of Bell France to the Port of Colombo in Euro. (10 Marks)
- (c) Calculate the Customs Value of the subject shipment in Sri Lankan Rupees. (10 Marks)





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**Question 02**

Tea Beverage (Pvt) Ltd has imported a consignment of 10,000 litres "Tea in Beverage Form" from Kenya. The price paid is CIF Colombo USD 1.4 per litre. According to the Sri Lanka Tariff Guide the Tea in Beverage Form is classified within HS Code 2202.90.10 and the following taxes are payable for the importation.

- |                                    |                              |
|------------------------------------|------------------------------|
| 1. Customs Duty                    | - 30% or Rs. 25/= per litre  |
| 2. VAT                             | - 11%                        |
| 3. PAL                             | - 5%                         |
| 4. NBT                             | - 2%                         |
| 5. Excise (Special Provision) Duty | - 18% or Rs. 8/= per litre   |
| 6. Cess                            | - 35% or Rs. 60/= per litre. |

Calculate all six taxes payable for the above shipment. Formulas are provided in the attached document to this question paper. (25 Marks)

**Question 03**

- (a) Name the six methods given in the WTO Valuation Agreement to determine the Customs Value. (10 Marks)
- (b) Explain in detail the Article 1 and the Article 8 of the Schedule E of the Customs Ordinance of Sri Lanka. (15 Marks)

**Question 04**

Explain in detail the 6 General Interpretative Rules (GIR) for the interpretation of Harmonized System with suitable examples. (25 Marks)



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## Question 05

- (a) Explain the scope of the Convention on Harmonized Commodity Description and Coding System. (10 Marks)
- (b) Explain in the structure of a HS Code upto 6 digits and the procedure one should follow to determine the HS Code of any given commodity. (15 Marks)

## Question 06

- (a) Describe the functions of the Sri Lanka Customs and legislative framework related to such functions. (10 Marks)
- (b) Explain Section 10 and Section 12 of the Customs Ordinance including a detail explanation of the Schedule A and Schedule B. (15 Marks)

## Question 07

Select **Five (05)** from the following topics and write short essays (25 Marks)

1. Special Import Licence and Payment Regulations
2. General Agreement on Tariff and Trade (GATT)
3. World Customs Organisation (WCO)
4. World Trade Organization (WTO)
5. India Sri Lanka Free Trade Agreement
6. Imports and Exports (Control) Act
7. Exchange Control Act
8. Protection of Government Revenue Act
9. Intellectual Property Right Act

-----END OF THE QUESTION PAPER-----

## Supporting documents

1. Exchange rates valid for the period from 25.07.2016 to 31.07.2016
2. Formulas for the calculation of taxes and other levies

Computation formulae for imported goods

Where

v	=	CIF value in Rupee
c	=	Cess levy under Sri Lanka Export Development Act
d	=	Customs Duty
e	=	Excise (Special Provisions) Duty (ED)
t	=	Value Added Tax (VAT)
n	=	Nation Building Tax
p	=	Port and Airport Development Levy (PAL)
r <sub>e</sub>	=	Rate of Excise (Special Provisions) Duty (ED)
r <sub>t</sub>	=	Rate of Value Added Tax (VAT)
r <sub>n</sub>	=	Rate of Nation Building Tax

- Customs Duty (d) = (CIF value) × (Customs duty rate)  
or  
= (quantity) × (unit rate of customs duty)
- Value Added Tax (t) = (v + 10% of v + d + c + p + e) × r<sub>t</sub>
- Cess Levy (c) = (v + 10% of v) × (Cess levy rate)  
or  
= (quantity) × (unit rate of Cess levy)
- Port and Airport Development Levy (p) = (CIF value) × (PAL rate)
- Excise (Special Provisions) Duty (e) = (v + 15% of v + d + c + p) × r<sub>e</sub>  
or  
= (quantity) × (unit rate of Excise Duty)
- Special Commodity Levy = (Quantity) × (unit rate of Special Commodity Levy)
- Nation Building Tax (n) = (v + 10%v + d + c + p + e) r<sub>n</sub>

Schedule  
Rates of Exchange Effective From 25.07.2016 to 31.07.2016

	Country	Country Code	Currency	Currency Code	Rate of Exchange (Rs.)
1	Australia	AU	Dollar	AUD	110.5655
2	Bahrain	BH	Dinar	BHD	391.8235
3	Bangladesh	BD	Taka	BDT	1.8845
4	Brazil	BRL	Brazil Real	BRL	45.1855
5	Brunei	BN	Brunei Dollar	BND	109.0839
6	Canada	CA	Canadian Dollar	CAD	112.8768
7	China	CN	Renminbi	CNY	22.1715
8	China	CN	Offshore		22.1541
9	Czecholovakia	CS	Koruna	CSK	6.0335
10	Denmark	DK	Kroner	DKK	21.9154
11	Egypt	EG	Pound	EGP	16.6526
12	Euro Zone		Euro	XEU	163.0387
13	Ghana	GH	Cedi	GHC	37.4840
14	Hongkong	HK	Dollar	HKD	19.0673
15	Hungary	HU	Forint	HUF	0.5192
16	India	IN	Rupee	INR	2.2016
17	Indonesia	ID	Rupiah	IDR	0.0113
18	Iran	IR	Riyal	IRR	0.0049
19	Japan	JP	Yen	JPY	1.3964
20	Jordan	JOR	Dinar	JOD	208.8176
21	Korea	KR	Won	KRW	0.1302
22	Kuwait	KW	Dinar	KWD	489.0829
23	Macau	MO	Pataca	MOP	18.5225
24	Malaysia	MY	Ringgit	MYR	36.4132
25	Maldiv Island	MI	Rufiya	MVR	9.6776
26	Marutius	MU	Rupee	MUR	4.1649
27	Myanmar	BU	Kyat	BUK	0.1252
28	Nepal	NP	Rupee	NPR	1.3737
29	New Zealand	NZ	Dollar	NZD	103.2901
30	Nigeria	NG	Naira	NGN	0.5060
31	Norway	NO	Kroner	NOK	17.4036
32	Oman	OM	Riyal	OMR	384.0838
33	Pakistan	PK	Rupee	PKR	1.4103
34	Papua New Guinea	PG	Kina	PGK	46.7282
35	Philippines	PH	Peso	PHP	3.1409
36	Poland	PL	Zloty	PLZ	37.3892
37	Qatar	QA	Riyal	QAR	40.6080
38	Russia	SU	Rouble	SUR	2.3033
39	Saudi Arabia	SA	Riyal	SAR	39.4305
40	Seychelles	SC	Rupee	SCR	11.2537
41	Singapore	SG	Dollar	SGD	109.0920
42	South Africa	ZA	Rand	ZAR	10.3771
43	Sweden	SE	Kroner	SEK	17.2039
44	Switzerland	CH	Franco	CHF	150.0728
45	Taiwan	TW	Dollar	TWD	4.6124
46	Thailand	TH	Baht	THB	4.2334
47	U.A.E.	AE	Dirham	AED	40.2603
48	United Kingdom	GB	Sterling Pound	GBP	195.6893
49	United States of America	US	Dollar	USD	147.8742
50	Zambia (Old)	ZM	Kwacha	ZMK	0.0285
51	Zambia (New)	ZM	Kwacha		15.8834
52	Zimbabwe	ZW	Dollar	ZWD	0.3897

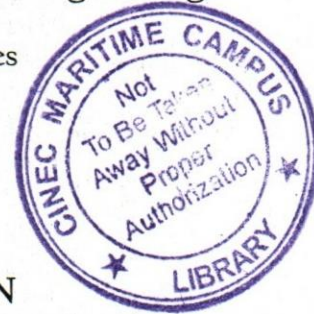


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# Colombo International Nautical and Engineering College

CINEC Campus  
Faculty of Management and Social Sciences  
Department of Logistics & Transport  
BSc in Logistics and Transportation  
Course CODE: COM551



## Year 3 Semester I SEMESTER END EXAMINATION Airline Business Management LTAM3202

- This paper consists of SEVEN questions on TWO (02) pages.
- Answer Four Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2016.07.22

Pass mark: 50%

Time: 02 Hours

### Question 01: (Compulsory)

- Explain the difference between corrective maintenance and preventive maintenance (07 marks)
- Identify two topics that the modern day human factors focus on (05 marks)
- List down two pricing tactics coming under fare actions and adjustments to fare rules and restrictions (08 marks)
- Identify five factors to be considered in fleet planning decision (05 marks)

### Question 02

- Explain what is meant by liberalization in the airline industry. Provide a comparative analysis on level of liberalization in EU, Asia and in Sri Lanka (15 marks)
- Explain the difference between crew pairing and crew rostering (10 marks)

### Question 03

- Explain each element of the route development and flight scheduling process including the timelines. You may use diagrams where necessary. (15 marks)
- Define what is scheduling in air transport industry (10 marks)



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## Question 04

- What are the factors that affect airline's choice on aircraft? Explain these factors in detail (15 marks)
- Explain the two fold responsibility of a pricing analyst in an airline (10 marks)

## Question 05

- What are the two broad distribution channels used in the airline industry. Explain them in brief. (05 marks)
- How many types of checks are there in aircraft maintenance? Explain in detail. (10 marks)
- How many types of fares are there an airline? What are these fare types, explain them in brief? (10 marks)

## Question 06

There are many factors that affect human performance. These factors can be grouped into three main broad areas. Explain two factors from each category in detail with reference to real life or hypothetical examples. (25 marks)

## Question 07

- What are the elements of developing a marketing concept? (05 marks)
- Explain two variables that affect the marketing strategy in relation to airline industry (10 marks)
- Use an example of an airline entering starting a new route and explain the market segmentation process (10 marks)

-----END OF THE QUESTION PAPER-----



# Colombo International Nautical and Engineering College

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Department of Logistics and Transport

BSc (Hons.) in Logistics and Transportation

Course CODE: COM551



## Year 3 Semester I SEMESTER END EXAMINATION Operational Research – LTOR3206

- This paper consists of SEVEN questions on FOUR (04) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2017.07.22

Pass mark: 50%

Time: 02 Hours

### Question 01 - Compulsory

The Agro promotion bank is trying to select an investment portfolio for a cotton farmer. The bank has chosen a set of five investment alternatives, with subjective estimates of rates of return and risk as follows.

Table 1.01

Investment	Annual rate of return	Risk
Tax-free municipal bonds	6.0	1.3
Corporate bonds	8.0	1.5
High grade common stock	5.0	1.9
Mutual fund	7.0	1.7
Real estate	15.0	2.7

The bank officer incharge of the portfolio would like to maximize the annual rate return on the portfolio. However, the wealthy investor has specified that the average risk of the portfolio should not exceed 2.0. The investor does not want more than 20% of the investment to be put into real estate.

Formulate this as an LP model.

(25 Marks)



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## Question 02

A diet for sick person must contain at least 4000 units of vitamins, 50 units of minerals and 1400 units of calories. Two foods A and B are available at a unit cost of USD 4 and USD 3 respectively. If one unit of A contains 200 units of vitamins, 1 unit of mineral and 40 units of calories and one unit of B contains 100 units of vitamins, 2 units of minerals and 40 units of calories.

Formulate this problem as an LP model and solve it by graphical method to find combination of foods to be used to have least cost?

(25 Marks)

## Question 03

Solve the below LP model using *Simplex Method*.

$$\text{Maximize } Z = 6X_1 + 4X_2$$

Subject to the constraints

$$2X_1 + 3X_2 \leq 30$$

$$3X_1 + 2X_2 \leq 24$$

$$X_1 + X_2 \leq 10$$

$$X_1, X_2 \geq 0$$

Check the existence of alternative optima. If an alternative optimum exists, find the alternative solution.

(25 Marks)

## Question 04

Solve the below LP model using *Two Phase Method*

$$\text{Minimize } Z = 4X_1 + X_2$$

Subject to the constraints

$$3X_1 + 4X_2 \geq 12$$

$$X_1 + 5X_2 \geq 15$$

$$X_1, X_2 \geq 0$$

(25 Marks)





## Colombo International Nautical and Engineering College

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### Question 05

Find the dual of the LP model (primal problem) given below.

$$\text{Minimize } Z = 6X_1 + 4X_2$$

Subject to the constraints

$$4X_1 + X_2 \geq 2$$

$$3X_1 + 2X_2 \geq 3$$

$$X_1 + 5X_2 \geq 1$$

$$X_1, X_2 \geq 0$$

Solve the primal problem using Dual Simplex criteria and hence obtain the solution of the dual problem.

(25 Marks)

### Question 06

Ace Limited has 03 factories that supply its production to five warehouses. The unit transportation cost from  $i^{\text{th}}$  factory to  $j^{\text{th}}$  warehouse is as given below.

Table 6.01

	Warehouse 1	Warehouse 2	Warehouse 3	Warehouse 4	Warehouse 5	Supply
Factory 1	6	4	4	7	5	100
Factory 2	5	6	7	4	8	125
Factory 3	3	4	6	3	4	175
Demand	60	80	85	105	70	400

(a) Find the initial transportation schedule using *North West Corner Method*.

(05 Marks)

(b) Find the optimum transportation schedule using *Method of Multipliers (U-V Method)*.

(20 Marks)



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## Question 07

A company trading in motor vehicle spare parts wishes to determine the level of stock it should carry for the items in its range. Demand is not certain and there is a lead time for stock replenishment. Following information is obtained.

Carrying cost per unit per day - USD 2

Ordering cost per order - USD 10

Lead time - 3 days

Current inventory level - 20 units

Ordering policy - Order 15 units when present inventory level plus any outstanding orders falls below 15 units

Carryout a simulation run for 10 days using below random numbers

0 9 1 1 5 1 8 6 3 5

Calculate the total operational cost of the warehouse.

(25 Marks)

-----END OF THE QUESTION PAPER-----



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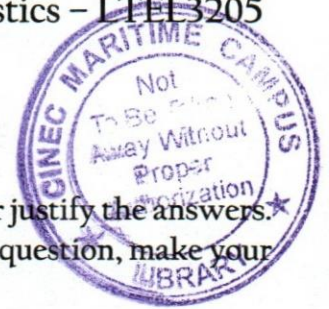
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Year 3 Semester I

SEMESTER END EXAMINATION

Environmental and Social Impacts on Transport and Logistics - LTEL3205

- This paper consists of SEVEN questions on THREE (03) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.



Date: 2017.07.20

Pass mark: 50%

Time: 02 Hours

**Question 01: (Compulsory)**

Mobility is a basic human need which is satisfied through transportation and the issue of transportation and the environment is paradoxical in nature.

- (a) What is paradoxical between transportation and the environment define and explain (10 Marks)
- (b) Environmental impacts arising out of transportation can be categorized. Cite these categories and explain with examples (15 Marks)

**Question 02**

Sri Lanka has undertaken many a transportation infrastructure project during the last decade. Some of these projects are associated with varying issues such as:

- Conflicts with wild animals
  - Social impacts with community separation
  - Soil erosion etc,
- (a) Which steps in the Environmental Impact Assessment may not have been executed correctly in these instances and explain why. (10 Marks)
  - (b) What is the possible outcome in the screening step that would have prevented the above issues getting highlighted in the subsequent steps? (05 Marks)



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- (b) Outline the scoping Process, and identify in your opinion which stake holders would have provided feedback on the above issues as concerns during the scoping process (10 Marks)

## Question 03

Governments that are committed to actively address climate change use various policy tools to achieve their emissions reduction targets.

- (a) Identify the three, policy options open to governments to achieve their emission reduction targets. (09 Marks)
- (b) Elaborate in detail one of the options citing examples (16 Marks)

## Question 04

The Kyoto Protocol was adopted at the third Conference of the Parties to the UNFCCC (COP 3) in Kyoto, Japan, on 11 December 1997. The Protocol shares the objective and institutions of the Convention. The major distinction between the two, however, is that while the Convention encouraged industrialized countries to stabilize GHG emissions, the Protocol commits them to do so. The detailed rules for its implementation were adopted at COP 7 in Marrakesh in 2001, and are called the Marrakesh Accords.

- (a) The Kyoto Protocol identified three mechanisms to reduce Carbon Emissions. Identify the three mechanisms. (09 Marks)
- (b) Explain in detail citing hypothetical examples one of the Mechanisms (16 Marks)



### Question 05

The existence of humanity maybe threatened with 'Peak Oil' a scenario that is dreaded by almost all, and is expected to create chaos.

- (a) What is Peak Oil? (05 Marks)
- (b) Explain four reasons for the inevitable scenario of Peak Oil (20 Marks)

### Question 06

A, phenomena arising with economic prosperity of nations is the Urban Sprawl. This is advancing at an accelerated speed through the global motorization.

- (a) What is Urban Sprawl? Briefly Explain with examples. (10 Marks)
- (b) Many an externality is a result of Urban Sprawl. Identify these and explain four of these fields citing measurement criteria (15 Marks)

### Question 07

Logistics, industry will not become a low carbon sector without operational changes, especially without adopting new, more efficient technologies.

- (a) Identify two out of the three focal points for CO<sub>2</sub> reductions in operational solutions for CO<sub>2</sub> reductions. (06 Marks)
- (b) Road Transportation is one of the highest contributors to CO<sub>2</sub> emissions. Identify five technologies that would help reduce emissions (10 Marks)
- (c) Identify three alternative fuels that are in use today and their sources (09 Marks)

-----END OF THE QUESTION PAPER-----



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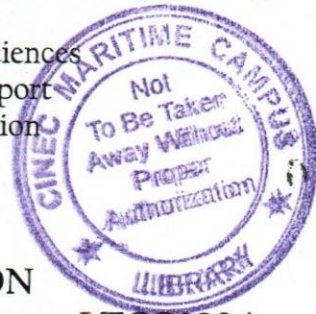
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Year 3 Semester I  
SEMESTER END EXAMINATION  
Customs and Commodity Inspections Operations – LTCO3204

- This paper consists of SEVEN questions on FOUR (04) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.
- Supporting documents will be provided.

Date: 2017.07.18

Pass mark: 50%

Time: 02 Hours

**Question 01 (Compulsory)**

Euro International Group is a multinational company based in The Netherlands and the rights holder of several world-renowned brands including "Clarity" and "Bee" brands.

Great Wall Ltd is a Pencil manufacturing company based in China. They manufacture "Clarity" brand Pencils according to the specified quality of Euro International Group and supply the same only to the buyers nominated by Euro International Group. Euro International Group holds 43% of shares of Great Wall Ltd and several Directors of Great Wall Ltd are also Directors of Euro International Group.

Euro Lanka Ltd is a Sri Lankan trading company registered under the Companies Act. However, Euro International Group holds 48% of shares of Euro Lanka Ltd. Several Directors including the Managing Director of Euro Lanka Ltd are also Directors of Euro International Group. Euro Lanka Ltd has been appointed by Euro International as their Sole-Agent in Sri Lanka for the sale of "Clarity" brand Pencils. In addition to the Sole-Agency Agreement Euro Lanka Ltd has also entered into an agreement with Euro International Group termed as Royalty Agreement. According to this Royalty Agreement, Euro Lanka has to pay 7.5% of the Ex-Work price as Royalty to Euro International Group for the "Clarity" brand Pencils purchased from Great Wall Ltd.

Euro Lanka has imported a shipment of 01x20' container said to contain 500,000 dozen of "Clarity" brand Pencils from Great Wall Ltd. The Ex-Work price agreed is USD 0.012 per pencil. Euro Lanka has entrusted the transportation of the said container from China to the Port of Colombo to a Freight Forwarding company namely Sea-Sky Lanka Ltd. They have issued a quotation containing the following charges.



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## *Charges at Origin*

1. Sea Freight - USD 1285
2. Packing Cost - USD 315
3. Inland Transport - USD 725
4. Handling Charges - USD 165

## *Charges at Destination*

1. Terminal Handling (THC) - USD 250
2. Container Deposit - Rs. 5750
3. Container Washing - Rs. 1150

The marine insurance has been obtained locally from Sri Lanka Insurance Company on payment of Rs. 15,538/= for the whole shipment.

The Commercial Invoice submitted to Sri Lanka Customs for the clearance of the said shipment indicated CIF price as USD 7,385. The Customs Officers rejected this value and move to calculate the correct CIF value. Presume that you are the Customs Officer who was entrusted with this task and calculate the Customs Value of the subject shipment in Sri Lankan Rupees. The Exchange Rate is provided in the attached sheet.

(25 Marks)

## **Question 02**

Excel (Pvt) Ltd has imported a consignment of 21 units of Brand New Refrigerator-Freezers from Malaysia. The price paid is CIF Colombo USD 1,545 per unit. According to the Sri Lanka Tariff Guide 2017 the Combined Refrigerator-Freezers, fitted with separate external doors (unused) is classified within HS Code 8418.10.90 and the following taxes are payable for the importation.

1. Customs Duty - 15%
2. VAT - 15%
3. PAL - 7.5%
4. NBT - 2%
5. Cess - 15% or Rs. 18,000 per unit
6. Excise (SP) Duty - 17%



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032

Calculate all six taxes payable for the above shipment. Exchange Rates and Formulas are provided in the attached documents to this question paper.

(25 Marks)

## Question 03

- (a) Name the six methods given in the WTO Valuation Agreement to determine the Customs Value. (06 Marks)
- (b) Explain in detail the Article 1 and the Article 8 of the Schedule E of the Customs Ordinance of Sri Lanka. (19 Marks)

## Question 04

Explain in detail the first three General Interpretative Rules (GIR) for the interpretation of Harmonized System with suitable examples. (25 Marks)

## Question 05

- (a) Write a short essay about the World Customs Organisation (WCO). (10 Marks)
- (b) Explain in the structure of a HS Code upto 6 digits and the procedure one should follow to determine the HS Code of any given commodity. (15 Marks)

## Question 06

- (a) Describe the functions of the Sri Lanka Customs and legislative framework related to such functions. (10 Marks)
- (b) Explain Section 10 and Section 12 of the Customs Ordinance including a detail explanation of the Schedule A and Schedule B. (15 Marks)





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## Question 07

Write short essays on any **FOUR (04)** of the following topics. (25 Marks)

- (a) Customs Ordinance
- (b) Imports and Exports (Control) Act
- (c) Exchange Control Act
- (d) Poison, Opium and Dangerous Drugs Act
- (e) Fauna and Flora Protection Act
- (f) Payment Methods
- (g) Value Added Tax Act

-----END OF THE QUESTION PAPER-----

Schedule  
Rates of Exchange Effective From 10.07.2017 to 16.07.2017

	Country	Country Code	Currency	Currency Code	Rate of Exchange (Rs.)
1	Australia	AU	Dollar	AUD	117.7106
2	Bahrain	BH	Dinar	BHD	411.9442
3	Bangladesh	BD	Taka	BDT	1.9135
4	Brazil	BR	Brazil Real	BRL	47.1044
5	Brunei	BN	Brunei Dollar	BND	112.3199
6	Canada	CA	Canadian Dollar	CAD	119.6407
7	China	CN	Renminbi	CNY	22.8407
8	China	CN	Offshore	CNH	22.8369
9	Czechoslovakia	CZ	Koruna	CZK	6.7782
10	Denmark	DK	Kroner	DKK	23.8391
11	Egypt	EG	Pound	EGP	8.6928
12	Euro Zone		Euro	EUR	177.3001
13	Ghana	GH	Cedi	GHS	35.1745
14	Hongkong	HK	Dollar	HKD	19.8922
15	Hungary	HU	Forint	HUF	0.5751
16	India	IN	Rupee	INR	2.4007
17	Indonesia	ID	Rupiah	IDR	0.0116
18	Iran	IR	Riyal	IRR	0.0048
19	Japan	JP	Yen	JPY	1.3652
20	Jordan	JO	Dinar	JOD	218.8651
21	Korea	KR	Won	KRW	0.1342
22	Kuwait	KW	Dinar	KWD	512.3850
23	Macau	MO	Pataca	MOP	19.3155
24	Malaysia	MY	Ringgit	MYR	36.1525
25	Maldives	MV	Rufiya	MVR	10.0118
26	Mauritius	MU	Rupee	MUR	4.5117
27	Myanmar	MM	Kyat	MMK	0.1135
28	Nepal	NP	Rupee	NPR	1.4998
29	New Zealand	NZ	Dollar	NZD	113.1035
30	Nigeria	NG	Naira	NGN	0.5086
31	Norway	NO	Kroner	NOK	18.5659
32	Oman	OM	Riyal	OMR	403.5406
33	Pakistan	PK	Rupee	PKR	1.4666
34	Papua New Guinea	PG	Kina	PGK	48.9846
35	Philippines	PH	Peso	PHP	3.0676
36	Poland	PL	Zloty	PLN	41.8304
37	Qatar	QA	Riyal	QAR	42.6760
38	Russia	RU	Rouble	RUB	2.5850
39	Saudi Arabia	SA	Riyal	SAR	41.4344
40	Seychelles	SC	Rupee	SCR	11.4764
41	Singapore	SG	Dollar	SGD	112.3199
42	South Africa	ZA	Rand	ZAR	11.5491
43	Sweden	SE	Krona	SEK	18.3862
44	Switzerland	CH	Francs	CHF	161.6219
45	Taiwan	TW	Dollar	TWD	5.0718
46	Thailand	TH	Baht	THB	4.5554
47	U.A.E.	AE	Dirham	AED	42.3042
48	United Kingdom	GB	Sterling Pound	GBP	201.4855
49	United States of America	US	Dollar	USD	155.3833
50	Zambia (Old)	ZM	Kwacha	ZMK	0.0299
51	Zambia (New)	ZM	Kwacha	ZMW	17.0483
52	Zimbabwe	ZW	Dollar	ZWD	0.4094

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**Computation formulae for imported goods**

Where

v	=	CIF value in Rupee
c	=	Cess levy under Sri Lanka Export Development Act
d	=	Customs Duty
e	=	Excise (Special Provisions) Duty (ED)
t	=	Value Added Tax (VAT)
n	=	Nation Building Tax
p	=	Port and Airport Development Levy (PAL)
r <sub>e</sub>	=	Rate of Excise (Special Provisions) Duty (ED)
r <sub>t</sub>	=	Rate of Value Added Tax (VAT)
r <sub>n</sub>	=	Rate of Nation Building Tax

- Customs Duty (d) = (CIF value) × (Customs duty rate)  
or  
= (quantity) × (unit rate of customs duty)
- Value Added Tax (t) = (v + 10% of v + d + c + p + e) × r<sub>t</sub>
- Cess Levy (c) = (v + 10% of v) × (Cess levy rate)  
or  
= (quantity) × (unit rate of Cess levy)
- Port and Airport Development Levy (p) = (CIF value) × (PAL rate)
- Excise (Special Provisions) Duty (e) = (v + 15% of v + d + c + p) × r<sub>e</sub>  
or  
= (quantity) × (unit rate of Excise Duty)
- Special Commodity Levy = (Quantity) × (unit rate of Special Commodity Levy)
- Nation Building Tax (n) = (v + 10%v + d + c + p + e) r<sub>n</sub>

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# Colombo International Nautical and Engineering College

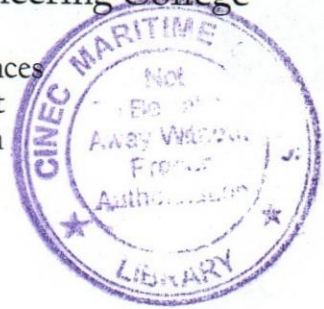
CINEC Campus

Faculty of Management and Social Sciences

Department of Logistics & Transport

BSc (Hons.) in Logistics and Transportation

Course CODE: COM551



## Year 3 Semester I SEMESTER END EXAMINATION Airline Business Management – LTAM3202

- This paper consists of SEVEN questions on THREE (03) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2017.07.13

Pass mark: 50%

Time: 02 Hours

### Question 01: (Compulsory)

- (a) List down two conventions that are important in the context of consumer rights in air transport industry (05 Marks)
- (b) List two broad distribution channels used in the airline industry (05 Marks)
- (c) What are the four types of maintenance checks conducted on an aircraft (05 Marks)
- (d) Identify two types of fares included in the passenger fare structure (05 Marks)
- (e) Define what is flight scheduling in the context of an airline (05 Marks)

### Question 02

- (a) What is the process of conducting maintenance analysis in an airline? Explain the process briefly (10 Marks)
- (b) Montreal Convention is an important convention widely spoken in the air transport industry, briefly describe its importance and the major outcomes of the convention (10 Marks)
- (c) Air travel demand is stimulated through drivers of travel demand. What are these drivers? (05 Marks)



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## Question 03

- (a) There are four steps in the route development and flight scheduling process. Explain in detail what are they and the types of planning/ activities in each phase. (10 Marks)
- (b) There are several factors that an airline consider when purchasing new aircraft to its fleet. What are these factors that affects airline's choice of aircraft type? Explain these with relevant examples. (10 Marks)
- (c) Explain the top down and bottom up approach in fleet planning briefly (05 Marks)

## Question 04

- (a) Explain what is crew pairing and crew rostering? How does this process take place in an airline? Explain with the aid of an example (15 Marks)
- (b) What are duty period, sit connections and overnight rest periods in the crew scheduling process? Explain with relevant examples (10 Marks)

## Question 05

- (a) SriLankan Airlines, the national flag carrier of Sri Lanka is planning to purchase five new A320 neo aircraft which is considered as a fuel efficient aircraft model of the Airbus family. As a fleet planner in the airline explain the economic evaluation process used when purchasing aircraft; how the airline has arrived on this purchase decision? What are the financial impacts of the new fleet planning exercise? (15 Marks)
- (b) Provide a brief description on the three type of maintenance programmes conducted in an airline (10 Marks)



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## Question 06

What are the individual characteristics & performance factors, interpersonal factors and workplace factors that affect human performance? List down five factors from each category and explain how it can impact to degrade the performance in relation to the functions carried out by a flight crew member in an airline.

(25 Marks)

## Question 07

- (a) Explain the two fold responsibility of a pricing analyst in an airline (05 Marks)
- (b) What are different pricing tactics used by airlines? Explain (10 Marks)
- (c) What is liberalization in the airline industry? Explain with examples on levels of liberalization in different regions (10 Marks)

-----END OF THE QUESTION PAPER-----



# Colombo International Nautical and Engineering College

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Faculty of Management and Social Sciences

Department of Logistics & Transport

BSc in Logistics and Transportation

Course CODE: COM551



Year 3 Semester I

REPEAT EXAMINATION

## Customs and Commodity Inspections Operations LTCO3204

- This paper consists of SEVEN questions on FOUR (04) pages.
- Answer Four Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2016.12.17

Pass mark: 50%

Time: 02 Hours

### Question 01: (Compulsory)

Ms. Crust Lanka (Pvt) Ltd is a limited liability company registered under the companies Act of Sri Lanka. "Crust" is a popular biscuit manufactured by Ms. Crust Lanka (Pvt) Ltd according to a secret recipe comprising several herbs. Ms. Crust Lanka (Pvt) Ltd contracted a company namely Ms. Can Print (Bhd) Ltd in Malaysia for printing the biscuit wrappers. According to the contract signed between two companies Ms. Crust Lanka (Pvt) Ltd has to supply the moulds required to print the biscuit wrappers to Ms. Can Print (Bhd) Ltd free of charge. The two parties have agreed an Ex Works price of USD 0.12 per packet containing 100 wrappers and to supply the same in cartons containing 144 packets per carton.

Meantime Ms. Crust Lanka (Pvt) Ltd also signed an agreement with Ms. Best Moulds (Gmb) Ltd in Germany to make moulds using the artwork supplied by Ms. Crust Lanka (Pvt) Ltd and to ship them to Ms. Can Print (Bhd) Ltd. The CIF (Kuala Lumpur) Price agreed was USD 12,640 per mould. Ms. Best Moulds (Gmb) Ltd has recommended that a mould should be used to print 1,000,000 wrappers only to maintain the expected printing quality. Accordingly, Ms. Best Moulds (Gmb) Ltd exported 10 units of moulds to Ms. Can Print (Bhd) Ltd. Total import clearance cost of this shipment incurred by Ms. Can Print (Bhd) Ltd was USD 3,160. This amount has been reimbursed by Ms. Crust Lanka (Pvt) Ltd to Ms. Can Print (Bhd) Ltd by a Telegraphic Transfer (TT) through Sampath Bank PLC.



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As the first shipment Ms. Crust Lanka (Pvt) Ltd has imported a shipment of 01x20' container said to contain 540 cartons of Printed Biscuit Wrappers from Ms. Can Print (Bhd) Ltd.

Ms. Crust Lanka (Pvt) Ltd has entrusted the transportation of the said container from Malaysia to the Port of Colombo to a Freight Forwarding company namely Sea-Sky Lanka Ltd. They have issued a quotation containing the following charges.

### Charges at Origin

1. Sea Freight - USD 1285
2. Loading Charges - USD 315
3. Inland Transport- USD 725
4. Handling Charges - USD 165

### Charges at Destination

1. Terminal Handling (THC) - USD 250
2. Container Deposit - Rs. 5750
3. Container Washing - Rs. 1150

In addition to the above charges the Sea-Sky Lanka Ltd has also charged USD 150 as Bunker Adjustment Fee (BAF) and USD 110 as Currency Adjustment Fee (CAF) on the arrival of the container.

The marine insurance has been obtained locally from Sri Lanka Insurance Company on payment of Rs. 15,060/= for the whole shipment.

The Commercial Invoice submitted to Sri Lanka Customs for the clearance of the said shipment indicated CIF price as USD 10,716. The Customs Officers rejected this value and move to calculate the correct CIF value. Presume that you are the Customs Officer who was entrusted with this task and calculate the Customs Value of the subject shipment in Sri Lankan Rupees. The Exchange Rate is provided in the attached sheet. (25 Marks)

### **Question 02**

Excel (Pvt) Ltd has imported a consignment of 15 units of Brand New Refrigerator-Freezers from Malaysia. The price paid is CIF Colombo USD 525 per unit. According to the Sri Lanka Tariff Guide 2014 the Combined Refrigerator-Freezers, fitted with separate external doors (unused) is classified within HS Code 8418.10.90 and the following taxes are payable for the importation.





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1. Customs Duty - 15%
2. VAT - 12%
3. PAL - 5%
4. NBT - 2%
5. Cess - 15%
6. Excise (SP) Duty - 17%

Calculate all six taxes payable for the above shipment. Exchange Rates and Formulas are provided in the attached documents to this question paper. (25 Marks)

## Question 03

1. Name the **six methods** given in the WTO Valuation Agreement to determine the Customs Value. (10 Marks)
2. Explain in detail the **Article 1** and the **Article 8** of the **Schedule E** of the Customs **Ordinance of Sri Lanka**. (15 Marks)

## Question 04

Explain in detail the 6 General Interpretative Rules (GIR) for the interpretation of Harmonized System with suitable examples. (25 Marks)

## Question 05

1. Explain the scope of the Convention on Harmonized Commodity Description and Coding System. (10 Marks)
2. Explain in the structure of a HS Code upto 6 digits and the procedure one should follow to determine the HS Code of any given commodity. (15 Marks)

## Question 06

1. Describe the functions of the Sri Lanka Customs and legislative framework related to such functions. (10 Marks)
2. Explain Section 10 and Section 12 of the Customs Ordinance including a detail explanation of the Schedule A and Schedule B. (15 Marks)



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## Question 07

Write short essays on **04 (FOUR)** of the following topics (25 Marks)

- (a) Customs Ordinance
- (b) Imports and Exports (Control) Act
- (c) Exchange Control Act
- (d) Antiquities Ordinance
- (e) Fauna and Flora Protection Act
- (f) Revenue Protection Act
- (g) Value Added Tax Act
- (h) Cosmetics, Devices and Drugs Act

-----**END OF THE QUESTION PAPER**-----

### *Supporting documents*

1. *Exchange rates valid for the period from 12.12.2016 to 18.12.2016*
2. *Formulas for the calculation of taxes and other levies*



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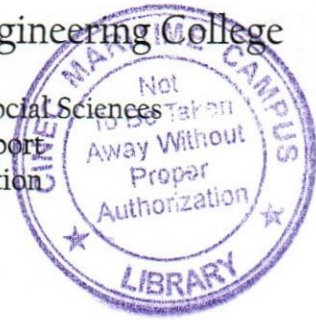
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## Year 3 Semester I REPEAT EXAMINATION International Economics – LTIE3201

- This paper consists of SEVEN questions on THREE (03) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2017.10.31

Pass mark: 50%

Time: 02 Hours

### Question 01: (Compulsory)

Explain that theory of Absolute Advantage and the Theory of Comparative Advantage using bellow information.

Country	output a worker per hour	
	X	Y
A	8	4
B	7	2

(25 Marks)

### Question 02

(a) What are the main assumptions of the H-O theory? Explain (10 Marks)

(b) Consider the Heckcher-Ohline model. Suppose County A is capital abundant with respect to County B and both nations produce two products namely X and Y while product X is a capital intensive. illustrate the gain for trade (15 Marks)



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## Question 03

Explain that factor intensity and factor endowment with appropriate example.

(25 Marks)

## Question 04

(a) "The welfare of the economy has decreased as result of tariff" explain with appropriate diagrams and figures

(15 Marks)

(b) What are the non-tariff trade restrictions on international trade? explain

(10 Marks)

## Question 05

Explain way of creating trade creating custom union with appropriate example.

(25 Marks)

## Question 06

(a) Explain the difference between nominal effective exchange rate and real effective exchange rate.

(06 Marks)

(b) What do you meant by Purchasing Power Parity Exchange Rate

(04 Marks)

(c) Suppose that currency exchange rate of currency pairs are as follow,

$$1 \text{ USD} = 0.95 \text{ Euro}$$

$$1 \text{ Euro} = 159.67 \text{ LKR}$$

$$1 \text{ USD} = 151.34 \text{ LKR}$$

(i) Is there arbitrage opportunity? Find out

(05 Marks)

(ii) If you sell 100000 USD for Euro first, illustrate the triangular arbitrage process

(10 Marks)



**Question 07**

**Write down short note on any five (5) of the following**

- (a) Factor price equalization theory
- (b) European Union
- (c) Balance of Payment
- (d) Forward Exchange Rate
- (e) Marshall -Lerner condition
- (f) J- curve effect

(5x5 Marks)

-----END OF THE QUESTION PAPER-----



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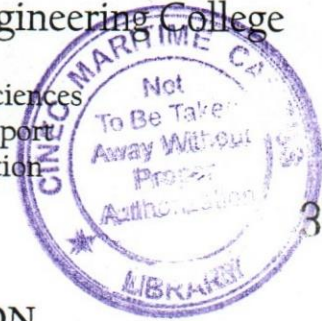
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Year 3 Semester I

SEMESTER END EXAMINATION

Transport Planning and Logistics Management – LTTM 3208

- This paper consists of SEVEN questions on SIX (06) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2017.07.27

Pass mark: 50%

Time: 02 Hours

**Question 01: (Compulsory)**

- (a) State briefly the role of planning transportation in logistics management. (03 Marks)
- (b) Briefly explain the implication on economic rationality behind choices of freight movement. (06 Marks)
- (c) Define the following terminologies commonly used in transportation network.
- (i) Link
  - (ii) Node
  - (iii) Flow
  - (iv) Path
  - (v) Cycle
  - (vi) Tree
- (06 Marks)
- (d) Briefly explain the usage of Dijkstra's algorithm in transportation network. (04 Marks)
- (e) Briefly explain the conservation law on transportation network taking into consideration the flows of network. (Hint - both centroid and intermediate nodes have to be considered) (02 Marks)
- (f) Briefly discuss the term 'generalized cost' in terms of freight transportation that is highly useful for planning trip distribution and mode choice. (04 Marks)



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## Question 02

- (a) State each example for the following transportation networks
- (i) Linear network
  - (ii) Grid network
- (04 Marks)
- (b) Explain two (02) advantages of hub and spoke network.
- (06 Marks)
- (c) Describe three (03) indexes that can be used to measure the efficiency of the transport network.
- (06 Marks)
- (d) Differentiate topology versus typology using two (02) each examples.
- (05 Marks)
- (e) Discuss two advantages of having an efficient freight transport systems through railways in Sri Lanka.
- (04 Marks)

## Question 03

- (a) Assume that the number of truck trips at a given location on an average weekday was 10,000 in 2005 and 15,000 in 2010. Estimate the number of truck trips for the year 2020. (Hint - Use simple growth factor method based on historic traffic trends)
- (04 Marks)
- (b) Find the total flow through the network shown in Q3-b when the node 1 is the source and node 4 is the sink. Flows between nodes are shown in the figure.

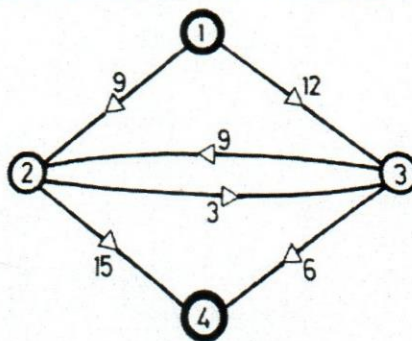


Figure Q3-b: Transportation network flow conservation law to be applied



(03 Marks)

- (c) Determine the shortest paths between all pairs of nodes on transportation network shown below in Q3-c using Floyd's algorithm.

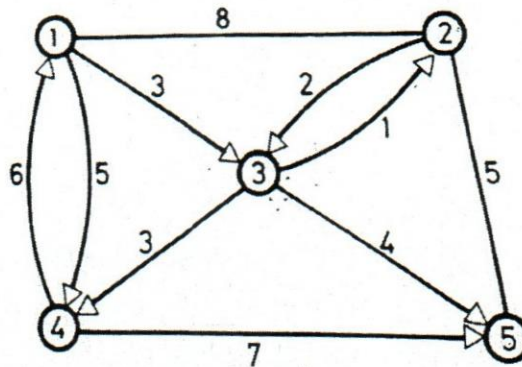
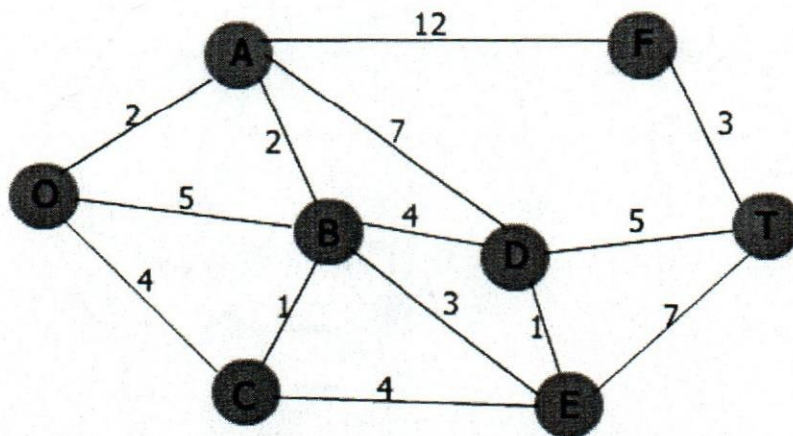


Figure Q3-c: Transportation network to which Floyd's algorithm to be applied.

(18 Marks)

#### Question 04

- (a) State two functionalities of transportation in terms of freight movement. (02 Marks)
- (b) Find the shortest route from the origin O to the destination T for the network shown in figure Q4-b using Dijkstra's Algorithm. The travel cost between nodes are stipulated in the figure.







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Figure Q4-b: Network to which shortest paths to be found out using Dijkstra Algorithm

(17 Marks)

- (c) Identify three contributions that containerization has made to the change of era in international trade.

(06 Marks)

## Question 05

- (a) Fill the table Q5-a shown below using the modal characteristics of transportation modes.

Table Q5-a: Table to be filled

Mode	Advantage (01)	Disadvantage (01)
Rail		
Highway		
Water		
Pipeline		
Air		

(05 Marks)

- (b) Determine the maximum flow between node s and node t of the transportation network shown in figure Q5-b. Capacities of individual branches are shown on the figure.

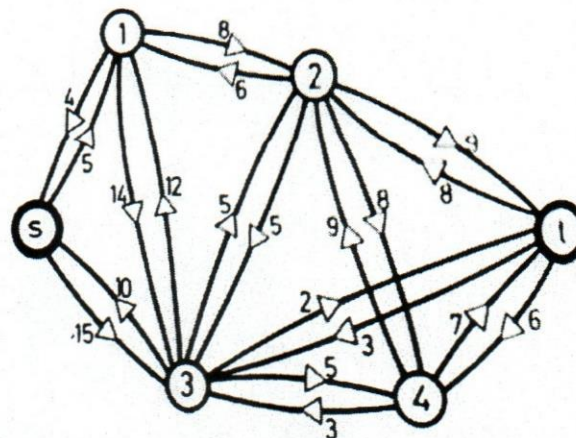


Figure Q5-b: The transportation network for which maximum flow to be found between node s and node t



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- (c) State three factors that might have contributed to the decline of freight movement by Sri Lanka Railway's during the last three decades. (14 Marks)

(06 Marks)

## Question 06

- (a) Identify two factors that contribute for the economic development of a country. (02 Marks)
- (b) Solve the Chinese Postman problem for a tour which starts and finishes in node a of the transportation network shown in Figure Q6-b.

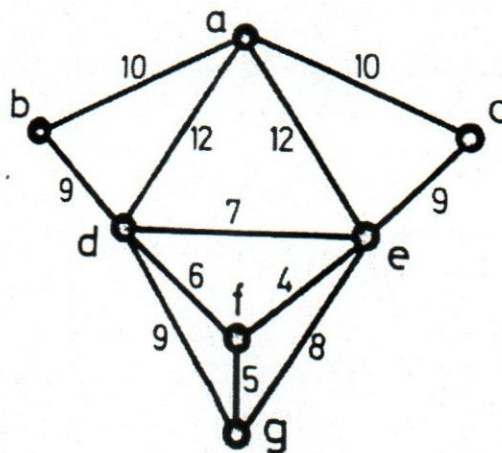


Figure Q6-b: Non oriented network for solving the Chinese Postman problem

(14 Marks)

- (c) Describe three ways that freight transportation helps for the economic development.

(09 Marks)



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## Question 07

Write short notes for the following.

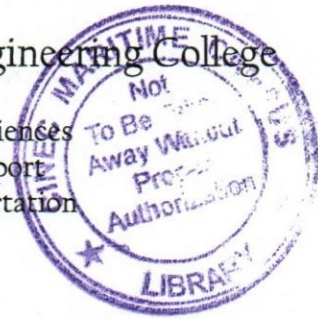
- (a) Two (02) factors affecting freight movement globally
- (b) Two (02) factors that affect pricing of freight movements
- (c) Transportation as a means of minimizing temporal, financial and environmental resource cost
- (d) Main actors in freight movement
- (e) Two difficulties in collecting freight related data.

(5\*5 Marks)

-----END OF THE QUESTION PAPER-----



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Year 3 Semester I  
 SEMESTER END EXAMINATION  
 Production and Operations Management – LTPM3207

- This paper consists of SEVEN questions on SIX (06) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.
- Supporting documents are attached to the question paper.

Date: 2017.07.25

Pass mark: 50%

Time: 02 Hours

**Question 01: (Compulsory)**

- (a) Freight car loadings over a 12-year period at a busy port are as follows;

Table 1:1 - Car Loadings

Week	Number	Week	Number	Week	Number
1	220	7	350	13	460
2	245	8	360	14	475
3	280	9	400	15	500
4	275	10	380	16	510
5	300	11	420	17	525
6	310	12	450	18	541

- (i) Determine a linear trend line for freight car loadings. (03 Marks)  
 (ii) Use the trend equation to predict loadings for weeks 20 and 21. (03 Marks)



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(iii) The manager intends to install new equipment when the volume exceeds 800 loadings per week. Assuming the current trend continues, the loading volume will reach that level approximately in which week? (04 Marks)

(b) A farming cooperative manager wants to estimate relatives for grain shipments, based on the data shown (quantities are in metric tons)

Table 1:2 - Quarter Grain Shipments

Year	QUARTER			
	1	2	3	4
1	200	451	100	200
2	225	456	125	212
3	210	500	123	202
4	241	472	101	256
5	195	525	152	233

Determine quarter relatives.

(15 Marks)

## Question 02

- (a) Briefly define the term "Operations Management" (02 Marks)
- (b) Briefly define the term "Manufacturing Operations". (03 Marks)
- (c) Identify five main responsibilities of operations management. (05 Marks)
- (d) Briefly explain three types of Manufacturing operations. (06 Marks)
- (e) Explain three types of production facilities. (09 Marks)

## Question 03

- (a) Identify five trends of product and service design. (05 Marks)
- (b) Contrast applied research and basic research. (05 Marks)
- (c) Briefly explain three Product or Service activities. (06 Marks)
- (d) Explain three reasons for product or service design. (09 Marks)



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### Question 04

For the set of tasks given below, do the following:

- Develop the precedence diagram. (03 Marks)
- Determine the minimum and maximum cycle times in seconds for a desired output of 500 units in a 7-hour day. Why might a manager use a cycle time of 50 seconds? (03 Marks)
- Determine the minimum number of workstations for output of 500 units per day. (03 Marks)
- Balance the line using the largest positional weight heuristic. Break ties with the most following tasks heuristic. Use a cycle time of 50 seconds. (13 Marks)
- Calculate the percentage idle time for the line. (03 Marks)

Table 4:1 - Task Time

Task	Task Time (Seconds)	Immediate Predecessors
A	45	-
B	11	A
C	9	B
D	50	-
E	26	D
F	11	E
G	12	C
H	10	C
I	9	F, G, H
J	10	I
	<b>193</b>	

### Question 05

- A news clipping service is considering computerizing the service to achieve more profits. The manual process has fixed costs of Rs 400, 000 per year and a variable cost of Rs.6.20 per clipping mail. The price charged from a client is Rs.8 per mail. The computerized process has fixed costs of Rs.1, 300,000 per year and variable costs of Rs.2.25 per mail.



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- (i) If the same price charged for either processes, what is the annual volume beyond which the automated process is more attractive? (04 Marks)
- (ii) The present volume of business is 225,000 mails per year. If the service is modernized instead of computerized the following changes will be made. The selling price will be reduced to Rs. 4 per mail and the volume will be increased up to 900,000 per year. Should the service is to be modernized or computerized? (07 Marks)
- (b) The design capacity for engine repair in our company is 80 trucks/day. The effective capacity is 40 engines/day and the actual output is 36 engines/day. Calculate the utilization and efficiency of the operation. If the efficiency for next month is expected to be 82%, what is the expected output? (04 Marks)
- (c) A product at ABC Company has enjoyed reasonable sales volumes, but its' contribution to profits has been disappointing. Last year, 17,500 units were produced and sold. The selling price is Rs.22.00 per unit. Variable cost and fixed costs are Rs.8.00 and Rs. 80,000 respectively.
- (i) What is the breakeven quantity? Explain your answer using an appropriate graph. (04 Marks)
- (ii) Management of the "ABC" Company believes that sales can be increased by 30% or that variable cost can be reduced to 85% of its current level. Which alteration will be the best (increasing sales or reducing variable cost) if both alternations are equally cost to implement. (06 Marks)

## Question 06

The production manager has developed an aggregate forecast:

Month	Jan	Feb	Mar	Apr	June	July	Aug	Total
Forecast	50	44	55	60	50	40	51	350

Use the following information to develop aggregate plans.

Regular Production cost	Rs. 80 per Unit
Overtime Production cost	Rs. 120 per Unit
Regular capacity	Rs. 40 units per month
Overtime capacity	8 units per month
Subcontracting cost	Rs. 140 per Unit



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Subcontracting capacity	12 units per month
Holding cost	Rs. 10 per unit per month
Back -order cost	Rs. 20 per Unit
Beginning Inventory	0 units

Develop an aggregate plan using each of the following guidelines and compute the total cost for each plan. Which plan has the lowest total cost?

Use regular production. Supplement using inventory, overtime and subcontracting as needed. No backlogs allowed. (25 Marks)

### Question 07

Assume that you are a manager. You have received an order of 40 units of machines, which is to be delivered at the start of week 7 of your schedule. You already have 10 Machines in the inventory. A Machine consists of three components: B, C & G. One B, one G and three Cs are used to make this product. Company needs two weeks to assemble Machines. Using the following information;

- Develop a product structure tree for the machine (05 Marks)
- Determine how many units of components G should be ordered and the timing of those orders, given that both components G & C must be ordered in multiples of 80 units. Assume that components are used only for this particular machine.

Item	LT(Weeks)	On Hand	Components
B	1	5	E,F
C	1	20	G(2), H
E	2	4	
F	3	8	
G	2	15	
H	1	10	

(20 Marks)

-----END OF THE QUESTION PAPER-----





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## Formula Sheet

### Simple Moving Average

$$F_{t+1} = \frac{D_t + D_{t-1} + \dots + D_{t-n+1}}{n}$$

$D_t$  : actual demand in period  $t$

$n$  : number of periods in the average

#### 1. Weighted Moving Average

$$T_{t+1} = W_1 D_1 + W_2 D_{t-1} + \dots + W_n D_{t-n+1}$$

#### 2. Exponential Smoothing

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

$F_t$  = new forecast

$F_{t-1}$  = previous forecast

$\alpha$  = smoothing (or weighting) constant ( $0 \leq \alpha \leq 1$ )

#### 4. Trend Projections

$$y = a + bx$$

$y$  = computed value of the variable to be predicted

$a$  = y-axis intercept

$b$  = slope of the regression line

$x$  = the independent variable

$$b = \frac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n\bar{x}^2} \quad a = \bar{y} - b\bar{x}$$

#### 5. Exponential Smoothing with Trend Adjustment

$$F_t = \alpha (A_{t-1}) + (1-\alpha) (F_{t-1} + T_{t-1})$$

$$T_t = \beta (F_t - F_{t-1}) + (1-\beta) T_{t-1}$$

$$FIT_t = F_t + T_t$$



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03

## Question 07

Logistics, industry will not become a low carbon sector without operational changes, especially without adopting new, more efficient technologies.

- (a) Identify two out of the three focal points for CO<sub>2</sub> reductions (06 Marks) in operational solutions for CO<sub>2</sub> reductions.
- (b) Road Transportation is one of the highest contributors to CO<sub>2</sub> emissions. Identify five technologies that would help reduce emissions (10 Marks)
- (c) Identify three alternative fuels that are in use today and their (09 Marks) sources

-----END OF THE QUESTION PAPER-----



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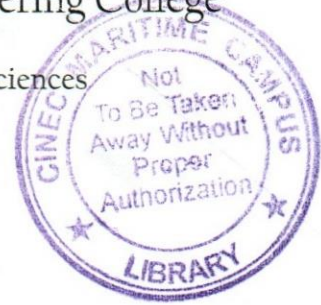
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06

Year 3 Semester I

## REPEAT EXAMINATION

### Customs and Commodity Inspections Operations – LTCO3204

- This paper consists of EIGHT questions on THREE (03) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly
- Required supporting documents are attached to the question paper.

Date: 2017.11.04

Pass mark: 50%

Time: 02 Hours

#### Question 01 (Compulsory)

Euro International Group is a multinational company based in The Netherlands and the rights holder of several world-renowned brands including "Clarity" and "Bee" brands.

Great Wall Ltd is a Pencil manufacturing company based in China. They manufacture "Clarity" brand Pencils according to the specified quality of Euro International Group and supply the same only to the buyers nominated by Euro International Group. Euro International Group holds 43% of shares of Great Wall Ltd and several Directors of Great Wall Ltd are also Directors of Euro International Group.

Euro Lanka Ltd is a Sri Lankan trading company registered under the Companies Act. However, Euro International Group holds 48% of shares of Euro Lanka Ltd. Several Directors including the Managing Director of Euro Lanka Ltd are also Directors of Euro International Group. Euro Lanka Ltd has been appointed by Euro International as their Sole-Agent in Sri Lanka for the sale of "Clarity" brand Pencils. In addition to the Sole-Agency Agreement Euro Lanka Ltd has also entered into an agreement with Euro International Group termed as Royalty Agreement. According to this Royalty Agreement, Euro Lanka has to pay 7.5% of the Ex-Work price as Royalty to Euro International Group for the "Clarity" brand Pencils purchased from Great Wall Ltd.

Euro Lanka has imported a shipment of 01x20' container said to contain 500,000 dozen of "Clarity" brand Pencils from Great Wall Ltd. The Ex-Work price agreed is USD 0.012 per pencil. Euro Lanka has entrusted the transportation of the said container from



China to the Port of Colombo to a Freight Forwarding company namely Sea-Sky Lanka Ltd. They have issued a quotation containing the following charges.

Charges at Origin

1. Sea Freight - USD 1285
2. Packing Cost - USD 315
3. Inland Transport - USD 725
4. Handling Charges - USD 165

Charges at Destination

1. Terminal Handling (THC) - USD 250
2. Container Deposit - Rs. 5750
3. Container Washing - Rs. 1150

The marine insurance has been obtained locally from Sri Lanka Insurance Company on payment of Rs. 15,452/= for the whole shipment.

The Commercial Invoice submitted to Sri Lanka Customs for the clearance of the said shipment indicated CIF price as USD 7,385. The Customs Officers rejected this value and move to calculate the correct CIF value. Presume that you are the Customs Officer who was entrusted with this task and calculate the Customs Value of the subject shipment in Sri Lankan Rupees. The Exchange Rate is provided in the attached sheet.

(25 Marks)

**Question 02**

Excel (Pvt) Ltd has imported a consignment of 21 units of Brand New Refrigerator-Freezers from Malaysia. The price paid is CIF Colombo USD 1,545 per unit. According to the Sri Lanka Tariff Guide 2017 the Combined Refrigerator-Freezers, fitted with separate external doors (unused) is classified within HS Code 8418.10.90 and the following taxes are payable for the importation.

1. Customs Duty - 15%
2. VAT - 15%
3. PAL - 7.5%
4. NBT - 2%
5. Cess - 15% or Rs. 18,000 per unit
6. Excise (SP) Duty - 17%



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06

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Calculate all six taxes payable for the above shipment. Exchange Rates and Formulas are provided in the attached documents to this question paper.

(25 Marks)

## Question 03

Explain the following sections and schedules of the Customs Ordinance.

(a) Section 10 and Schedule A

(12 Marks)

(b) Section 12 and Schedule B

(13 Marks)

## Question 04

Describe the functions of the Sri Lanka Customs and legislative framework related to such functions.

(25 Marks)

## Question 05

(a) Name the **six methods** given in the WTO Valuation Agreement to determine the Customs Value.

(06 Marks)

(b) Explain in detail the **Article 1** and the **Article 8** of the **Schedule E** of the Customs Ordinance of Sri Lanka.

(19 Marks)

## Question 06

Explain in detail the first three General Interpretative Rules (GIR) for the interpretation of Harmonized System with suitable examples.

(25 Marks)

## Question 07

(a) Write a short essay about the World Customs Organisation (WCO).

(12 Marks)

(b) Explain in the structure of a HS Code upto 6 digits and the procedure one should follow to determine the HS Code of any given commodity.

(13 Marks)

-----END OF THE QUESTION PAPER-----

Schedule  
Rates of Exchange Effective From 11.09.2017 to 17.09.2017

	Country	Country Code	Currency	Currency Code	Rate of Exchange (Rs.)
1	Australia	AU	Dollar	AUD	124.9371
2	Bahrain	BH	Dinar	BHD	409.7639
3	Bangladesh	BD	Taka	BDT	1.8937
4	Brazil	BR	Brazil Real	BRL	49.8572
5	Brunei	BN	Brunei Dollar	BND	115.4685
6	Canada	CA	Canadian Dollar	CAD	127.8186
7	China	CN	Renminbi	CNY	23.9034
8	China	CN	Offshore	CNH	23.8910
9	Czechoslovakia	CZ	Koruna	CZK	7.1253
10	Denmark	DK	Kroner	DKK	25.0220
11	Egypt	EG	Pound	EGP	8.7596
12	Euro Zone		Euro	EUR	186.1810
13	Ghana	GH	Cedi	GHS	34.8803
14	Hongkong	HK	Dollar	HKD	19.8071
15	Hungary	HU	Forint	HUF	0.6087
16	India	IN	Rupee	INR	2.4138
17	Indonesia	ID	Rupiah	IDR	0.0116
18	Iran	IR	Riyal	IRR	0.0046
19	Japan	JP	Yen	JPY	1.4276
20	Jordan	JO	Dinar	JOD	217.9406
21	Korea	KR	Won	KRW	0.1369
22	Kuwait	KW	Dinar	KWD	512.5973
23	Macau	MO	Pataca	MOP	19.1688
24	Malaysia	MY	Ringgit	MYR	36.9223
25	Maldives	MV	Rufiya	MVR	9.9434
26	Mauritius	MU	Rupee	MUR	4.6612
27	Myanmar	MM	Kyat	MMK	0.1137
28	Nepal	NP	Rupee	NPR	1.5078
29	New Zealand	NZ	Dollar	NZD	112.6450
30	Nigeria	NG	Naira	NGN	0.5062
31	Norway	NO	Kroner	NOK	20.0173
32	Oman	OM	Riyal	OMR	401.3660
33	Pakistan	PK	Rupee	PKR	1.4667
34	Papua New Guinea	PG	Kina	PGK	48.2875
35	Philippines	PH	Peso	PHP	3.0464
36	Poland	PL	Zloty	PLN	43.7926
37	Qatar	QA	Riyal	QAR	41.7909
38	Russia	RU	Rouble	RUB	2.7135
39	Saudi Arabia	SA	Riyal	SAR	41.2031
40	Seychelles	SC	Rupee	SCR	11.4906
41	Singapore	SG	Dollar	SGD	115.4469
42	South Africa	ZA	Rand	ZAR	12.0759
43	Sweden	SE	Krona	SEK	19.5315
44	Switzerland	CH	Francs	CHF	163.3403
45	Taiwan	TW	Dollar	TWD	5.1596
46	Thailand	TH	Baht	THB	4.6725
47	U.A.E.	AE	Dirham	AED	42.0691
48	United Kingdom	GB	Sterling Pound	GBP	202.8074
49	United States of America	US	Dollar	USD	154.5199
50	Zambia (Old)	ZM	Kwacha	ZMK	0.0297
51	Zambia (New)	ZM	Kwacha	ZMW	16.9048
52	Zimbabwe	ZW	Dollar	ZWD	0.4072

21 Db

### Computation formulae for imported goods

Where

v	=	CIF value in Rupee
c	=	Cess levy under Sri Lanka Export Development Act
d	=	Customs Duty
e	=	Excise (Special Provisions) Duty (ED)
t	=	Value Added Tax (VAT)
n	=	Nation Building Tax
p	=	Port and Airport Development Levy (PAL)
r <sub>e</sub>	=	Rate of Excise (Special Provisions) Duty (ED)
r <sub>t</sub>	=	Rate of Value Added Tax (VAT)
r <sub>n</sub>	=	Rate of Nation Building Tax

- Customs Duty (d) = (CIF value) × (Customs duty rate)  
or  
= (quantity) × (unit rate of customs duty)
- Value Added Tax (t) = (v + 10% of v + d + c + p + e) × r<sub>t</sub>
- Cess Levy (c) = (v + 10% of v) × (Cess levy rate)  
or  
= (quantity) × (unit rate of Cess levy)
- Port and Airport Development Levy (p) = (CIF value) × (PAL rate)
- Excise (Special Provisions) Duty (e) = (v + 15% of v + d + c + p) × r<sub>e</sub>  
or  
= (quantity) × (unit rate of Excise Duty)
- Special Commodity Levy = (Quantity) × (unit rate of Special Commodity Levy)
- Nation Building Tax (n) = (v + 10%v + d + c + p + e) r<sub>n</sub>

*Lehman*



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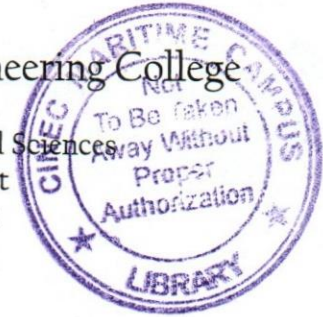
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Year 3 Semester I  
REPEAT EXAMINATION  
Production and Operations Management – LTPM3207

- This paper consists of SEVEN questions on SEVEN (07) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.
- Supporting documents are attached to the question paper.

Date: 2017.11.01

Pass mark: 50%

Time: 02 Hours

**Question 01: (Compulsory)**

- (a) Cosmetics sales firm over the last 10 weeks are shown in the table below. Determine the equation of the trend line, and predict for weeks 11 and 12.

Table 1.1 - Unit Sales

Week	Unit Sales	Week	Unit Sales
1	700	6	742
2	724	7	758
3	720	8	750
4	728	9	770
5	740	10	775

(10 Marks)





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- (b) Using the following information, the Branch Manager of a Tourist Centre wants to predict the first quarter of next year demand for the purpose of writing a report to Top Management.

Table 1.2 - Seasonal Relatives

Month	Seasonal Relative	Month	Seasonal Relative
Jan	1.2	Jul	0.8
Feb	1.3	Aug	0.6
Mar	1.3	Sep	0.7
Apr	1.1	Oct	1.0
May	0.8	Nov	1.1
Jun	0.7	Dec	1.4

The monthly forecast equation being used is:

$$F_t = 402 + 3t$$

Where

$t_0$  = January of last year

$F_t$  = Number of arrivals

Determine the number of arrivals of the first three months of next year. (15 Marks)

## Question 02

- (a) Briefly define the term "Operations Management" (02 Marks)
- (b) Briefly define the term "Manufacturing Operations". (03 Marks)
- (c) Identify five main responsibilities of operations management. (05 Marks)
- (d) Briefly explain three types of Manufacturing operations. (06 Marks)
- (e) Explain three types of production facilities. (09 Marks)



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## Question 03

- (a) Identify the factors that cause organisations to redesign their products or services. (07 Marks)
- (b) Contrast applied research and basic research. (08 Marks)
- (c) Briefly explain the advantages of Computer Aided Design (CAD) in product design. (10 Marks)

## Question 04

Twelve tasks, with times and precedence requirements as shown in the following table, are to be assigned to workstations using a cycle time of 1.2 minutes. Two heuristic rules will be tried:

- 1) Greatest positional weight, and 2) greatest number of following tasks.

In each case, the tiebreaker will be shortest task time.

Task	Length (minutes)	Follows Task
a	0.2	–
b	0.5	a
c	1.0	b
d	0.6	c
e	0.2	–
f	0.5	d, e
g	0.4	f
h	0.1	g
i	0.3	h
j	0.1	i
k	0.2	j
l	0.3	k

- (a) Draw the precedence diagram for this line. (04 Marks)
- (b) Assign tasks to stations under each of the two rules. (16 Marks)
- (c) Compute the percentage of idle time for each rule. (05 Marks)

## Question 05



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- (a) A small firm produces and sells automotive items in a five-state area. The firm, expects to consolidate assembly of its battery charges line at a single location. Currently, operations are in three widely scattered locations. The leading candidate for location will have a monthly fixed cost of \$42,000 and variable costs of \$3 per charger. Charges sell for \$7 each.
- (i) Prepare a table that shows total profits, fixed costs, variable costs, and revenues for monthly volumes of 10,000, 12,000, and 15,000 units. (04 Marks)
  - (ii) What is the break-even point? (03 Marks)
  - (ii) Determine profit when volume equals 22,000 units. (03 Marks)
- (b) The owner of Old-Fashioned Berry Pies, S. Simon, is contemplating adding a new line of pies, which will require leasing new equipment for a monthly payment of \$6000. Variable costs would be \$2.00 per pie, and pies would retail for \$7.00 each.
- (i) How many pies must be sold in order to break even? (03 Marks)
  - (ii) What would the profit (loss) be if 1,000 pies are made and sold in a month? (04 Marks)
  - (iii) How many pies must be sold to realize a profit of \$4,000? (04 Marks)
  - (iv) If 2,000 can be sold, and a profit target is \$5,000, what price should be charged per pie? (04 Marks)

## Question 06

Now juice, Inc., produces bottled pickle juice. A planner has developed an aggregate forecast for demand (in cases) for the next six months.

Month	May	Jun	Jul	Aug	Sep	Oct
Forecast	4000	4800	5600	7200	6400	5000

Use the following information to develop aggregate plans



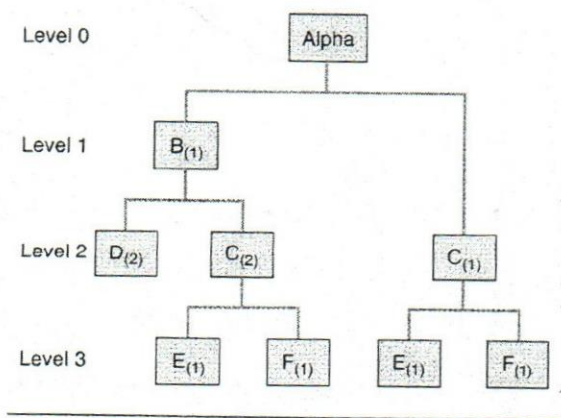
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Regular Production cost	Rs. 10 per case
Regular Production capacity	5,000 cases
Overtime Production cost	Rs. 16 per case
Subcontracting cost	Rs. 20 per case
Holding cost	Rs. 10 per case per month
Beginning Inventory	0 units

Develop an aggregate plan using a combination of overtime (500 cases per period maximum), inventory, and subcontracting (500 cases per period maximum) to handle variations in demand. (25 Marks)

**Question 07**

Using the product structure for Alpha below, and the following lead times, quantity on hand, and master production schedule, prepare a net MRP table for Alphas. (25 Marks)



MPS for Alpha



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Item	Lead Time	Quantity on hand
Alpha	1	10
B	2	20
C	3	0
D	1	100
E	1	10
F	1	50

Period	6	7	8	9	10	11	12	13
GR			50			50		100

-----END OF THE QUESTION PAPER-----



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## Formula Sheet

### Simple Moving Average

$$F_{t+1} = \frac{D_t + D_{t-1} + \dots + D_{t-n+1}}{n}$$

$D_t$  : actual demand in period  $t$

$n$  : number of periods in the average

#### 1. Weighted Moving Average

$$T_{t+1} = W_1 D_1 + W_2 D_{t-1} + \dots + W_n D_{t-n+1}$$

#### 2. Exponential Smoothing

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

$F_t$  = new forecast

$F_{t-1}$  = previous forecast

$\alpha$  = smoothing (or weighting) constant ( $0 \leq \alpha \leq 1$ )

#### 4. Trend Projections

$$y = a + bx$$

$y$  = computed value of the variable to be predicted

$a$  = y-axis intercept

$b$  = slope of the regression line

$x$  = the independent variable

$$b = \frac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n\bar{x}^2}$$

$$a = \bar{y} - b\bar{x}$$

#### 5. Exponential Smoothing with Trend Adjustment



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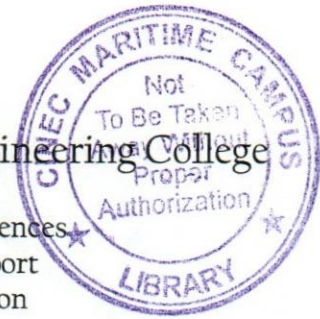
$$F_t = \alpha (A_{t-1}) + (1-\alpha) (F_{t-1} + T_{t-1})$$

$$T_t = \beta (F_t - F_{t-1}) + (1-\beta) T_{t-1}$$

$$FIT_t = F_t + T_t$$



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Year 3 Semester I  
 REPEAT EXAMINATION  
 Operational Research – LTOR3206

- This paper consists of SEVEN questions on FIVE (05) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2017.10.31

Pass mark: 50%

Time: 02 Hours

**Question 01 (COMPULSARY)**

The security and traffic force, on the eve of Republic Day, must satisfy the staffing requirements as shown in the table given below. Officers work 8-hour shifts starting at each of the 4-hour intervals as shown below. How many officers should report for duty at the beginning of each time period in order to minimize the total number of officers needed to satisfy the requirements?

Formulate this as an LP model.

(25 Marks)

**Question 02**

Orange Electrical co. produced two products P1 and P2. These products are produced and sold on a weekly basis. The weekly production cannot exceed 25 for product P1 and 35 for P2 because of the limited available facilities. The company has total of 60 workers. Product P1 requires 2 man-weeks of labour, while P2 requires one man-week of labour. Profit of P1 and P2 are Rs. 60 and Rs. 40 respectively.





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- (a) Formulate the LP model (05 Marks)
- (b) Find the optimal product mix that maximizes the profit using graphical method. (20 Marks)

### Question 03

Solve the below LP model using *Simplex Method*.

$$\text{Maximize } Z = 6X_1 + 4X_2$$

Subject to the constraints

$$2X_1 + 3X_2 \leq 30$$

$$3X_1 + 2X_2 \leq 24$$

$$X_1 + X_2 \leq 10$$

$$X_1, X_2 \geq 0$$

Check the existence of alternative optima. If an alternative optimum exists, find the alternative solution.

(25 Marks)

### Question 04

Solve the below LP model using *Two Phase Method*

$$\text{Minimize } Z = 4X_1 + X_2$$

Subject to the constraints

$$3X_1 + 4X_2 \geq 12$$

$$X_1 + 5X_2 \geq 15$$

$$X_1, X_2 \geq 0$$

(25 Marks)

### Question 05

Consider the LP model given below;



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$$\text{Minimize } Z = 10 X_1 + 20 X_2$$

Subject to

$$3 X_1 + 2 X_2 \geq 18$$

$$X_1 + 3 X_2 \geq 8$$

$$2 X_1 + X_2 \geq 6$$

$$X_1, X_2 \geq 0$$

(a) Construct the dual problem, for this primal problem. (05 Marks)

(b) Solve the primal problem using any appropriate method. (25 Marks)

### Question 06

A manufacturer has 03 distribution centers at Colombo, Galle and Gampaha. These centers have availability of 40, 20 and 40 units supply respectively. His retail outlets at A, B, C, D and E require 25, 10, 20, 30 and 15 units respectively. Unit transportation cost is given in Table 6.01 given below.

Table 6.01

	A	B	C	D	E	Supply
Colombo	55	30	40	50	40	40
Galle	35	30	100	45	60	20
Gampaha	40	60	95	35	30	40
Demand	25	10	20	30	15	

(a) Find the initial transportation schedule using *North West Corner Method*.

(05 Marks)

(b) Find the optimum transportation schedule using *Method of Multipliers*



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(U-V Method).

(20 Marks)

## Question 07

Dr. Jayasinghe is a dentist who schedules all his patients for 30-minutes appointments. Some of the patients take more or less than 30 minutes depending on the type of dental work to be done. The following summary shows the various categories of work, their probabilities and the time actually needed to complete the work.

Table 7.01

CATEGORY	TIME REQUIRED	PROBABILITY OF THE CATEGORY
Filling	45 minutes	0.40
Crown	60 minutes	0.15
Cleaning	15 minutes	0.15
Extraction	45 minutes	0.10
Check-up	15 minutes	0.20



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Simulate the dentist's clinic for **FOUR** hours and determine average waiting time for the patients as well as the idleness of the doctor.

Assume that all patients show up at the clinic at exactly their scheduled arrival time starting at 8.00 am. Use below random numbers for simulation run.

40    82    11    34    25    66    17    79

(25 Marks)

----- **END OF THE QUESTION PAPER** -----



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Year 3 Semester I

SEMESTER END EXAMINATION

Customs and Commodity Inspection Operations – LTCO3204

- This paper consists of SEVEN questions on FOUR (04) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.
- Supporting documents are attached.

Date: 2018.07.31

Pass mark: 50%

Time: 02 Hours

## Question 01 (Compulsory)

Solid International Group is a multinational company based in The Netherlands and owns several cement manufacturing plants in several countries in the Asia-Pacific region. The Solid International Group is the rights holder for the world-renowned brand Portland Cement "Solid".

Solid Malaysia Bhd is a cement manufacturing company based in Malaysia. They manufacture "Solid" brand Portland Cement according to the specified quality of Solid International Group and supply the same only to the buyers nominated by Solid International Group. Solid International Group holds 43% of shares of Solid Malaysia Bhd and several Directors of Solid Malaysia Bhd are also Directors of Solid International Group.

Solid Lanka Ltd is a Sri Lankan company registered under the Companies Act. However, Solid International Group holds 48% of shares of Solid Lanka Ltd. Several Directors including the Managing Director of Solid Lanka Ltd are also Directors of Solid International Group. Solid International Group has authorized Solid Lanka Ltd to import Portland Cement in bulk from Solid Malaysia Bhd, bag the same in 50kg bags in their facility situated in Galle, Sri Lanka and market a 50kg bag of Portland Cement in Sri Lanka under the brand name "Solid" for maximum retail price of Rs. 950/=. According to the tripartite agreement signed in that regard between Solid



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International Group, Solid Malaysia Bhd and Solid Sri Lanka Ltd, Solid Sri Lanka Ltd should pay 5% from the maximum retail price as royalty to Solid International Group.

Solid Lanka has imported a shipment of 10,000 metric tons of Portland Cement from Solid Malaysia Bhd in a chartered vessel at the FOB price of USD 50 per metric ton. According to the charter party agreement entered into between Solid Sri Lanka Ltd and the shipping company, the freight charges for a voyage from Malaysia to Colombo is USD 75,000. In addition to that a pumping charge of USD 5 per metric ton was also payable for discharging the cement from the vessel to the trucks at the Port of Colombo.

The marine insurance has been obtained locally from Sri Lanka Insurance Company on payment of Rs. 251,522.97/= for the whole shipment.

In the Customs Declaration submitted to Sri Lanka Customs by Solid Sri Lanka Ltd for the clearance of the said shipment, the Customs Value was given as Rs. 92,811,975.47. The Customs Officers rejected this value and move to calculate the correct Customs Value. Presume that you are the Customs Officer who was entrusted with this task and calculate the Customs Value of the subject shipment in Sri Lankan Rupees. The Exchange Rate is provided in the attached sheet.

(25 Marks)

## Question 02

Coco Fiber (Pvt) Ltd has imported a consignment of 1x20 container containing 2,621 Broom made of coconut fibre from Malaysia. The price paid is CIF Colombo USD 0.20 per Broom. According to the Sri Lanka Tariff Guide 2017, Broom made of coconut fibre is classified within HS Code 9603.10.10 and the following taxes are payable for the importation.

- Customs Duty - 30%
- VAT - 15%
- PAL - 7.5%
- NBT - 2%
- Cess - 20% or Rs. 75/= per unit
- Excise (SP) Duty - 17% or Rs. 15/= per unit



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33

Calculate all six taxes payable for the above shipment. Exchange Rates and Formulas are provided in the attached documents to this question paper.

(25 Marks)

## Question 03

(a) Write a short essay about the World Trade Organization (WTO).

(06 Marks)

(b) Name the **six methods** given in the WTO Valuation Agreement to determine the Customs Value and explain in detail the **Article 1** and the **Article 8** of the **Schedule E** of the Customs Ordinance of Sri Lanka.

(19 Marks)

## Question 04

(a) Write a short essay about the World Customs Organisation (WCO).

(06 Marks)

(b) Explain in the structure of a HS Code upto 6 digits and the procedure one should follow to determine the HS Code of any given commodity.

(19 Marks)

## Question 05

Explain in detail the first three General Interpretative Rules (GIR) for the interpretation of Harmonized System with suitable examples.

(25 Marks)

## Question 06

(a) Describe the functions of the Sri Lanka Customs and legislative framework related to such functions.

(10 Marks)

(b) Explain Section 10 and Section 12 of the Customs Ordinance including a detail explanation of the Schedule A and Schedule B.

(15 Marks)



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## Question 07

Write short essays on 4 of the following topics.

(25 Marks)

- (a) Customs Ordinance
- (b) Imports and Exports (Control) Act
- (c) Revenue Protection Order
- (d) Poison, Opium and Dangerous Drugs Act
- (e) Fauna and Flora Protection Act
- (f) Payment Methods
- (g) Value Added Tax Act

-----END OF THE QUESTION PAPER-----



Schedule  
Rates of Exchange Effective From 30.07.2018 to 05.08.2018

	Country	Country Code	Currency	Currency Code	Rate of Exchange (Rs.)
1	Australia	AU	Dollar	AUD	119.7813
2	Bahrain	BH	Dinar	BHD	425.6732
3	Bangladesh	BD	Taka	BDT	1.9050
4	Brazil	BR	Brazil Real	BRL	43.6482
5	Brunei	BN	Brunei Dollar	BND	119.0906
6	Canada	CA	Canadian Dollar	CAD	123.4753
7	China	CN	Renminbi	CNY	23.8005
8	China	CN	Offshore	CNH	23.7722
9	Czechoslovakia	CZ	Koruna	CZK	7.3691
10	Denmark	DK	Kroner	DKK	25.3440
11	Egypt	EG	Pound	EGP	8.9930
12	Euro Zone		Euro	EUR	188.8394
13	Ghana	GH	Cedi	GHS	33.9609
14	Hongkong	HK	Dollar	HKD	20.5177
15	Hungary	HU	Forint	HUF	0.5804
16	India	IN	Rupee	INR	2.3421
17	Indonesia	ID	Rupiah	IDR	0.0111
18	Iran	IR	Riyal	IRR	0.0037
19	Japan	JP	Yen	JPY	1.4521
20	Jordan	JO	Dinar	JOD	226.8847
21	Korea	KR	Won	KRW	0.1436
22	Kuwait	KW	Dinar	KWD	532.0686
23	Macau	MO	Pataca	MOP	19.9091
24	Malaysia	MY	Ringgit	MYR	39.7223
25	Maldives	MV	Rufiya	MVR	10.4123
26	Mauritius	MU	Rupee	MUR	4.7000
27	Myanmar	MM	Kyat	MMK	0.1109
28	Nepal	NP	Rupee	NPR	1.4627
29	New Zealand	NZ	Dollar	NZD	110.0262
30	Nigeria	NG	Naira	NGN	0.5271
31	Norway	NO	Kroner	NOK	19.7913
32	Oman	OM	Riyal	OMR	418.1270
33	Pakistan	PK	Rupee	PKR	1.2465
34	Papua New Guinea	PG	Kina	PGK	48.9363
35	Philippines	PH	Peso	PHP	3.0185
36	Poland	PL	Zloty	PLN	43.9575
37	Qatar	QA	Riyal	QAR	44.2117
38	Russia	RU	Rouble	RUB	2.5622
39	Saudi Arabia	SA	Riyal	SAR	42.9226
40	Seychelles	SC	Rupee	SCR	11.8844
41	Singapore	SG	Dollar	SGD	118.4334
42	South Africa	ZA	Rand	ZAR	12.2647
43	Sweden	SE	Krona	SEK	18.3921
44	Switzerland	CH	Francs	CHF	162.3711
45	Taiwan	TW	Dollar	TWD	5.2704
46	Thailand	TH	Baht	THB	4.8443
47	U.A.E.	AE	Dirham	AED	43.8247
48	United Kingdom	GB	Sterling Pound	GBP	212.4705
49	United States of America	US	Dollar	USD	160.9747
50	Zambia (Old)	ZM	Kwacha	ZMK	0.0310
51	Zambia (New)	ZM	Kwacha	ZMW	16.1378
52	Zimbabwe	ZW	Dollar	ZWD	0.4242

### Computation formulae for imported goods

Where

v	=	CIF value in Rupee
c	=	Cess levy under Sri Lanka Export Development Act
d	=	Customs Duty
e	=	Excise (Special Provisions) Duty (ED)
t	=	Value Added Tax (VAT)
n	=	Nation Building Tax
p	=	Port and Airport Development Levy (PAL)
$r_e$	=	Rate of Excise (Special Provisions) Duty (ED)
$r_t$	=	Rate of Value Added Tax (VAT)
$r_n$	=	Rate of Nation Building Tax

- Customs Duty (d) = (CIF value) × (Customs duty rate)  
or  
= (quantity) × (unit rate of customs duty)
- Value Added Tax (t) =  $(v + 10\% \text{ of } v + d + c + p + e) \times r_t$
- Cess Levy (c) =  $(v + 10\% \text{ of } v) \times (\text{Cess levy rate})$   
or  
= (quantity) × (unit rate of Cess levy)
- Port and Airport Development Levy (p) = (CIF value) × (PAL rate)
- Excise (Special Provisions) Duty (e) =  $(v + 15\% \text{ of } v + d + c + p) \times r_e$   
or  
= (quantity) × (unit rate of Excise Duty)
- Special Commodity Levy = (Quantity) × (unit rate of Special Commodity Levy)
- Nation Building Tax (n) =  $(v + 10\%v + d + c + p + e) r_n$



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## Year 3 Semester I SEMESTER END EXAMINATION Port Planning – LTPP3203



25

- This paper consists of SEVEN questions on TWO (02) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2018.07.28

Pass mark: 50%

Time: 02 Hours

### Question - 1 (Compulsory)

What is Sri Lanka Ports Authority VISION 2020 and strategies fostering the aspirations?

(25 Marks)

### Question -2

Select one of the following and discuss the impact to Sri Lankan Ports with regard to future port planning?

- (a) One Belt One Road concept and Hambantota Port
- (b) Vallapadam International Transshipment Container Terminal in Kerala State
- (c) Rail connectivity between China & Europe
- (d) Port of Hambantota management transfer to a Chinese Company for 99 years?
- (e) LNG as alternate for ship fuel
- (f) Vizhinjam International Transshipment Container Terminal in Kerala State

(25 Marks)

### Question - 3

What are the challenges faced by Port Managers and your suggestions to resolve?

(25 Marks)



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## Question - 4

Describe Hambantota Port Project and what should be done to make the port more attractive?

(25 Marks)

## Question - 5

Draw a RO - RO Terminal layout plan for Hambantota Port to make it an Automobile Transshipment Hub?

(25 Marks)

## Question - 6

Select one of the cargo handling terminals and draw a full terminal layout to handled three ships at any given time and describe the terminal facilities.

- (a) Liquid & Dry Bulk Handling Terminal
- (b) Cruise Terminal

(25 Marks)

## Question - 7

Draw a Container Terminal Layout Plan to handle three ULCS at any given time and select suitable equipment mix for the Terminal Operation?

(25 Marks)

-----END OF THE QUESTION PAPER-----



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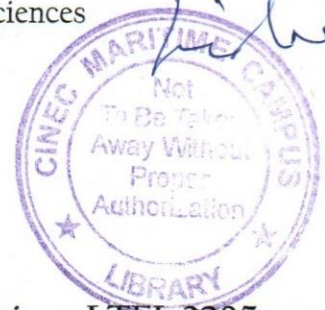
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Year 3 Semester I

SEMESTER END EXAMINATION

Environmental and Social Impacts of Transport and Logistics - LTEE 3205

- This paper consists of SEVEN (07) questions on FOUR (04) pages.
- Answer FOUR questions including question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly.

Date: 2018.08.02

Pass mark: 50%

Time: 02 Hours

## Question 01 (Compulsory)

The International Maritime Organization is the United Nations technical-body responsible for maritime safety and maritime pollution, and since 1948 has been working towards reducing the impact of shipping on the environment. Australia has been a member of the IMO from the beginning and is an active participant in its delegations. Certain shipping activities have been identified that may have a serious impact on the marine environment. These include: Discharge of ballast water, Disposal of marine debris, waste materials and sewage, oil spills, impact on fauna and flora and noise and air emissions.

Indian Government is proposing to construct a shipping channel SethuSamuduram Ship Channel (SSCP)] through the Palk Strait linking the Gulf of Mannar and the Bay of Bengal. Sri Lankan maritime environment and resources could be negatively affected. The Indian studies have not taken the Sri Lankan maritime and terrestrial



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environment into account in their studies and thus, no mitigation measures are being proposed to prevent or reduce the potential impacts on Sri Lanka.

- (a) As a transport planner, identify the shipping activities that may have a serious impact on the marine environment around Sri Lankan waters. (10 Marks)
- (b) Sri Lanka was objecting for the SSCP project due to environment impact that can be caused by the project. Discuss the impact and give your recommendations to mitigate the coastal water pollution. (15 Marks)

## Question 02

Give brief elaborated introductory explanation on the following (25 Marks)

- (a) MARPOL  
(b) Ballast water management  
(c) Polar code

## Question 03

The National Master Plan for 2007-2017 of Government of Sri Lanka (GOSL) has identified Inter Alia, the Central Expressway as one of the key expressways to be implemented soon. The need of an efficient transport infrastructure is mandatory for development and need of improving the existing land based transport systems, i.e. road and rail road transport systems has been identified as other critical areas in development.

- (a) Explain one of the following topics.
- (i). ER process  
(ii). EPL process (10 Marks)
- (b) Road Development Authority (RDA) under the guidance of Ministry of Higher Education and Highways (MoHEH) has already advanced Rs 314 million to your consultancy firm for Environmental Impact Assessment (EIA). As an EIA



consultant, explain your procedure in carrying out the EIA assessment. You may use appropriate flowcharts to present your answer. (15 Marks)

#### Question 04

When a transport mode becomes more advantageous than another over the same route or market, a modal shift take place. A modal shift occurs when one mode (A; e.g. road) has a comparative advantage in a similar market over another (B; e.g. rail).

- (a) What are the three phases of modal shift? (03 Marks)
- (b) Explain the Comparative advantages of modal shift. (05 Marks)
- (c) Explain advantages and disadvantages of Nuclear energy. (05 Marks)
- (d) Explain the social impacts of nonrenewable energy. (12 Marks)

#### Question 05

Air quality standards, on the other hand, are set by each country to protect the public health of their citizens and as such are an important component of national risk management and environmental policies. The WHO air quality guidelines (AQGs) are intended for worldwide use but have been developed to support actions to achieve air quality that protects public health in different contexts.

- (a) Explain the current Air quality status in Sri Lanka by comparing the WHO air quality guidelines (AQGs) indicators and suggest strategic and technical methods to mitigate or control the harmful emissions to the atmosphere. (25 Marks)



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## Question 06

ITS varies from traffic light control to incident management, from enforcement to passenger information and from driver assistance to intelligent speed limit enforcement. Intermodal freight movement is an important contributor to our economic prosperity and living standards. With the emergence of ITS usage the use of intermodal transport options has been declined respectively.

- (a) What is causing earth's climate to change? (05 Marks)
- (b) Explain climate change impacts on supply chain and value chain in general. You may use appropriate graphs, diagrams, equation/s to prove or justify the answers. (10 Marks)
- (c) As a transport planner explain the areas where you can overcome intermodalism by applying intelligent transport strategies. (10 Marks)

## Question 07

Along with a brief description to below, list down 6 threats each may contribute to damage the marine environment (25 Marks)

- (a) Dry Cargo Ships
- (b) Tankers ships
- (c) RoRo ships
- (d) Passenger Ships

-----END OF THE QUESTION PAPER-----



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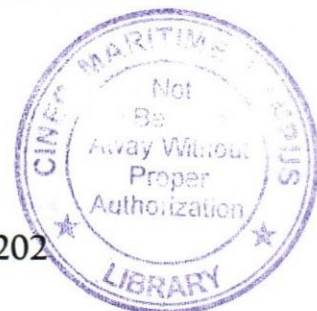
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## Year 3 Semester I SEMESTER END EXAMINATION Airline Business Management – LTAM3202

- This paper consists of SEVEN questions on TWO (02) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2018.07.26

Pass mark: 50%

Time: 02 Hours

### Question 01: (Compulsory)

- (a) What are the drivers of travel demand in air transport industry? (05 marks)
- (b) Explain the difference between corrective maintenance and preventive maintenance (05 marks)
- (c) What are Global Distribution Systems? Briefly explain with examples. (05 marks)
- (d) Identify five factors to be considered in fleet planning decision (05 marks)
- (e) Airlines decision to offer flights to new destinations or to increase the frequencies depend on several factors. Identify two such factors (05 marks)

### Question 02

- (a) Explain what is meant by liberalization in the airline industry. Provide a comparative analysis on level of liberalization in EU, Asia and in Sri Lanka. Reason out as to why there different levels of liberalization in different regions (15 marks)
- (b) Explain the difference between crew pairing and crew rostering. (10 marks)

### Question 03

- (a) Explain each element of the route development and flight scheduling process including the timelines. You may use diagrams where necessary. (15 marks)
- (b) Define what is scheduling in air transport industry. What are the elements of a flight schedule (10 marks)



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## Question 04

- (a) What are the factors that affect airline's choice on aircraft? Explain these factors in detail (15 marks)
- (b) Explain the two fold responsibility of a pricing analyst in an airline (05 marks)
- (c) What are the unique problems that airlines undergo during the schedule development (05 marks)

## Question 05

- (a) What are the two broad distribution channels used in the airline industry. Explain them in brief. What is the most popular mean of distribution among full service airlines and low cost airlines? Why? (05 marks)
- (b) How many types of checks are there in aircraft maintenance? Explain in detail. (10 marks)
- (c) How many types of fares are there an airline? What are these fare types, explain them in brief? (10 marks)

## Question 06

There are many factors that affect human performance. These factors can be grouped into three main broad areas. Explain two factors from each category in detail with reference to real life or hypothetical examples. (25 marks)

## Question 07

- (a) What are the elements of developing a marketing concept? (05 marks)
- (b) Explain two variables that affect the marketing strategy in relation to airline industry (10 marks)
- (c) Use an example of an airline entering into a new market and explain the market segmentation process (10 marks)

-----END OF THE QUESTION PAPER-----



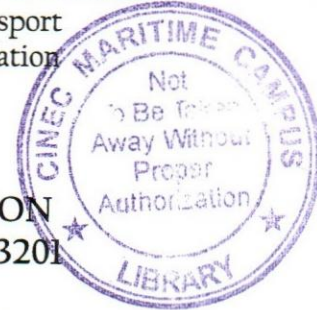
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Year 3 Semester I  
SEMESTER END EXAMINATION  
International Economics – LTIE3201



- This paper consists of SEVEN questions on FIVE (05) pages.
- Answer FOUR Questions including Question 01.
- Use MCQ answer sheet provided with the question paper to answer Question 01
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2018.07.24

Pass mark: 50%

Time: 02 Hours

**Question 01: (Compulsory)**

According to the Central Bank Report of Sri Lanka 2017,

- 1) The share of Industrial exports in total exports,
  - A. 44%
  - B. 75%
  - C. 24%
  - D. 32%
  
- 2) The major Industrial exports of Sri Lanka is,
  - A. Textile and Garment
  - B. Leather, travel goods and footwear,
  - C. Rubber products
  - D. Gems, diamonds and jewelry
  
- 3) The major imports under the intermediate good of Sri Lanka is,
  - A. Refined Petroleum
  - B. Crude oil
  - C. Textiles and Textile Articles
  - D. Plastic and Articles



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- 4) Major Export Destination of Sri Lanka is,
  - A. UK
  - B. India
  - C. Middle East
  - D. USA
  
- 5) Highest imports by Origin Sri Lanka is,
  - A. India
  - B. China
  - C. Singapore
  - D. EU
  
- 6) Other than India second largest market for tourism is,
  - A. UK
  - B. China
  - C. Germany
  - D. France
  
- 7) Major Lender for the Hambantota Hub Development project is,
  - A. Asian Development Bank
  - B. Import Bank of China
  - C. International Development Association
  - D. Government of Japan
  
- 8) Trade balance of Sri Lanka as a percentage of GDP in 2017 is,
  - A. 15.0
  - B. 14.0
  - C. 11.0
  - D. 10.0
  
- 9) Which one is incorrect about current account of Sri Lanka in 2017 is,
  - A. Current Balance is a surplus
  - B. Primary income account balance is deficit



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- C. Workers' remittance is more contributed to secondary income accounts.
- D. It has a trade deficit.

10) Largest share of exports recorded under preferential trade Agreements of Sri Lanka is,

- A. South Asia Free Trade Agreement.
- B. GSP +
- C. Indo Sri Lanka Free Trade Agreement
- D. Asian Pacific Trade Agreement

(2\*10 Marks)

11) Earnings from tourism has been decreasing over the period of time.

True [ ]      False [ ]

12) NEER ia a weight average of nominal exchange rates of 24 trading partners.

True [ ]      False [ ]

13) Sri Lanka's terms of trade has improved in 2017.

True [ ]      False [ ]

14) Net earnings from air transport service is greater than sea transportation in 2017.

True [ ]      False [ ]

15) Rubber is the major exported agriculture product in the Sri Lanka.

True [ ]      False [ ]

(1\*5 Marks)



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## Question 02

- (a) Explain that theory of Absolute Advantage and the Theory of Comparative Advantage in international trade using following figures,

Country	Labour hours needed to produce one unit of	
	Capital good	Consumers' good
USA	12	3
India	24	4

(10 Marks)

- (b) How does the exchange rate between nation determine? (05 Marks)

- (c) What do you mean by Offer Curve? (05 marks)

- (d) How does the term of trade equilibrium determine? (05 Marks)

## Question 03

- (a) Explain the term factor abundance and factor intensity with appropriate examples (10 Marks)
- (b) Illustrate H-O model and H-O-S model with appropriate example. (15 Marks)

## Question 04

- (a) "There are economic cost and economic benefits of import tariff" explain with appropriate diagrams and figures (15 Marks)
- (b) "Tariff is the only way to restrict international trade by a government, do you agree? explain (10 Marks)



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## Question 05

- (a) Different types of economic integration with appropriate examples (10 Marks)
- (b) Discuss the difference between Trade Creating Custom Union and Trade Diverting Custom Union with appropriate examples. (15 Marks)

## Question 06

- (a) Suppose that currency exchange rate of currency pairs are as follow,
- 0.95Euro/USD  
159.67 LKR/ Euro  
151.34LKR / USD
- (i) Is there arbitrage opportunity? Find out (05 Marks)
- (ii) If you sell 100000 USD for Euro first, illustrate the triangular arbitrage process (10 Marks)
- (b) Explain that,
- (i) Relationship between national income and the BOP
- (ii) Relationship between Exchange rate and the BOP (10 Marks)

## Question 07

Write down short note on any FIVE (5) of the following

- (a) Depreciation of local currency  
(b) Dynamic Benefit of Customs Union  
(c) Rate of effective Protection  
(d) Forward Exchange Rate  
(e) Marshall -Lerner condition  
(f) J- curve effect

(5x5 Marks)

-----END OF THE QUESTION PAPER-----



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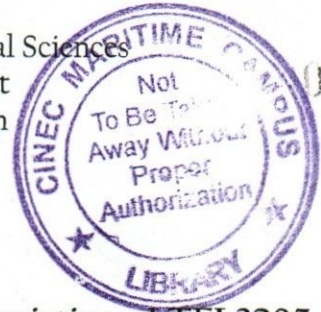
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Year 3 Semester I

REPEAT EXAMINATION

Environmental and Social Impacts on Transport and Logistics - LTEL3205

- This paper consists of SEVEN questions on THREE (03) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2017.11.04

Pass mark: 50%

Time: 02 Hours

## Question 01: (Compulsory)

One of the major environmental issues faced by developing nations with rapid urbanization is known as the 'Urban Sprawl'.

- (a) Give examples of Urban Sprawl and give the definition (10 Marks)
- (b) Which fields of environmental externalities are associated with Urban Sprawl, identify these and give details of four with measurement criteria. (15 Marks)

## Question 02

Human thinking has an impact and a challenge to Sustainability. What are those challenges to the 'human mind', describe them.

(25 Marks)

## Question 03

Carbon emissions directly impact climate change with transportation industry a major contributor of carbon emissions.

- (a) Identify three types of Climate Change (09 Marks)
- (b) There are associated impacts identify two of these to the types of climate change identified in 2(a) above with examples (16 Marks)





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## Question 04

One of the most damaging scenarios to mankind is 'Peak Oil'.

- (a) Define Peak Oil ? (05 Marks)
- (b) Identify and explain four reasons for the inevitable scenario of Peak Oil (20 Marks)

## Question 05

Policy Tools are one options available to Governments that are committed to actively address climate change to achieve their emissions reduction targets.

- (a) What are the policy options open to governments to achieve their emission reduction targets, identify three. (09 Marks)
- (b) Give details of one of the options citing examples (16 Marks)

## Question 06

Environment Impact Assessment (EIA) is an important aspect of sustainability in ensuring that development processes will not compromise the ability of future generations to meet their own needs.

- (a) What is an EIA Process, describe. (08 Marks)
- (b) There are eight (08) steps in the EIA process, what are they? (08 Marks)
- (c) Scoping is the key step in EIA process, outline the scoping Process. (09 Marks)



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Year 3 Semester I

REPEAT EXAMINATION

Airline Business Management – LTAM3202

- This paper consists of SEVEN questions on THREE (03) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2018.12.18

Pass mark: 50%

Time: 02 Hours

## Question 01: (Compulsory)

- (a) List down the elements of a flight schedule (05 marks)
- (b) Identify the two conventions that are important in the context of consumer rights in air transport industry and explain one of them in brief (10 marks)
- (c) What are two types of fares included in the passenger fare structure (05 marks)
- (d) Define what is flight scheduling in the context of an airline (05 marks)

## Question 02

- (a) Montreal Convention is an important convention widely spoken in the air transport industry, briefly describe its importance and the major outcomes of the convention. Explain the status of Sri Lanka in ratifying the Montreal Convention of 1999 (10 marks)
- (b) List two broad distribution channels used in the airline industry (05 marks)
- (c) What is the process of conducting maintenance analysis in an airline? Explain the process briefly (10 marks)



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## Question 03

- (a) Air travel demand is stimulated through drivers of travel demand. What are these drivers? List down the two main drivers (05 marks)
- (b) There are four steps in the route development and flight scheduling process. Explain in detail what are these steps and the types of planning/activities in each phase. (10 marks)
- (c) Explain the two fold responsibility of a pricing analyst in an airline (05 marks)
- (d) Explain the top down and bottom up approach in fleet planning briefly (05 marks)

## Question 04

- (a) Explain what is crew pairing and crew rostering? How do airlines perform crew pairing and rostering? Explain with the aid of an example (15 marks)
- (b) Explain what is liberalization in the airline industry? (05 marks)
- (c) What are the three types of maintenance programmes conducted in an airline (05 marks)

## Question 05

- (a) SriLankan Airlines, the national flag carrier of Sri Lanka is planning to purchase five new A320 neo aircraft which is considered as a fuel efficient aircraft model of the Airbus family. As a fleet planner in the airline explain the economic evaluation process used when purchasing aircraft; how the airline has arrived on this purchase decision? What are the financial impacts of the new fleet planning exercise? (15 marks)
- (b) Pricing tactics used by airlines can be categorized into broad categories namely fare actions and adjustments to fare rules and/or restrictions. Explain two pricing tactics falling under each of these broad categories. (10 marks)



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## Question 06

- (a) What are the individual characteristics & performance factors, interpersonal factors and workplace factors that affect human performance? List down five factors from each category and explain how it can impact to degrade the performance in relation to the functions carried out by a flight crew member in an airline. (25 marks)

## Question 07

- (a) There are several factors that an airline consider when purchasing new aircraft to its fleet. What are these factors that affects airline's choice of aircraft type? Explain these with relevant examples. (15 marks)
- (b) What are duty period, sit connections and overnight rest periods in the crew scheduling process? Explain with relevant examples (10 marks)

-----END OF THE QUESTION PAPER-----



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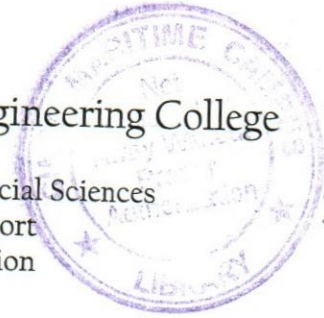
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Department of Logistics & Transport

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Year 3 Semester I

SEMESTER END EXAMINATION

Transport Planning and Logistics Management – LTTM3208

- This paper consists of SEVEN (07) questions on SEVEN (07) pages.
- Answer FOUR (04) Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2018.08.09

Pass mark: 50%

Time: 02 Hours

**Question 01: (Compulsory)**

- (a) State three factors that could have impact on pricing freight movement services. (03 Marks)
- (b) Briefly discuss the actors and their roles in the freight movement. (06 Marks)
- (c) Define the following terminologies commonly used in transportation network. (06 Marks)
- (i) Link
  - (ii) Node
  - (iii) Flow
  - (iv) Path
  - (v) Cycle
  - (vi) Tree
- (d) Briefly explain the usage of Dijkstra's algorithm in transportation network. (04 Marks)
- (e) Assume that the number of truck trips at a given location on an average weekday was 8,000 in 2005 and 10,000 in 2010. Estimate the number of truck trips for the year 2020. (Hint - Use simple growth factor method based on historic traffic trends) (02 Marks)
- (f) Briefly discuss the term 'generalized cost' in terms of freight transportation that is highly useful for planning trip distribution and mode choice. (04 Marks)



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## Question 02

- (a) Explain three parameters that could be used to measure the efficiency of a transportation network. (04 Marks)
- (b) Compare and contrast linear network with grid network in transportation network topologies. (06 Marks)
- (c) Compare and contrast point to point network and hub and spoke network with related to economies of scale at hubs. (06 Marks)
- (d) Differentiate topology versus typology using two (02) each example. (05 Marks)
- (e) Discuss two advantages of having an efficient freight transport system through railways in Sri Lanka. (04 Marks)

## Question 03

- (a) Briefly describe the use of Dijkstra Algorithm commonly used in transportation network. (04 Marks)
- (b) Identify three contributions that containerization has made to the change of era in international trade. (03 Marks)
- (c) Determine the shortest paths between node 5 to node 4 on transportation network shown below in Q3-c. The distance between nodes are stipulated in the network. The last distance matrix and the last predecessor node matrix obtained after using Floyd's algorithm to the network are shown by  $D_5$  and  $Q_5$  respectively.

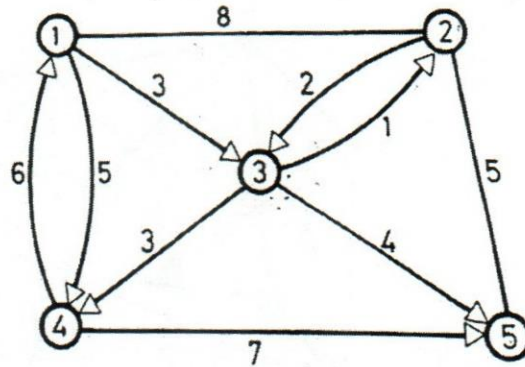


Figure Q3-c: Transportation network to which Floyd's algorithm applied.

Table Q3-c1: The last distance matrix ( $D_5$ )

i \ j	1	2	3	4	5
1	0	4	3	5	7
2	8	0	2	5	5
3	9	1	0	3	4
4	6	10	9	0	7
5	13	5	7	10	0

Table Q3-c2: The last predecessor node matrix ( $Q_5$ )

i \ j	1	2	3	4	5
1	0	3	1	1	3
2	2	0	2	3	2
3	2	3	0	3	3
4	4	3	1	0	4
5	2	5	2	3	0

(05 Marks)

- (d) Determine the minimum spanning tree for the transportation network shown in figure Q3-d.



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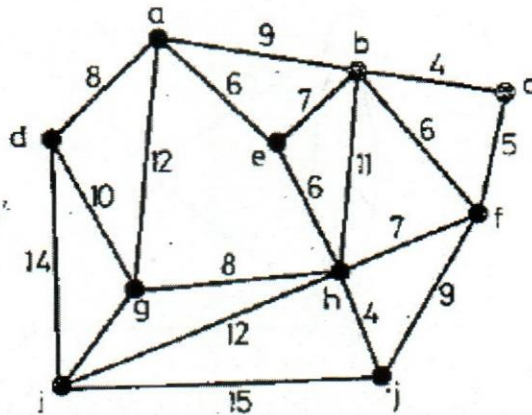


Figure Q3-d: Transportation network for which minimum spanning tree to be found

(13 Marks)

## Question 04

- State two functionalities of transportation in terms of freight movement. (02 Marks)
- Find the shortest route from the origin O to the destination T for the network shown in figure Q4-b using Dijkstra's Algorithm. The travel cost between nodes are stipulated in the figure.

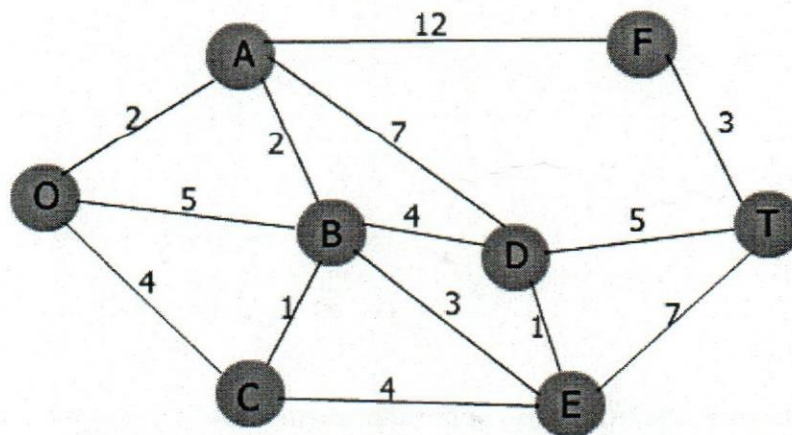


Figure Q4-b: Network to which shortest paths to be found out using Dijkstra Algorithm





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- (c) Find the total flow through the network shown in Q4-c when the node 1 is the source and node 4 is the sink. Flows between nodes are shown in the figure. (17 Marks)

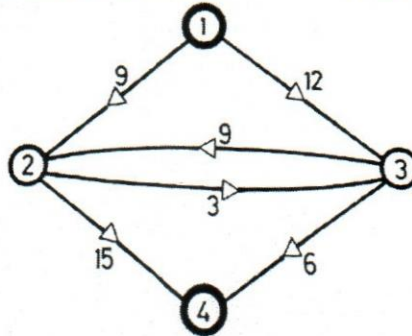


Figure Q4-c: Transportation network flow conservation law to be applied

(06 Marks)

## Question 05

- (a) Identify two factors that contribute for the economic development of a country. (05 Marks)
- (b) Determine the maximum flow between node s and node t of the transportation network shown in figure Q5-b1. Capacities of individual branches are shown on the figure. The very last modified capacity matrix is shown in table Q5-b1.

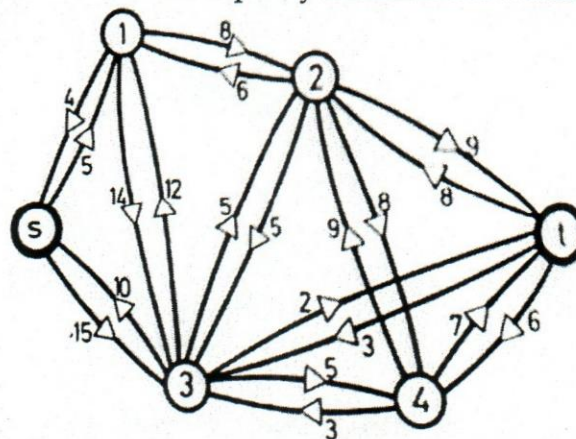


Figure Q5-b1: The transportation network for which maximum flow to be found between node s and node t



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Table Q5-b1: The very last modified capacity matrix

s \ t	t	s	1	2	3	4	t
s	s	0	0	0	2	0	0
1	s	9	0	2	15	0	0
2	1	0	12	0	10	6	0
3	2	23	11	0	0	0	0
4	3	0	0	11	8	0	0
t	4	0	0	17	5	13	0

(14 Marks)

- (c) Describe three ways that freight transportation helps for the economic development.

(06 Marks)

**Question 06**

- (a) State three ways that freight transportation helps for the economic development. (03 Marks)
- (b) Solve the Chinese Postman problem for a tour which starts and finishes in node a of the transportation network shown in Figure Q6-b.

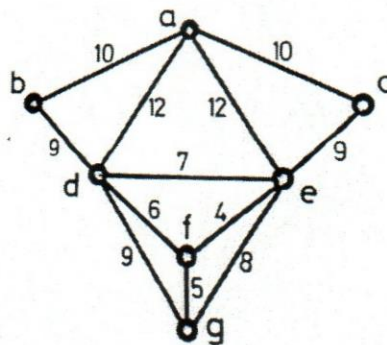


Figure Q6-b: Non oriented network for solving the Chinese Postman problem

(13 Marks)

- (a) Describe three means how freight transportation affect environment.

(09 Marks)



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**Question 07**

Write short notes for the following.

- (a) Two implicit freight transportation policies
- (b) Centripetal networks versus centrifugal networks
- (c) Transportation as a means of minimizing temporal, financial and environmental resource cost
- (d) Two difficulties in collecting freight related data.
- (e) Define speed, flow and density in traffic.

(5X5 Marks)

-----END OF THE QUESTION PAPER-----



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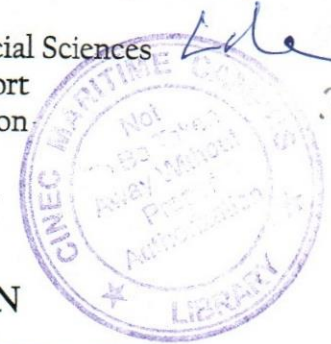
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Year 3 Semester I

SEMESTER END EXAMINATION

Production and Operations Management – LTPM3207

- This paper consists of SEVEN (07) questions on EIGHT (08) pages.
- Answer FOUR (04) Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2018.08.07

Pass mark: 50%

Time: 02 Hours

## Question 01: (Compulsory)

- (a) A commercial bakery has recorded sales (in dozens) for three products, as shown below.

Table 1:1 - Daily Production

Day	Blackberry Muffins	Cinnamon Buns	Cupcakes
1	30	18	45
2	34	17	26
3	32	19	27
4	34	19	23
5	35	22	22
6	30	23	48
7	34	23	29
8	36	25	20
9	29	24	14



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10	31	26	18
11	35	27	47
12	31	28	26
13	37	29	27
14	34	31	24
15	33	33	22

Predict orders for the following day for each of the products using an appropriate naive method. (06 Marks)

- (b) An ABC transporter's records during the last five weeks indicate the number of job requests:

Table 1:2 - Jobs

Week	1	2	3	4	5
Requests	20	22	18	21	22

Predict the number of requests for week 6 using each of these methods:

- (i) A four-period moving average (02 Marks)
- (ii) Exponential smoothing with  $\alpha = 0.3$ . Use 20 for week 2 forecast. (08 Marks)
- (c) Obtain the linear trend equation for the following data on new checking accounts at Fair Savings Bank and use it to predict new checking accounts for periods 16 through 19. (09 Marks)



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Table 1:3 - New Accounts

Period	New Accounts	Week	Number	Week	Number
1	200	7	248	13	280
2	214	8	250	14	288
3	211	9	253	15	310
4	228	10	267		
5	235	11	281		
6	232	12	275		

## Question 02

- (a) Identify two different types of functions of Production System Design and Production System Operation. (05 Marks)
- (b) Briefly define the term "Service Operations". (05 Marks)
- (c) Briefly explain three types of Manufacturing operations. (06 Marks)
- (d) Explain three types of production facilities. (09 Marks)

## Question 03

- (a) Identify five activities of product or service design. (05 Marks)
- (b) Identify five reasons for product or service design. (05 Marks)
- (c) Briefly explain "Quality Function Deployment". (05 Marks)
- (d) Briefly explain "Reverse Engineering". (05 Marks)
- (e) Identify three advantages and two disadvantages of Standardization. (05 Marks)



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## Question 04

A shop works a 400 minute day. The manager of the shop wants an output of 200 units per day for the assembly line that has the elemental tasks shown in the table.

Do the following:

Table 1:4 - Tasks

Task	Immediately Precedes Task(s)	Task Time
a	b,c,d	0.5
b	e	1.4
c	e	1.2
d	f	0.7
e	g,j	0.5
f	i	1.0
g	h	0.4
h	k	0.3
i	j	0.5
j	k	0.8
k	l	0.9
l	End	0.3

- Construct the precedence diagram. (02 Marks)
- Assign tasks according to the *most following tasks* rule. (10 Marks)
- Assign tasks according to the *greatest positional weight* rule. (10 Marks)
- Compute the balance delay for each rule. Which one yields the better set of assignments in this instance? (03 Marks)



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## Question 05

- (a) Determine the utilization and the efficiency for each of these situations: (06 Marks)
- (i) A loan processing operation that processes an average of seven loans per day. The operation has a design capacity of 10 loans per day and an effective capacity of 8 loans per day.
- (ii) A furnace repair team that services an average of four furnaces a day if the design capacity is six furnaces a day and the effective capacity is five furnaces a day.
- (b) A manager must decide how many machines of a certain type to purchase. Each machine can process 100 customers per day. One machine will result in a fixed cost of \$2,000 per day, while two machines will result in a fixed cost of \$3,800 per day. Variable costs will be \$20 per customer, and revenue will be \$45 per customer.
- (i) Determine the break-even point for each range. (06 Marks)
- (ii) If estimated demand is 90 to 120 customers per day, how many machines should be purchased? (06 Marks)
- (c) The manager of a car wash must decide whether to have one or two wash lines. One line will mean a fixed cost of \$6,000 a month, and two lines will mean a fixed cost of \$10,500 a month. Each line would be able to process 15 cars an hour. Variable costs will be \$3 per car, and revenue will be \$5.95 per car. The manager projects an average demand of between 14 and 18 cars an hour. Would you recommend one or two lines? The car wash is open 300 hours a month. (07 Marks)





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## Question 06

The production manager has developed an aggregate forecast:

Month	Jan	Feb	Mar	Apr	June	July	Aug	Total
Forecast	50	44	55	60	50	40	51	350

Use the following information to develop aggregate plans.

Regular Production cost	Rs. 80 per Unit
Overtime Production cost	Rs. 120 per Unit
Regular capacity	Rs. 40 units per month
Overtime capacity	8 units per month
Subcontracting cost	Rs. 140 per Unit
Subcontracting capacity	12 units per month
Holding cost	Rs. 10 per unit per month
Back -order cost	Rs. 20 per Unit
Beginning Inventory	0 units

Develop an aggregate plan using each of the following guidelines and compute the total cost for each plan. Which plan has the lowest total cost?

Use a combination of backlogs, subcontracting, and inventory to handle variations in demand.

(25 Marks)



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## Question 07

One unit of A is made of two units of B and one unit of C. B is made of three units of D and one unit of F. C is composed of three units of B, one unit of D, and four units of E. D is made of one unit of E. Item C has a lead time of one week; Items A, B, E, and F have two-week lead times; and Item D has a lead time of three weeks.

Lot-for-lot lot sizing is used for Items C, E, and F; lots of size 20, 40, and 160 are used for items A, B, and D, respectively. Items A, B, D, and E have on-hand (beginning) inventories of 5, 10, 100, and 100, respectively; all other items have zero beginning inventories. We are scheduled to receive 10 units of A in Week 3, 20 units of B in Week 7, 40 units of F in week 5 and 60 units of E in Week 2; there are no other schedule receipts. If 20 units of A are required in Week 10, use the low-level-coded bill of materials (product structure tree) to find the necessary planned order releases for all components.

(25 Marks)

-----END OF THE QUESTION PAPER-----



## Formula Sheet

### Simple Moving Average

$$F_{t+1} = \frac{D_t + D_{t-1} + \dots + D_{t-n+1}}{n}$$

$D_t$  : actual demand in period  $t$

$n$  : number of periods in the average

### 1. Weighted Moving Average

$$T_{t+1} = W_1 D_1 + W_2 D_{t-1} + \dots + W_n D_{t-n+1}$$

### 2. Exponential Smoothing

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

$F_t$  = new forecast

$F_{t-1}$  = previous forecast

$\alpha$  = smoothing (or weighting) constant ( $0 \leq \alpha \leq 1$ )

### 4. Trend Projections

$$y = a + bx$$

$y$  = computed value of the variable to be predicted

$a$  = y-axis intercept

$b$  = slope of the regression line

$x$  = the independent variable

$$b = \frac{\frac{\sum xy}{n} - \frac{\sum x}{n} \frac{\sum y}{n}}{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2} \quad a = \frac{\sum y}{n} - b \bar{x}$$

### 5. Exponential Smoothing with Trend Adjustment

$$F_t = \alpha(A_{t-1}) + (1-\alpha)(F_{t-1} + T_{t-1})$$

$$T_t = \beta(F_t - F_{t-1}) + (1-\beta)T_{t-1}$$

$$FIT_t = F_t + T_t$$



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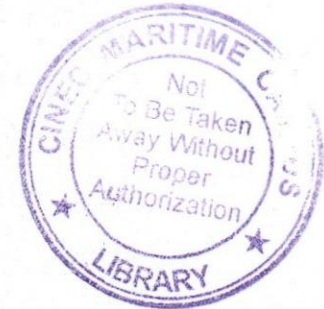
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Year 3 Semester I

SEMESTER END EXAMINATION

Operational Research – LTOR3206



- This paper consists of SEVEN (07) questions on FIVE (05) pages.
- Answer FOUR (04) Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2018.08.04

Pass mark: 50%

Time: 02 Hours

## Question 01: (Compulsory)

*Fresh Mart* is a super market in a Colombo city area, needs 22 to 30 workers in the super market depending on the time of the day. The busy hours are between noon and 2pm. Table 1.01 below indicates the number of workers needed at various hours when the super market is open.

Table 1.01: worker requirement of Fresh Mart

Time Period	Number of workers needed
9.00 am - 11.00 am	22
11.00 am - 1.00 pm	30
1.00 pm - 3.00 pm	25
3.00 pm - 5.00 pm	23

- The *Fresh Mart* now employs 24 full-time workers, but also needs a few part-time workers.



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- A part-time worker must put in exactly 04 hours per day, but can start at the begging of the any time period given in table 1.01, between 9.00 am and 1.00 pm.
- Fulltime workers work from 9.00am to 5.00pm. but are allowed an hour for lunch (half of the full-time workers off for lunch at 12 noon , the other half at 1.00 pm.)
- Full time workers of *Fresh Mart* provide 35 productive hours of labour time per week.
- The management of the *Fresh Mart* limits part time hours to a maximum of 50% of the day's total requirement.
- Part time workers earn Rs. 1500/- per day on average, while full time workers earn Rs. 2000/- per day in salary.
- The management wants to set a schedule that minimize total manpower cost.
- Formulate this problem as an LP model.

(25 Marks)

### Question 02

Star Fashions is a cloth manufacturer who employs three inputs: man-hours, machine-hours and cloth materials to manufacture two types of dresses. Type A dress makes a profit of Rs. 160/- per dress and type B makes Rs. 180/- per dress. The manufacturer has enough man-hours to manufacture 50 dresses of type A or 20 dresses of type B per day while the machine-hours he possesses suffice only for 36 dresses of type A or for 24 dresses of type B.

Cloth material available per day is limited but sufficient enough for 30 dresses of either type.

- (i). Formulate this a a LP model (05 Marks)
- (ii). Solve the model using graphical method. (20 Marks)



**Question 03**

Use Simplex Method to solve the following LP problem.

(25 Marks)

$$\text{Maximize } Z = 3X_1 + 4X_2 + X_3$$

Subject to

$$X_1 + 2X_2 + 3X_3 \leq 90$$

$$2X_1 + X_2 + X_3 \leq 60$$

$$3X_1 + X_2 + 2X_3 \leq 80$$

$$X_1, X_2, X_3 \geq 0$$

**Question 04**

$$\text{Max } Z = 2X_1 + 2X_2 + 4X_3$$

$$2X_1 + 2X_2 + X_3 \leq 2$$

$$3X_1 + 4X_2 + 2X_3 \geq 8$$

$$X_1, X_2, X_3 \geq 0$$

Show that Phase I will terminate with an artificial *basic* variable at zero.

Remove the zero artificial variables prior to the start of Phase II, then carry out Phase II iterations.

(25 Marks)

**Question 05**

Consider the LP model given below;

$$\text{Minimize } Z = 10X_1 + 20X_2$$

Subject to

$$3X_1 + 2X_2 \geq 18$$

$$X_1 + 3X_2 \geq 8$$

$$2X_1 + X_2 \geq 6$$

$$X_1, X_2 \geq 0$$



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- (a) Construct the dual problem, for this primal problem. (05 Marks)
- (b) Solve the primal and dual problems using any appropriate method. (20 Marks)

## Question 06

A company has three factories F1, F2 and F3 that supply products to warehouses W1, W2 and W3. The weekly capacities of the factories are 200, 160 and 90 respectively. The weekly warehouse requirements are 180, 120 and 150. The unit shipping costs are as follows.

	W1	W2	W3	Supply
F1	16	20	12	200
F2	14	08	18	160
F3	26	24	16	90
Demand	180	120	150	450

- (a) Find the initial transportation schedule using North West Corner method (05 Marks)
- (b) Find the optimal solution using UV method (20 Marks)



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### Question 07

A company manufactures 30 units per day. The sale of these items depends upon demand which has the following distributions.

Sales (Units)	Probability
27	0.10
28	0.15
29	0.20
30	0.35
31	0.15
32	0.05

- The production cost and sales price of each unit are Rs. 40 and Rs. 50 respectively.
- Any unsold product is to be disposed off at a loss of Rs. 15 per unit.
- There is a penalty of Rs. 5 per unit if the demand is not met.
- Using the following random numbers, estimate the total profit/loss for the company for the next ten days.
- 10    99    65    99    95    01    79    11    16    20
- If the company decides to produce 25 units per day, what is the advantage or disadvantage of the company. (25 Marks)

-----END OF THE QUESTION PAPER-----





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Solid Lanka Ltd is a Sri Lankan company registered under the Companies Act. However, Solid International Group holds 48% of shares of Solid Lanka Ltd. Several Directors including the Managing Director of Solid Lanka Ltd are also Directors of Solid International Group. Solid International Group has authorized Solid Lanka Ltd to import Portland Cement in bulk from Solid Malaysia Bhd, bag the same in 50kg bags in their facility situated in Galle, Sri Lanka and market a 50kg bag of Portland Cement in Sri Lanka under the brand name "Solid" for maximum retail price of Rs. 950/= . According to the tripartite agreement signed in that regard between Solid International Group, Solid Malaysia Bhd and Solid Sri Lanka Ltd, Solid Sri Lanka Ltd should pay 5% from the maximum retail price as royalty to Solid International Group.

Solid Lanka has imported a shipment of 10,000 metric tons of Portland Cement from Solid Malaysia Bhd in a chartered vessel at the FOB price of USD 50 per metric ton. According to the charter party agreement entered into between Solid Sri Lanka Ltd and the shipping company, the freight charges for a voyage from Malaysia to Colombo is USD 75,000. In addition to that a pumping charge of USD 5 per metric ton was also payable for discharging the cement from the vessel to the trucks at the Port of Colombo.

The marine insurance has been obtained locally from Sri Lanka Insurance Company on payment of Rs. 251,522.97/= for the whole shipment.

In the Customs Declaration submitted to Sri Lanka Customs by Solid Sri Lanka Ltd for the clearance of the said shipment, the Customs Value was given as Rs. 92,811,975.47. The Customs Officers rejected this value and move to calculate the correct Customs Value. Presume that you are the Customs Officer who was entrusted with this task and calculate



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the Customs Value of the subject shipment in Sri Lankan Rupees. The Exchange Rate is provided in the attached sheet. (25 Marks)

## Question 02

Tea Beverage (Pvt) Ltd has imported a consignment of 10,000 litres "Tea in Beverage Form" from Kenya. The price paid is CIF Colombo USD 1.4 per litre. According to the Sri Lanka Tariff Guide the Tea in Beverage Form is classified within HS Code 2202.90.10 and the following taxes are payable for the importation.

1. Customs Duty - 30% or Rs. 25/= per litre
2. VAT - 11%
3. PAL - 5%
4. NBT - 2%
5. Excise (Special Provision) Duty - 18% or Rs. 8/= per litre
6. Cess - 35% or Rs. 60/= per litre.

Calculate all six taxes payable for the above shipment. Formulas and exchange rates are provided in the attached documents to this question paper. (25 Marks)

## Question 03

What is Harmonized Commodity Description and Coding System (Harmonized System)? Explain in detail the structure of the Harmonized System. (25 Marks)

## Question 04

Describe the functions and objectives of the Sri Lanka Customs and the legal framework in place which empowers the Director General of Customs to perform such functions and to achieve such objectives. (25 Marks)



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## Question 05

Imagine that you start a trading company and decide to introduce a new smart phone model to the market. Explain in details the steps you should follow in finding a supplier, negotiating with the supplier and clearing imported goods through Customs.

(25 Marks)

## Question 06

(a) Name the 6 methods of payments practiced in international trade

(b) Explain in detail as to how the risk is transferred from the buyer to the seller in the above-mentioned methods of payment. and how risk become equal for both buyer and seller in Letter of Credit.

(25 Marks)

## Question 07

(a) Write a short essay about the World Trade Organization (WTO)

(b) Name the six methods given in the WTO Valuation Agreement to determine the Customs Value and explain in detail the Article 1 and the Article 8 of the Schedule E of the Customs Ordinance of Sri Lanka.

(25 Marks)

-----END OF THE QUESTION PAPER-----

### Computation formulae for imported goods

Where

v	=	CIF value in Rupee
c	=	Cess levy under Sri Lanka Export Development Act
d	=	Customs Duty
e	=	Excise (Special Provisions) Duty (ED)
t	=	Value Added Tax (VAT)
n	=	Nation Building Tax
p	=	Port and Airport Development Levy (PAL)
r <sub>e</sub>	=	Rate of Excise (Special Provisions) Duty (ED)
r <sub>t</sub>	=	Rate of Value Added Tax (VAT)
r <sub>n</sub>	=	Rate of Nation Building Tax

- Customs Duty (d) = (CIF value) × (Customs duty rate)  
or  
= (quantity) × (unit rate of customs duty)
- Value Added Tax (t) = (v + 10% of v + d + c + p + e) × r<sub>t</sub>
- Cess Levy (c) = (v + 10% of v) × (Cess levy rate)  
or  
= (quantity) × (unit rate of Cess levy)
- Port and Airport Development Levy (p) = (CIF value) × (PAL rate)
- Excise (Special Provisions) Duty (e) = (v + 15% of v + d + c + p) × r<sub>e</sub>  
or  
= (quantity) × (unit rate of Excise Duty)
- Special Commodity Levy = (Quantity) × (unit rate of Special Commodity Levy)
- Nation Building Tax (n) = (v + 10%v + d + c + p + e) r<sub>n</sub>

**Schedule**  
**Rates of Exchange Effective From 11.09.2017 to 17.09.2017**

	Country	Country Code	Currency	Currency Code	Rate of Exchange (Rs.)
1	Australia	AU	Dollar	AUD	124.9371
2	Bahrain	BH	Dinar	BHD	409.7639
3	Bangladesh	BD	Taka	BDT	1.8937
4	Brazil	BR	Brazil Real	BRL	49.8572
5	Brunei	BN	Brunei Dollar	BND	115.4685
6	Canada	CA	Canadian Dollar	CAD	127.8186
7	China	CN	Renminbi	CNY	23.9034
8	China	CN	Offshore	CNH	23.8910
9	Czechoslovakia	CZ	Koruna	CZK	7.1253
10	Denmark	DK	Kroner	DKK	25.0220
11	Egypt	EG	Pound	EGP	8.7596
12	Euro Zone		Euro	EUR	186.1810
13	Ghana	GH	Cedi	GHS	34.8803
14	Hongkong	HK	Dollar	HKD	19.8071
15	Hungary	HU	Forint	HUF	0.6087
16	India	IN	Rupee	INR	2.4138
17	Indonesia	ID	Rupiah	IDR	0.0116
18	Iran	IR	Riyal	IRR	0.0046
19	Japan	JP	Yen	JPY	1.4276
20	Jordan	JO	Dinar	JOD	217.9406
21	Korea	KR	Won	KRW	0.1369
22	Kuwait	KW	Dinar	KWD	512.5973
23	Macau	MO	Pataca	MOP	19.1688
24	Malaysia	MY	Ringgit	MYR	36.9223
25	Maldives	MV	Rufiya	MVR	9.9434
26	Mauritius	MU	Rupee	MUR	4.6612
27	Myanmar	MM	Kyat	MMK	0.1137
28	Nepal	NP	Rupee	NPR	1.5078
29	New Zealand	NZ	Dollar	NZD	112.6450
30	Nigeria	NG	Naira	NGN	0.5062
31	Norway	NO	Kroner	NOK	20.0173
32	Oman	OM	Riyal	OMR	401.3660
33	Pakistan	PK	Rupee	PKR	1.4667
34	Papua New Guinea	PG	Kina	PGK	48.2875
35	Philippines	PH	Peso	PHP	3.0464
36	Poland	PL	Zloty	PLN	43.7926
37	Qatar	QA	Riyal	QAR	41.7909
38	Russia	RU	Rouble	RUB	2.7135
39	Saudi Arabia	SA	Riyal	SAR	41.2031
40	Seychelles	SC	Rupee	SCR	11.4906
41	Singapore	SG	Dollar	SGD	115.4469
42	South Africa	ZA	Rand	ZAR	12.0759
43	Sweden	SE	Krona	SEK	19.5315
44	Switzerland	CH	Francs	CHF	163.3403
45	Taiwan	TW	Dollar	TWD	5.1596
46	Thailand	TH	Baht	THB	4.6725
47	U.A.E.	AE	Dirham	AED	42.0691
48	United Kingdom	GB	Sterling Pound	GBP	202.8074
49	United States of America	US	Dollar	USD	154.5199
50	Zambia (Old)	ZM	Kwacha	ZMK	0.0297
51	Zambia (New)	ZM	Kwacha	ZMW	16.9048
52	Zimbabwe	ZW	Dollar	ZWD	0.4072

Library

A<sub>3</sub>-A<sub>4</sub> (1) + (2)  
12.30



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Year 3 Semester I

REPEAT EXAMINATION

Production and Operations Management – LTPM3207

- This paper consists of SEVEN (07) questions on EIGHT (08) pages.
- Answer FOUR (04) Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2018.12.24<sup>27</sup>

Pass mark: 50%

Time: 02 Hours

## Question 01: (Compulsory)

- (a) Freight car loadings over a 12-year period at a busy port are as follows;

Table 1:1 - Car Loadings

Week	Number	Week	Number	Week	Number
1	220	7	350	13	460
2	245	8	360	14	475
3	280	9	400	15	500
4	275	10	380	16	510
5	300	11	420	17	525
6	310	12	450	18	541

- (i) Determine a linear trend line for freight car loadings. (03 Marks)
- (ii) Use the trend equation to predict loadings for weeks 20 and 21. (03 Marks)



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(iii) The manager intends to install new equipment when the volume exceeds 800 loadings per week. Assuming the current trend continues, the loading volume will reach that level approximately in which week? (04 Marks)

(b) A farming cooperative manager wants to estimate relatives for grain shipments, based on the data shown (quantities are in metric tons)

Table 1:2 - Quarter Grain Shipments

	QUARTER			
Year	1	2	3	4
1	200	451	100	200
2	225	456	125	212
3	210	500	123	202
4	241	472	101	256
5	195	525	152	233

Determine quarter relatives.

(15 Marks)

## Question 02

(a) Briefly describe the term "Operations Management".

(03 Marks)

(b) Identify the three major functional areas of business organizations and briefly describe how they interrelate?

(06 Marks)

(c) Describe the operations functions and the nature of the operations manager's job.

(06 Marks)

(d) Can you think of a business that doesn't have operations management? Explain.

(10 Marks)



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## Question 03

- (a) Identify the main advantage and disadvantage of standardisation. (04 Marks)
- (b) Identify the factors that cause organisations to redesign their products or services. (05 Marks)
- (c) Contrast applied research and basic research. (08 Marks)
- (d) Briefly explain the advantages of Computer Aided Design (CAD) in product design. (08 Marks)

## Question 04

A shop works a 400 minute day. The manager of the shop wants an output of 200 units per day for the assembly line that has the elemental tasks shown in the table.

Do the following:

Table 1:4 - Tasks

Task	Immediately Precedes Task(s)	Task Time
a	b,c,d	0.5
b	e	1.4
c	e	1.2
d	f	0.7
e	g,j	0.5
f	i	1.0
g	h	0.4
h	k	0.3
i	j	0.5
j	k	0.8
k	l	0.9
l	End	0.3





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- (a) Construct the precedence diagram. (02 Marks)
- (b) Assign tasks according to the *most following tasks* rule. (10 Marks)
- (c) Assign tasks according to the *greatest positional weight* rule. (10 Marks)
- (d) Compute the balance delay for each rule. Which one yields the better set of assignments in this instance? (03 Marks)

## Question 05

- (a) In a job shop, effective capacity is only 50% of design capacity, and actual output is 80% of effective output. What design capacity would be needed to achieve an actual output of eight jobs per week? (03 Marks)
- (b) A producer of felt-tip pens has received a forecast of demand of 30,000 pens for the coming month from its marketing department. Fixed costs of \$25,000 per month are allocated to the felt-tip operation, and variable costs are 37 cents per pen.
  - (i) Find the break-even quantity if pens sell for \$1 each. (04 Marks)
  - (ii) At what price must pens be sold to obtain a monthly profit of \$15,000, assuming that estimated demand materialises? (05 Marks)
- (c) A small firm intends to increase the capacity of a bottleneck operation by adding a new machine. Two alternatives, A and B, have been identified, and the associated costs and revenues have been estimated. Annual fixed costs would be \$40,000 for A and \$30,000 for B; variable costs per unit would be \$10 for A and \$11 for B; and revenue per unit would be \$15.
  - (i) Determine each alternative's break-even point in units. (04 Marks)



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(ii) At what volume of output would the two alternatives yield the same profit?

(04 Marks)

(iii) If expected annual demand is 12,000 units, which alternative would yield the higher profit?

(05 Marks)

## Question 06

The production manager has developed an aggregate forecast:

Month	Jan	Feb	Mar	Apr	June	July	Aug	Total
Forecast	50	44	55	60	50	40	51	350

Use the following information to develop aggregate plans.

Regular Production cost	Rs. 80 per Unit
Overtime Production cost	Rs. 120 per Unit
Regular capacity	Rs. 40 units per month
Overtime capacity	8 units per month
Subcontracting cost	Rs. 140 per Unit
Subcontracting capacity	12 units per month
Holding cost	Rs. 10 per unit per month
Back -order cost	Rs. 20 per Unit
Beginning Inventory	0 units

Develop an aggregate plan using each of the following guidelines and compute the total cost for each plan. Which plan has the lowest total cost?

Use a combination of backlogs, subcontracting, and inventory to handle variations in demand.

(25 Marks)



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## Question 07

You have just received an order for 1250 chairs which is to be delivered at the start of week 9 of your schedule. In addition to complete chairs part E is sold separately for repair. There is an order for 380 part Es at the start of week 9. The following table lists parts/ components needed to assemble a chair, lead times (in weeks) and quantities on hand.

Table 7:1 - Item description

Item	Lead Time	Quantity on hand	Components
Saw	2	50	D(1), E(2), C(1)
C	1	40	D(1), F(2)
D	1	30	E(1), F(1)
E	1	30	-
F	1	40	-

- (a) Construct a product structure tree and a master schedule (05 Marks)
- (b) Use low-level-coded bills of material to find the necessary planned order releases for all components. (Use lot for lot ordering) (20 Marks)

-----END OF THE QUESTION PAPER-----



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## Formula Sheet

### Simple Moving Average

$$F_{t+1} = \frac{D_t + D_{t-1} + \dots + D_{t-n+1}}{n}$$

$D_t$  : actual demand in period  $t$

$n$  : number of periods in the average

### 1. Weighted Moving Average

$$T_{t+1} = W_1 D_1 + W_2 D_{t-1} + \dots + W_n D_{t-n+1}$$

### 2. Exponential Smoothing

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

$F_t$  = new forecast

$F_{t-1}$  = previous forecast

$\alpha$  = smoothing (or weighting) constant ( $0 \leq \alpha \leq 1$ )

### 4. Trend Projections

$$y = a + bx$$

$y$  = computed value of the variable to be predicted

$a$  = y-axis intercept

$b$  = slope of the regression line

$x$  = the independent variable

$$b = \frac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n\bar{x}^2}$$

$$a = \bar{y} - b\bar{x}$$

### 5. Exponential Smoothing with Trend Adjustment



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$$F_t = \alpha (A_{t-1}) + (1-\alpha) (F_{t-1} + T_{t-1})$$

$$T_t = \beta (F_t - F_{t-1}) + (1-\beta) T_{t-1}$$

$$FIT_t = F_t + T_t$$



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Year 3 Semester I

REPEAT EXAMINATION

Transport Planning and Logistics Management – LTTM 3208

- This paper consists of SEVEN questions on SEVEN (07) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2018.12.26

Pass mark: 50%

Time: 02 Hours

**Question 01: (Compulsory)**

- (a) State the function of transport in logistics management. (03 Marks)
- (b) Briefly discuss the actors and their roles in the freight movement. (06 Marks)
- (c) Define the following terminologies commonly used in transportation network.
- Link
  - Node
  - Flow
  - Path
  - Cycle
  - Tree
- (06 Marks)
- (d) Briefly explain the usage of Dijkstra's algorithm in transportation network. (04 Marks)
- (e) Compare and contrast the usage of Chinese Postman Problem for oriented and non-oriented transport network. (02 Marks)
- (f) Briefly discuss the term 'generalized cost' in terms of freight transportation that is highly useful for planning trip distribution and mode choice. (04 Marks)



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## Question 02

(a) Explain the following indexes that could be used to measure the efficiency of a transportation network.

I. Detour Index

II. Network Density

(04 Marks)

(b) Compare and contrast linear network with grid network in transportation network topologies.

(06 Marks)

(c) Compare and contrast point to point network and hub and spoke network with related to economies of scale at hubs.

(06 Marks)

(d) Differentiate topology versus typology using two (02) each example.

(05 Marks)

(e) Discuss two advantages of having an efficient freight transport system through railways in Sri Lanka.

(04 Marks)

## Question 03

(a) Briefly describe the use of Floyd's algorithm in transportation planning.

(04 Marks)

(b) Identify three contributions that containerization has made to the change of era in international trade.

(03 Marks)

(c) Determine the shortest paths between node 5 to node 4 on transportation network shown below in Q3-c. The distance between nodes are stipulated in the network. The last distance matrix and the last predecessor node matrix obtained after using Floyd's algorithm to the network are shown by  $D_5$  and  $Q_5$  respectively.



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05

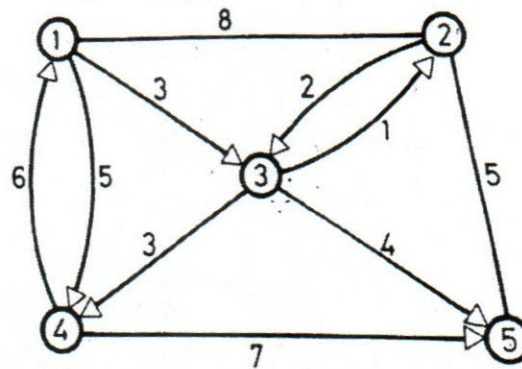


Figure Q3-c: Transportation network to which Floyd's algorithm applied.

Table Q3-c1: The last distance matrix ( $D_5$ )

i \ j	1	2	3	4	5
1	0	4	3	5	7
2	8	0	2	5	5
3	9	1	0	3	4
4	6	10	9	0	7
5	13	5	7	10	0

Table Q3-c2: The last predecessor node matrix ( $Q_5$ )

i \ j	1	2	3	4	5
1	0	3	1	1	3
2	2	0	2	3	2
3	2	3	0	3	3
4	4	3	1	0	4
5	2	5	2	3	0

(05 Marks)

- (d) Determine the minimum spanning tree for the transportation network shown in figure Q3-d.





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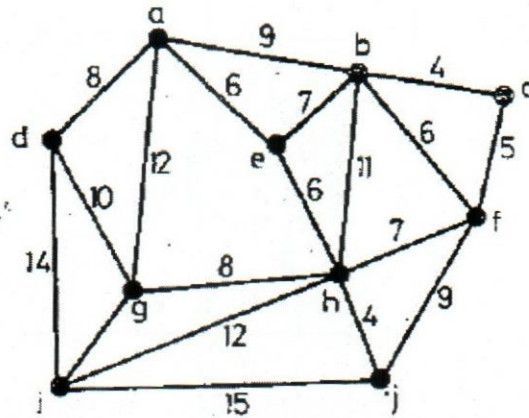
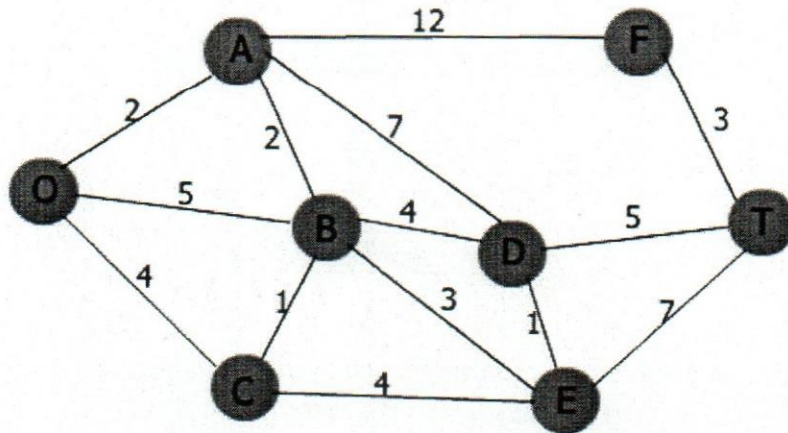


Figure Q3-d: Transportation network for which minimum spanning tree to be found

(13 Marks)

## Question 04

- State two functionalities of transportation in terms of freight movement. (02 Marks)
- Find the shortest route from the origin O to the destination T for the network shown in figure Q4-b using Dijkstra's Algorithm. The travel cost between nodes are stipulated in the figure.





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Figure Q4-b: Network to which shortest paths to be found out using Dijkstra Algorithm

(17 Marks)

- (c) Find the total flow through the network shown in Q4-c when the node 1 is the source and node 4 is the sink. Flows between nodes are shown in the figure.

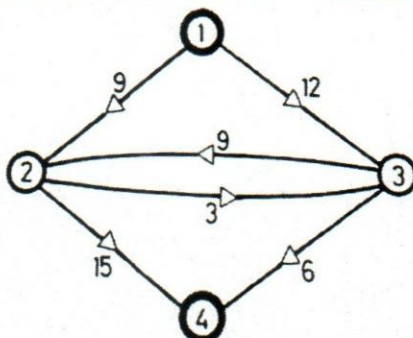


Figure Q4-c: Transportation network flow conservation law to be applied

(06 Marks)

Question 05

- (a) Identify two factors that contribute for the economic development of a country. (05 Marks)
- (b) Determine the maximum flow between node s and node t of the transportation network shown in figure Q5-b1. Capacities of individual branches are shown on the figure. The very last modified capacity matrix is shown in table Q5-b1.

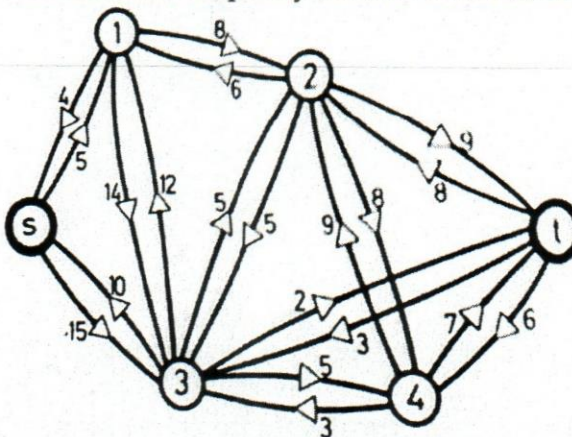


Figure Q5-b1: The transportation network for which maximum flow to be found between node s and node t



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Table Q5-b1: The very last modified capacity matrix

s \ T	S	1	2	3	4	t
s	0	0	0	2	0	0
1	9	0	2	15	0	0
2	0	12	0	10	6	0
3	23	11	0	0	0	0
4	0	0	11	8	0	0
t	0	0	17	5	13	0

(14 Marks)

- (c) Describe three ways that freight transportation helps for the economic development.

(06 Marks)

## Question 06

- (a) Solve the Chinese Postman problem for a tour which starts and finishes in node a of the transportation network shown in Figure Q6-b.

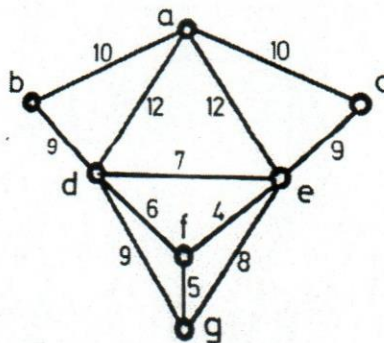


Figure Q6-b: Non oriented network for solving the Chinese Postman problem

(16 Marks)

- (b) Describe three means how freight transportation affect environment.

(09 Marks)



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## Question 07

Write short notes for the following.

- (a) Two implicit transportation policies
- (b) Centripetal networks versus centrifugal networks
- (c) Transportation as a means of minimizing temporal, financial and environmental resource cost
- (d) Two difficulties in collecting freight related data.
- (e) Define speed, flow and density in traffic.

(25 Marks)

-----END OF THE QUESTION PAPER-----

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Year 3 Semester I

REPEAT EXAMINATION

Operational Research – LTOR3206

- This paper consists of SEVEN (07) questions on FIVE (05) pages.
- Answer FOUR (04) Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2018.12.23

Pass mark: 50%

Time: 02 Hours

**Question 01 and Question 02 are based on the case given below.**

### CASE STUDY

Mr. Ratnayake is a retired government servant who is interested in investing up to an amount of LKR 300,000.00 in a fixed income securities. For this purpose, he consulted a broker and broker recommends investing in two bonds.

BOND A: yielding 7%

BOND B: yielding 10%

After some consideration, Mr. Ratnayake decides to invest at most LKR. 120,000.00 in BOND B and at least LKR. 60,000.00 in BOND A. He also wants the amount invested in BOND A to be at least equal to the amount invested in BOND B.

Mr. Ratnayake is interested in maximizing his return on investment.



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## Question 01 Compulsory

Formulate a Linear Programming model for the above case. (25 Marks)

## Question 02

Solve the formulated LP model graphically. (25 Marks)

## Question 03

Solve the below LP model using *Simplex Method*. (25 Marks)

$$\text{Maximize } Z = 6X_1 + 4X_2$$

Subject to the constraints

$$2X_1 + 3X_2 \leq 30$$

$$3X_1 + 2X_2 \leq 24$$

$$X_1 + X_2 \leq 10$$

$$X_1, X_2 \geq 0$$

Check the existence of alternative optima. If an alternative optimum exists, find the alternative solution.

## Question 04

(a) Explain when we need to use 2 phase method. (05 Marks)

(b) Use 2 phase method and solve the following Linear Programming Problem by clearly stating the phase I objective function. (20 Marks)

$$\text{MAX } Z = 2X_1 + 5X_2$$

Subject to:

$$3X_1 + 2X_2 \geq 6$$

$$2X_1 + X_2 \leq 2$$

$$X_1, X_2 \geq 0$$



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02

## Question 05

$$\text{MAX } z = 4X_1 + 2X_2 + 6X_3$$

Subject to

$$2X_1 + X_2 + X_3 \leq 10$$

$$2X_1 + 3X_2 + 3X_3 \leq 10$$

$$X_1, X_2, X_3 \geq 0$$

- (a) Construct the dual problem, for this primal problem. (05 Marks)
- (b) Solve the primal and dual problems using any appropriate method. (20 Marks)

## Question 06

Consider a transportation problem where items should be transported from 03 warehouses to 04 sales outlets.

Table 4

		Sales Outlets				Supply
		S1	S2	S3	S4	
Warehouses	W1	7	3	8	6	60
	W2	4	2	5	10	100
	W3	2	6	5	1	40
Demand		20	50	50	80	200

- (a) Using North West Corner method to find the initial transportation schedule. (05 Marks)
- (b) Find the optimal transportation schedules using any appropriate method. (15 Marks)
- (c) Evaluate the minimum transportation cost. (05 Marks)



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## Question 07

### CASE I

Dr. Greru is a dentist who schedules all his patients for 30-minutes appointments. Some of the patients take more or less than 30 minutes depending on the type of dental work to be done. The following summary shows the various categories of work, their probabilities and the time actually needed to complete the work.

Table 7.01

CATEGORY	TIME REQUIRED	PROBABILITY OF THE CATEGORY
Filling	45 minutes	0.40
Crown	60 minutes	0.15
Cleaning	15 minutes	0.15
Extraction	45 minutes	0.10
Check-up	15 minutes	0.20

Simulate the dentist's clinic for **FOUR** hours and determine average waiting time for the patients as well as the idleness of the doctor.

Assume that all patients show up at the clinic at exactly their scheduled arrival time starting at 8.00 am. Use below random numbers for simulation run.

40 82 11 34 25 66 17 79

(10 Marks)





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02 \$

## CASE II

Dr. Greru is planning to recruit a trainee dentist in his dental clinic to reduce the waiting time of his patients. But this Trainee dentist is performing

- Cleaning
- Extraction and
- Checkup jobs ONLY.

Anyway if both of the dentists available, patients are preferred Dr. Greru, as he is more experienced person.

Simulate dentist's clinic again for FOUR hours, and compare the average waiting time of patients in both cases.

(15 Marks)

-----END OF THE QUESTION PAPER-----



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Course CODE: COM551

Year 3 Semester I

REPEAT EXAMINATION

Environmental and Social Impacts of Transport and Logistics - LTEL 3205

- This paper consists of SEVEN (07) questions on TWO (02) pages.
- Answer FOUR questions including question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly.

Date: 2018.12.21

Pass mark: 50%

Time: 02 Hours

**Question 01**

- (a) Give an elaborated and summarized view the on MERPOL Convention.
- (b) How would you describe Greenhouse gases (GHG) of the atmosphere?

(25 Marks)

**Question 02**

Give brief elaborated introductory explanation on the following:

- (a) MARPOL
- (b) Ballast water management
- (c) Polar code

(25 Marks)

**Question 03**

Explain in details, how would the maritime transportation effect to impact or pollute the marine environment?

(25 Marks)



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Course CODE: COM551

## Question 04

Along with a brief description to below, list down 6 threats each may contribute to damage the marine environment (25 Marks)

- (a) Dry Cargo Ships
- (b) Tankers ships
- (c) RoRo ships
- (d) Passenger Ships

## Question 05

List down 8 threats to the marine and coastal environment you could anticipate upon a spillage of 50% of crude oil cargo from a fully laden ULCC. (25 Marks)

## Question 06

Briefly discuss any incident involving ship you are aware of which is known to have caused extensive damages to the marine environment. (25 Marks)

## Question 07

Briefly discuss any incident involving ship you are aware of which is known to have caused extensive damages to the marine environment. (25 Marks)

-----END OF THE QUESTION PAPER-----



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Course CODE: COM551

06

Year 3 Semester I

REPEATEXAMINATION

Customs and Commodity Inspection Operations – LTCO3204

- This paper consists of SEVEN questions on FOUR (04) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.
- Supporting documents are attached.

Date: 2018.12.20

Pass mark: 50%

Time: 02 Hours

**Question 01 (Compulsory)**

Good Food International Group is a multinational company based in The Netherlands and owns several wheat cultivating farms in several countries in the world. The Good Food International Group is the rights holder for the internationally popular bakery products under the brand name "Big Bite".

Good Food Canada Ltd is a wheat cultivating company based in Canada. They cultivate and process wheat according to the quality standards set out by Good Food International Group and supply the same only to the buyers nominated by Good Food International Group. Good Food International Group holds 43% of shares of Good Food Canada Ltd and several Directors of Good Food Canada Ltd are also Directors of Good Food International Group.

Good Food Lanka Ltd is a Sri Lankan company registered under the Companies Act. However, Good Food International Group holds 48% of shares of Good Food Lanka Ltd. Several Directors including the Managing Director of Good Food Lanka Ltd are also Directors of Good Food International Group. Good Food International Group has authorized Good Food Lanka Ltd to import wheat in bulk only from Good Food Canada Ltd and manufacture wheat flour in their flour mill situated in Galle Port. During the milling process Good Food Lanka Ltd can manufacture 950kg of pure wheat flour and 50kg of wheat bran from one metric ton of wheat. The wheat flour and wheat bran are packed in 50kg bags separately and sold for making bakery products and animal feed respectively. A bag of wheat flour is sold at Rs. 4,000/= while a bag



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of wheat bran is sold at Rs. 1,250/= . According to the tripartite agreement signed between Good Food International Group, Good Food Canada Ltd and Good Food Sri Lanka Ltd, Good Food Sri Lanka Ltd should pay 5% from the sales proceeds of flour and bran to Good Food International Group.

Good Food Lanka has imported a shipment of 20,000 metric tons of wheat from Good Food Canada Ltd in a chartered vessel at the FOB price of USD 200 per metric ton. According to the charter party agreement entered into between Good Food Sri Lanka Ltd and the shipping company, the freight charges for a voyage from Canada to Colombo is USD 75,000. In addition to that a pumping charge of USD 5 per metric ton was also payable for discharging the wheat from the vessel to the silos at the Port of Galle.

The marine insurance has been obtained locally from Sri Lanka Insurance Company on payment of Rs. 650,869.60 for the whole shipment.

In the Customs Declaration submitted to Sri Lanka Customs by Good Food Sri Lanka Ltd for the clearance of the said shipment, the Customs Value was given as Rs. 650,869,600/=. The Customs Officers rejected this value and move to calculate the correct Customs Value. Presume that you are the Customs Officer who was entrusted with this task and calculate the Customs Value of the subject shipment in Sri Lankan Rupees. The Exchange Rate is provided in the attached sheet. (25 Marks)

## Question 02

Coco Fiber (Pvt) Ltd has imported a consignment of 1x20 container containing 2,621 Broom made of coconut fibre from Malaysia. The price paid is CIF Colombo USD 0.20 per Broom. According to the Sri Lanka Tariff Guide 2017, Broom made of coconut fibre is classified within HS Code 9603.10.10 and the following taxes are payable for the importation.

1. Customs Duty - 30%
2. VAT - 15%
3. PAL - 7.5%
4. NBT - 2%
5. Cess - 20% or Rs. 75/= per unit
6. Excise (SP) Duty - 17% or Rs. 15/= per unit

Calculate all six taxes payable for the above shipment. Exchange Rates and Formulas are provided in the attached documents to this question paper.

(25 Marks)



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06

## Question 03

- (a) Write a short essay about the World Trade Organization (WTO).  
(07 Marks)
- (b) Name the six methods given in the WTO Valuation Agreement to determine the Customs Value and explain in detail the Article 1 and the Article 8 of the Schedule E of the Customs Ordinance of Sri Lanka.  
(18 Marks)

## Question 04

- (a) Write a short essay about the World Customs Organisation (WCO).  
(07 Marks)
- (b) Explain in the structure of a HS Code upto 6 digits and the procedure one should follow to determine the HS Code of any given commodity.  
(18 Marks)

## Question 05

Explain in detail the first three General Interpretative Rules (GIR) for the interpretation of Harmonized System with suitable examples.

(25 Marks)

## Question 06

Describe the functions of the Sri Lanka Customs and legislative framework related to such functions.

(25 Marks)



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## Question 07

Write short essays on 4 of the following topics.

(25 Marks)

- (a) Customs Ordinance
- (b) Imports and Exports (Control) Act
- (c) INCOTERMS
- (d) Methods of payment in international trade
- (e) Value of identical goods and similar goods
- (f) Trade agreements
- (g) Roles of Sri Lanka Customs

-----END OF THE QUESTION PAPER-----

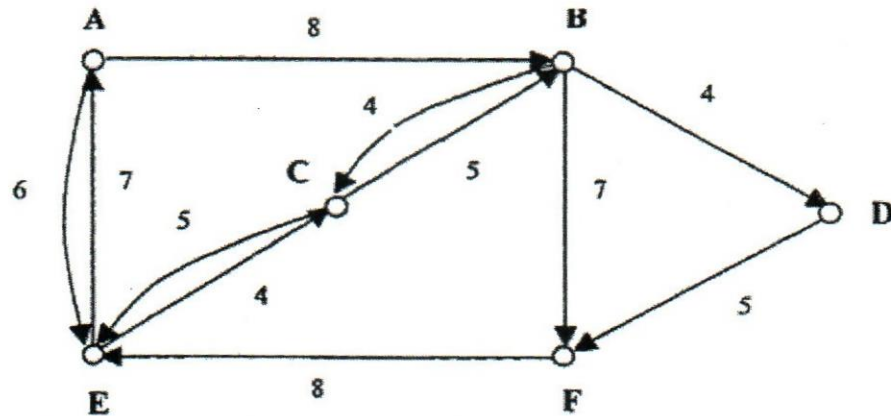


Figure Q6-b: Oriented network for solving the Chinese Postman problem

(13 Marks)

c) Describe three means how freight transportation affect environment.

(09 Marks)

### Question 07

(a) Briefly explain the statement 'Improved allocation of road user charges is a policy option for better freight transport management'.

(05 Marks)

(b) State two methods used commonly for forecasting future freight trips.

(06 Marks)

(c) Define Euler Tour and Euler Path addressing the importance in solving Chinese Postman Problem.

(05 Marks)

(d) Describe three roles of freight demand modelling.

(09 Marks)

-----END OF THE QUESTION PAPER-----





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Year 3 Semester I

SEMESTER END EXAMINATION

Environmental and Social Impacts of Transport and Logistics - LTEL 3205



- This paper consists of SEVEN (07) questions on FOUR (04) pages.
- Answer FOUR questions including question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly.

Date: 2019.09.10

Pass mark: 50%

Time: 02 Hours

### Question 01 (Compulsory)

Briefly discuss the factors to be considered under its "determinants" and "fluctuations" on maritime transportation "costs", and what we can do to control and standardize.

(25 marks)

### Question 02

In the following map, indicate by drawn lines and the distances from coast the following limits of Sri Lanka:

- (a) Territorial Waters
- (b) Contiguous Zone
- (c) Exclusive Economic Zone'



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Figure 2.01

Note: the maximum length of 268 miles and a maximum width of 139 miles.

(25 marks)



**Question 03**

Under Coastal Management Systems in Sri Lanka, give brief introduction to the following, their importance and the threats they face upon in the event of a maritime desalter.

- (a) Lagoons & Estuaries
- (b) Seagrass Beds
- (c) Mangroves
- (d) Coral Reefs
- (e) Salt Marshes

(25 marks)

**Question 04**

- (a) Give an elaborated and summarized view the on MERPOL Convention.
- (b) How would you describe Greenhouse gases (GHG) of the atmosphere?

(25 marks)

**Question 05**

- (a) Transportation systems worldwide are undergoing a shift from supply side techniques to demand management. Identify such demand management strategies and explain how they can be used to improve the transportation system of Sri Lanka. (15 Marks)
- (b) Sri Lanka incurs a massive financial and man-hour loss due to traffic congestion. Traffic congestion is one of the most serious problems in big cities like Colombo and Kandy. Discuss on Intelligent transport systems (ITS) that can be used to reduce the road traffic congestion. (10 Marks)



**Question 06**

- (a) 'Conducting an Environmental Impact Assessment (EIA) has a long-term aim and objectives.' Explain this statement. (06 Marks)
- (b) Prepare the scoping impact of a proposed expressway from Kandy to Dambulla. (10 Marks)
- (c) Explain why public involvement in an EIA is important, especially in transport projects. (09 Marks)

**Question 07**

- (a) Identify 3(three) alternative fuels that are in use today and its sources. (06 Marks)
- (b) Discuss the advantages and disadvantages of using alternative fuels for transport activities in comparison to use of petroleum. (09 Marks)
- (c) Explain with examples criteria used for evaluating an energy source. (10 Marks)

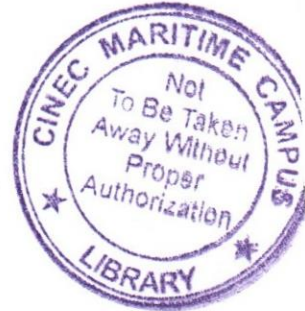
-----END OF THE QUESTION PAPER-----



Year 3 Semester I

SEMESTER END EXAMINATION

Production and Operations Management – LTPM3207



- This paper consists of SEVEN (07) questions on EIGHT (08) pages.
- Answer FOUR (04) Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2019.09.05

Pass mark: 50%

Time: 02 Hours

### Question 01 (Compulsory)

(a) Prepare a forecast using each of below approaches:

**Table 1:1 – Seasonal Relatives**

Month	Number of orders
Jan	60
Feb	65
Mar	55
Apr	58
May	64

- (i) The appropriate naïve approach (01 Mark)
- (ii) A four-period moving average (02 Marks)
- (iii) A weighted average using weights of 0.5, 0.3 and 0.2 (02 Marks)



- (b) Logistics firm operations of last 7 weeks are shown in the table below. Predict the operations of 8<sup>th</sup> and 9<sup>th</sup> weeks by using appropriate forecasting technique.

(06 Marks)

**Table 1:2 - Operations**

Week	Operations
1	405
2	410
3	420
4	415
5	412
6	120
7	124

- (c) A well-known transport agency wants to predict quarterly demand for periods 15 and 16. Use below information to predict the demand. The series consists of both trend and seasonality.

(14 Marks)

**Table 1:2 - Demand**

Year	Quarter	Actual Demand
1	1	132
2	2	140
3	3	146



4	4	153
5	1	160
6	2	168
7	3	176
8	4	185

### Question 02

- (a) Define the term "Operations Management". (02 Marks)
- (b) Briefly explain the Business Operations overlap. (05 Marks)
- (c) Briefly explain the transformation process of an organization. (06 Marks)
- (d) Briefly explain the "Value-Added" in Operations Management. (06 Marks)
- (e) Briefly explain the role of a Operations Manager. (06 Marks)

### Question 03

- (a) Identify and briefly explain two types of researches in Operations Management. (05 Marks)
- (b) Identify five reasons for product and service design and explain one of those. (06 Marks)
- (c) Briefly explain trends in product and service design. (06 Marks)
- (d) Briefly explain three sources of ideas for product and service design. (08 Marks)



### Question 04

Twelve tasks, with times and precedence requirements as shown in the following table, are to be assigned to workstations using a cycle time of 1.2 minutes. Two heuristic rules will be tried:

- 1) Greatest positional weight, and 2) greatest number of following tasks.

In each case, the tiebreaker will be shortest task time.

Task	Length (minutes)	Follows Task
a	0.1	–
b	0.2	a
c	0.9	b
d	0.6	c
e	0.1	–
f	0.2	d, e
g	0.4	f
h	0.1	g
i	0.2	h
j	0.7	i
k	0.3	j
l	0.2	k

- (a) Draw the precedence diagram for this line. (03 Marks)
- (b) Assign tasks to stations under each of the two rules. (18 Marks)
- (c) Compute the percentage of idle time for each rule. (04 Marks)





### Question 05

- (a) A work center operates 2 shifts per day 5 days per week (8 hours per shift) and has 4 machines of equal capability. This is the effective capacity. If the work center has a system efficiency of 95%, what is the expected output in hours per week?

(05 Marks)

- (b) A manager is trying to decide whether to purchase a certain part or to have it produced internally. Internal production could use either of two processes. One would entail a variable cost of \$ 17 per unit and an annual fixed cost of \$200,000; the other would entail a variable cost of \$14 per unit and an annual fixed cost of \$240,000. Three vendors are willing to provide the part. Vendor "A" has a price of \$20 per unit for any volume up to 30,000 units. Vendor "B" has a price of \$22 per unit for demand of 1,000 units or less, and \$18 per unit for larger quantities. Vendor "C" offers a price of \$21 per unit for the first 1,000 units, and \$19 per unit for additional units.

If the manager anticipates an annual volume of 10,000 units, which alternative would be best from a cost standpoint? For 20,000 units, which alternative would be best?

(08 Marks)

- (c) The owner of logistics firm, is contemplating adding a new project, which will require leasing a new vehicle for a monthly payment of \$6000. Variable costs would be \$2.00 per each contract, and they earn \$7.00 from each .

- (i) How many contracts must have in order to break even? (02 Marks)
- (ii) What would the profit (loss) be for 1,000 contracts in a month? (02 Marks)
- (iii) How many contracts must have to realize a profit of \$4,000? (04 Marks)
- (iv) For 2,000 contracts, and a profit target of \$5,000, what price should be charged per contract? (04 Marks)



### Question 06

Now juice, Inc., produces bottled pickle juice. A planner has developed an aggregate forecast for demand (in cases) for the next six months.

Month	May	Jun	Jul	Aug	Sep	Oct
Forecast	4000	4800	5600	7200	6400	5000

Use the following information to develop aggregate plans

Regular Production cost	Rs. 10 per case
Regular Production capacity	5,000 cases
Overtime Production cost	Rs. 16 per case
Subcontracting cost	Rs. 20 per case
Holding cost	Rs. 10 per case per month
Beginning Inventory	0 units

Develop an aggregate plan using a combination of overtime (500 cases per period maximum), inventory, and subcontracting (500 cases per period maximum) to handle variations in demand.

(25 Marks)

### Question 07

One unit of A is made of two units of B and one unit of C. B is made of three units of D and one unit of F. C is composed of three units of B, one unit of D, and four units of E. D is made of one unit of E. Item C has a lead time of one week; Items A, B, E, and F have two-week lead times; and Item D has a lead time of three weeks.

Lot-for-lot lot sizing is used for Items C, E, and F; lots of size 20, 40, and 160 are used for



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items A, B, and D, respectively. Items A, B, D, and E have on-hand (beginning) inventories of 5, 10, 100, and 100, respectively; all other items have zero beginning inventories. We are scheduled to receive 10 units of A in Week 3, 20 units of B in Week 7, 40 units of F in week 5 and 60 units of E in Week 2; there are no other schedule receipts. If 20 units of A are required in Week 10, use the low-level-coded bill of materials (product structure tree) to find the necessary planned order releases for all components.

(25 Marks)

-----END OF THE QUESTION PAPER-----



## Formula Sheet

### Simple Moving Average

$$F_{t+1} = \frac{D_t + D_{t-1} + \dots + D_{t-n+1}}{n}$$

$D_t$  : actual demand in period  $t$

$n$  : number of periods in the average

### 1. Weighted Moving Average

$$T_{t+1} = W_1 D_1 + W_2 D_{t-1} + \dots + W_n D_{t-n+1}$$

### 2. Exponential Smoothing

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

$F_t$  = new forecast

$F_{t-1}$  = previous forecast

$\alpha$  = smoothing (or weighting) constant ( $0 \leq \alpha \leq 1$ )

### 4. Trend Projections

$$y = a + bx$$

$y$  = computed value of the variable to be predicted

$a$  = y-axis intercept

$b$  = slope of the regression line

$x$  = the independent variable

$$b = \frac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n\bar{x}^2} \quad a = \bar{y} - b\bar{x}$$

### 5. Exponential Smoothing with Trend Adjustment

$$F_t = \alpha (A_{t-1}) + (1-\alpha) (F_{t-1} + T_{t-1})$$

$$T_t = \beta (F_t - F_{t-1}) + (1-\beta) T_{t-1}$$

$$FIT_t = F_t + T_t$$



Year 3 Semester I

SEMESTER END EXAMINATION

Operational Research – LTOR3206



- This paper consists of TWO (02) parts on THIRTEEN (13) pages.
- Part A is compulsory
- Answer TWO (02) Questions from Part B.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2019.09.03

Pass mark: 50%

Time: 02 Hours

**PART A (Compulsory)**

**Question 01**

Use MCQ answer sheet to answer following questions with one correct answer.

1. Unboundedness is usually a sign that the LP problem

- (A) has finite multiple solutions
- (B) is degenerate.
- (C) contains too many redundant constraints.
- (D) has been formulated improperly.

2. The objective functions and constraints are linear relationships between

.....

- (A) variables
- (B) constraints
- (C) Functions
- (D) All of the above



3. In order for a linear programming problem to have a unique solution, the solution must exist .....

- (A) at the intersection of the nonnegativity constraints.
- (B) at the intersection of two or more constraints.
- (C) at the intersection of a nonnegativity constraint and a resource constraint.
- (D) at the intersection of the objective function and a constraint.

4. LP theory states that the optimal solution to any problem will lie at.....

- (A) the origin.
- (B) the highest point of the feasible region.
- (C) a corner point of the feasible region.
- (D) the lowest point in the feasible region.

5. The first step in formulating an LP problem is

- (A) graph the problem.
- (B) identify the objective and the constraints.
- (C) define the decision variables.
- (D) understand the managerial problem being faced.

6. What is the cost of the transportation solution shown in the table?

	W	X	Y	Supply
A	\$3 20	\$5 50	\$9 0	70
B	\$5 0	\$4 30	\$7 0	30
C	\$10 40	\$8 0	\$3 80	120
Demand	60	80	80	220



- (A) \$1350
- (B) \$1070
- (C) \$1230
- (D) \$1150

7. An initial transportation solution appears in the table given below.

	C	D	Factory Capacity
A	10	0	10
B	15	25	40
Warehouse			
	25	25	50
Demand			

Can this solution be improved if it costs \$5 per unit to ship from A to C; \$7 per unit to ship from A to D; \$8 to ship from B to C; and \$9 to ship from B to D?

- (A) Yes, the initial solution can be improved by \$10.
  - (B) No, this solution is optimal.
  - (C) Yes, this solution can be improved by \$50.
  - (D) Yes, this solution can be improved by \$100.
8. The transportation method assumes that .....
- (A) there are no economies of scale if large quantities are shipped from one source to one destination.
  - (B) the number of occupied squares in any solution must be equal to the number of rows in the table plus the number of columns in the table plus 1
  - (C) there is only one optimal solution for each problem.
  - (D) the number of dummy sources equals the number of dummy destinations.



9. Which of the following is a method for improving an initial solution in a transportation problem?

- (A) Least Cost
- (B) northwest-corner
- (C) Method of Multipliers
- (D) Vogel's Approximation Method

10. The purpose of a dummy source or dummy destination in a transportation problem is to

- (A) prevent the solution from becoming degenerate.
- (B) make certain that the total cost does not exceed some specified figure.
- (C) provide a means of representing a dummy problem.
- (D) obtain a balance between total supply and total demand.

11. With the transportation technique, the initial solution can be generated in any fashion one chooses. The only restriction is that

- (A) the solution is not degenerate.
- (B) the edge constraints for supply and demand are satisfied.
- (C) one must use the northwest-corner method.
- (D) the solution must be optimal.

12. The purpose of the method of Multipliers is to

- (A) assist one in moving from an initial feasible solution to the optimal solution.
- (B) determine whether a given solution is feasible or not
- (C) identify the relevant costs in a transportation problem.
- (D) develop the initial solution to the transportation problem.





13. if the feasible region of a LP model is empty, the solution is,

- (A) infeasible
- (B) unbounded
- (C) alternative
- (D) degeneracy

14. if there are 'm' original variables and 'n' introduced variables, then there will be ..... columns in the simplex table

- (A)  $m+n-3$
- (B)  $m+n+3$
- (C)  $m-n$
- (D)  $m+n-1$

15. If in a LP model, the solution of a variable can be made infinitely large without violating the constraints, the solution is

- (A) infeasible
- (B) alternative
- (C) unbounded
- (D) degeneracy

16. In 2-phase method, we add ..... variables in the case of '='

- (A) artificial variables
- (B) slack variables
- (C) surplus variables
- (D) all of the above



17. Which of the following statement is true with respect to the optimal solution of an LP problem
- (A) every LP problem has an optimal solution
  - (B) optimal solution of an LP model always occurs at extreme point
  - (C) at optimal solution, all resources are fully utilized.
  - (D) if an optimal solution exists, there will always be at least one at a corner
18. While plotting constraints on a graph paper, terminal points on both axes are connected by a straight line because .....
- (A) the resources are limited in supply
  - (B) the objective function as a linear function
  - (C) the constraints are linear equations or inequalities
  - (D) all of the above
19. alternative solution exists when .....
- (A) one constraint is redundant
  - (B) objective function is parallel to binding constraint
  - (C) two constraints are parallel
  - (D) all of the above
20. .... assumption means the prior knowledge of all the coefficients in the objective function, the coefficients of the constraints and the resource values.
- (A) proportionality
  - (B) certainty
  - (C) additivity
  - (D) divisibility
21. Operations research practitioners do not .....
- (A) Predict future operations
  - (B) Build more than one model



- (C) Collect relevant data  
(D) Recommend decisions and accept
22. Decision variables are .....
- (A) Controllable  
(B) Uncontrollable  
(C) Parameters  
(D) All of the above
23. Every mathematical model .....
- (A) Must be deterministic  
(B) Required computer aid for its solution  
(C) Represents data in numeric form  
(D) All of the above
24. A model is an .....
- (A) An essence of reality  
(B) An approximation  
(C) An idealization  
(D) All of the above
25. Operations research approach is .....
- (A) Multi-disciplinary  
(B) Scientific  
(C) Intuitive  
(D) All of the above



### Question 02 (Compulsory)

A leading chartered accountant is attempting to determine the best investment portfolio and is considering six alternative investment proposals. The following table indicates point estimates for the price per share, the annual growth rate in the price per share, the annual dividend per share and a measure of the risk associated with each investment. Table 2.01 gives the portfolio data.

Table 2.01

Shares under the consideration	Investment alternatives					
	A	B	C	D	E	F
Current price per share LKR	80.00	100.00	160.00	120.00	150.00	200.00
Projected annual growth rate	0.08	0.07	0.01	0.12	0.09	0.15
Projected annual dividend per share LKR	4.00	4.50	7.50	5.50	5.75	0.00
Projected risk return	0.05	0.03	0.10	0.20	0.06	0.08

- The total amount available for investment is LKR 1,250,000.00 and the following conditions are required to be satisfied.
- The maximum rupee amount to be invested in alternative 'F' is LKR 250,000.00.
- No more than LKR 500,000 should be invested in alternative A and B combined.
- Total weighted risk should not be greater than 0.10.
- $$\text{Total weighted risk} = \frac{(\text{amount invested in alternative } i) * (\text{risk of alternative } i)}{(\text{total amount invested in all the alternatives})}$$
- For the sake of diversity, at least 100 shares of each stock should be purchased.
- At least 10% of the total investment should be in alternatives A and B combined.



- Dividends for the year should be at least LKR 10,000.00.
- Rupee return per share of stock = current price per share + dividend per share
- If the objective is to maximise total rupee return, formulate this problem as an LP model.
- Assume that the time horizon for the investment is one year.

(25 Marks)

### PART B - Answer TWO (02) questions ONLY

#### Question 03

A manufacturer of packing materials manufactures two different types of packing tins; type A and type B. Major production facilities involved are cutting and joining. The cutting department can process 300 type A tins or 500 type B tins per hour. The joining department can process 500 type A tins or 300 type B tins per hour. If the contribution towards profit for type A tin is the same as that of a type B tin (USD 1),

Find the optimum production level using graphical method. (25 Marks)

#### Question 04

Consider the LP model given below;

$$\text{Minimize } Z = 10 X_1 + 20 X_2$$

Subject to

$$3 X_1 + 2 X_2 \geq 18$$

$$X_1 + 3 X_2 \geq 8$$

$$2 X_1 + X_2 \geq 6$$

$$X_1, X_2 \geq 0$$



- (a) Construct the dual problem, for this primal problem. (05 Marks)
- (b) Solve the primal problem using any appropriate method. (20 Marks)

### Question 05

Consider the LP model given below.

$$\text{Minimize } Z = 40 X_1 + 24 X_2$$

Subject to

$$20 X_1 + 50 X_2 \geq 4800$$

$$80 X_1 + 50 X_2 \geq 7200$$

$$X_1, X_2 \geq 0$$

Use 2 phase method and solve the following Linear Programming Problem by clearly stating the phase I objective function. (25 Marks)

### Question 06

Melwa steel company is concerned with the problem of distributing imported ore from three ports (Colombo, Hambanthota and Galle) to four steel mills. The supplies of ore arriving at the ports are

Table 6.01

Port Name	Supply Tonnes per week
Port of Colombo	20,000
Port of Hambanthota	38,000
Port of Galle	16,000

The demand at four steel mills are as follows

Table 6.02

Steel Mill	Demand Tonnes per week
A	10,000
B	18,000



C	22,000
D	24,000

The transportation cost is USD 0.5 per tonne per kilometre. The distance between the ports and the steel mills is as given below.

Table 6.03

	A	B	C	D
Port of Colombo	50	60	100	50
Port of Hambanthota	80	40	70	50
Port of Galle	90	70	30	50

- (a) Calculate the unit transportation cost from  $i^{\text{th}}$  port to  $j^{\text{th}}$  steel mill  
(05 Marks)
- (b) Find the initial transportation schedule using North West Corner method  
(05 Marks)
- (c) Find the optimal transportation schedule  
(15 Marks)

### Question 07

#### CASE I

Mr. Seneviratne is a system administrator of leading company, responsible for training non-IT staff members individually of the company for new software platform. As the IT literacy of staff members are different, training requirement of the staff members are also different. He schedules all his training sessions for 30-minutes. Some of the staff members take more or less than 30 minutes depending on the type of training requested. The following summary shows the various categories of training, their probabilities and the time actually needed to complete the training.



Table 7.01

CATEGORY OF TRAINING	TIME REQUIRED	PROBABILITY OF THE CATEGORY
Backup emails	45 minutes	0.40
Monthly backup of SAP system	60 minutes	0.15
Web browsing and email basics	15 minutes	0.15
OS installation	45 minutes	0.10
Troubleshooting	15 minutes	0.20

Simulate the training session of Mr. Seneviratne for **FOUR** hours and determine average waiting time for the staff members as well as the idleness of the trainer Mr. Seneviratne.

Assume that all staff members show up at the IT department at exactly their scheduled arrival time starting at 8.00 am. Use below random numbers for simulation run.

40 82 11 34 25 66 17 79

### CASE II

Mr. Seneviratne is planning to recruit a trainee IT assistant on contract basis to reduce the waiting time of his staff members. But this Trainee is performing

- Web browsing and email basics
- Troubleshooting
- OS installations ONLY





Anyway if both of the trainees available, staffmembers are preferred Mr. Seneviratne, as he is more experienced person.

Simulate training sessions again for FOUR hours, and compare the average waiting time of patients in both cases.

What are recommendations that you suggest to Mr. Seneviratne in recruiting trainee person according to the results of your simulation?

(25 Marks)

----- **END OF THE QUESTION PAPER** -----



## Year 3 Semester I

## SEMESTER END EXAMINATION

## Airline Business Management – LTAM3202



- This paper consists of SEVEN questions on FIVE (05) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2019.08.31

Pass mark: 50%

Time: 02 Hours

**Question 01 (Compulsory)**

- (a) Explain the "Hub & Spoke network system" by illustrating advantages & disadvantages. (at least three from each). (08 Marks)
- (b) Explain the "Fleet planning process" & Describe why the Fleet planning is a Long term issue for an Airline? (08 Marks)
- (c) List down main stages of schedules planning process. Briefly describe the restrictions on developing an optimized schedule for an Airline. (09 Marks)

**Question 02**

- (a) Define the term "Flight Disruption" in aviation industry & provide an example. (04 Marks)
- (b) Briefly explain the "Airline Operations Control Center" concept and name at least two key positions in the operations control environment. (05 Marks)



- (c) "Flight Dispatcher plays a key role in Airlines Business as a frontline staff of Flight Operation Department." Explain the role of flight dispatcher in an airline by stating four key responsibilities of the Job. (08 Marks)
- (d) "Adhoc disruption which is happening at Hub is the worst disruptive scenario for Airlines." Critically evaluate the statement by providing examples for disruption types & areas of impact. (08 Marks)

### Question 03

Let's assume Government of Sri Lanka is in the process of build a new Terminal in the CMB Airport. New terminal consists of 3 Aerobridges (Pier Gates). At a given time number of passengers can be handle from 3 gates are different for 3 aircrafts due to various conditions (E.g. Engineering requirements, Document Scanning, Aircraft Size etc.). As the Airport Services Manager of the CMB Airport decide the optimal way to assign gates to each airline. Below matrix illustrate number of passengers can be handle by each Aircraft from a given gate.

Number of Passengers	G1	G2	G3
Aircraft A	158	127	132
Aircraft B	125	117	131
Aircraft C	115	136	169

- (a) State the Operations Research technique/algorithm can be used to optimize the passenger movements. (03 Marks)
- (b) Define the Decision variables & state assumptions (if available). (04 Marks)
- (c) Identify the Objective of the Problem and construct the mathematical function for Objective (06 Marks)
- (d) Write down all constraints (as equations) according to the model. (12 Marks)



### Question 04

- (a) "Customer Service is an essential part of the Airline Business." Provide at least four advantages of fulfilling customer needs of an Airline. (04 Marks)
- (b) Briefly explain the difference between schedule & unscheduled maintenance. (04 Marks)
- (c) Name the Four principals of interpersonal communication and briefly explain two of them. (08 Marks)
- (d) "Error models help to understand the nature of the different type of Errors which is an important part of CRM studies". Name three "Error Models" and Explain two of them. (09 Marks)

### Question 05

- (a) Why revenue management concepts are important for airlines (03 Marks)
- (b) What causes of seat spoilage in the airline revenue management? How do airlines overcome this problem? (04 Marks)
- (c) ABC airline operate daily flights from Colombo to Maldives. Below table shows the passenger boarded count from 1-January, 2019 to 7-January, 2019.

Average fare for the period is USD250.

Distance between CMB and MLE is 768 km

Sector CMBMLE	Capacity		Boarded Count	
	Business Class	Economy class	Business class	Economy class
Flight Date				
1-Jan	12	138	11	135
2-Jan	28	269	22	250
3-Jan	28	269	20	225
4-Jan	16	153	15	150
5-Jan	16	120	11	115



6-Jan	28	269	25	265
7-Jan	18	251	11	240

Answer below questions based on the given information

- (i) Calculate the total cabin factor for each flight (02 Marks)
- (ii) Calculate the RASK for the period (03 Marks)
- (iii) Calculate the YRPK for the period (03 Marks)
- (iv) What type of strategies you can do to improve the revenue in terms of revenue management concepts when you are planning the seat inventory next year on above dates. (03 Marks)
- (d) Identify various factors that influence airline passenger demand and describe their effects on passenger demand with relevant examples (07 Marks)

### Question 06

The emergence of Low Cost Carriers (LCC) has changed the competitive stance in the airline industry across the world. Comparatively a different business model from the Full Service Carriers (FSC), it has created a different market segment of passengers whom are willing to fly with no frills and low price across the world, starting from US to EU to Asia.

- (a) Distinguish the main product fractures of Full Service Carriers and Low Cost Carriers (08 Marks)
- (b) How full service carriers can response to the growth of low cost carriers in terms of airline business model/Product features? explain your answer with examples and justifications (12 Marks)



- (c) Due to high competition in the airline industry, full services airlines are finding new ways of ancillary revenue opportunities. Exam new ways of ancillary revenue opportunities for a full service airline which operate in the south Asian region (05 Marks)

**Question 07**

- (a) In analyzing a firm's marketing environment, it is usual to use the model known as PESTE analysis. This model categorises the factors in the marketing environment under the five headings of Political, Economic, Social, Technological and Environmental. Discuss the impact of each factor to the airline industry (08 Marks)
- (b) Why Frequent flyer programmes are important for airlines (03 Marks)
- (c) Economists describe the airline industry as closely approximating an oligopolistic market structure. Explain the characteristics of an oligopolistic industry related to airline industry (05 Marks)
- (d) What are the 3 largest passenger airline alliance in the world? List 3 benefits for the airline passengers from airline alliance (06 Marks)
- (e) What are the market segmentation variable of air freight market (03 Marks)

-----END OF THE QUESTION PAPER-----



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Faculty of Management, Humanities and Social Sciences

Department of Logistics & Transport

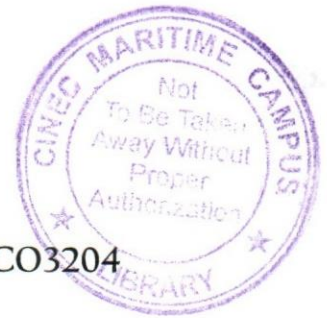
BSc (Hons.) in Logistics and Transportation

Course CODE: COM551

Year 3 Semester I

SEMESTER END EXAMINATION

Customs and Commodity Inspection Operations – LTCO3204



- This paper consists of SEVEN questions on FOUR (04) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.
- Supporting documents are attached.

Date: 2019.08.27

Pass mark: 50%

Time: 02 Hours

## Question 01 (Compulsory)

Solid International Group is a multinational company based in The Netherlands and owns several cement manufacturing plants in several countries in the Asia-Pacific region. The Solid International Group is the rights holder for the world-renowned brand Portland Cement "Solid".

Solid Malaysia Bhd is a cement manufacturing company based in Malaysia. They manufacture "Solid" brand Portland Cement according to the specified quality of Solid International Group and supply the same only to the buyers nominated by Solid International Group. Solid International Group holds 43% of shares of Solid Malaysia Bhd and several Directors of Solid Malaysia Bhd are also Directors of Solid International Group.



## Colombo International Nautical and Engineering College

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Course CODE: COM551

- (c) Briefly explain trends in product and service design. (06 Marks)
- (d) Briefly explain three sources of ideas for product and service design. (08 Marks)

### Question 04

For the set of tasks given below, do the following:

- (a) Develop the precedence diagram. (03 Marks)
- (b) Determine the minimum and maximum cycle times in seconds for a desired output of 500 units in a 7-hour day. Why might a manager use a cycle time of 50 seconds? (03 Marks)
- (c) Determine the minimum number of workstations for output of 500 units per day. (03 Marks)
- (d) Balance the line using the largest positional weight heuristic. Break ties with the most following tasks heuristic. Use a cycle time of 50 seconds. (13 Marks)
- (e) Calculate the percentage idle time for the line. (03 Marks)

Table 4:1 - Task Time

Task	Task Time (Seconds)	Immediate Predecessors
A	45	-
B	11	A
C	9	B
D	50	-
E	26	D
F	11	E
G	12	C
H	10	C
I	9	F, G, H
J	10	I
	193	





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### Question 05

- (a) A work center operates 2 shifts per day 5 days per week (8 hours per shift) and has 4 machines of equal capability. This is the effective capacity. If the work center has a system efficiency of 95%, what is the expected output in hours per week?  
(05 Marks)
- (b) A manager is trying to decide whether to purchase a certain part or to have it produced internally. Internal production could use either of two processes. One would entail a variable cost of \$ 17 per unit and an annual fixed cost of \$200,000; the other would entail a variable cost of \$14 per unit and an annual fixed cost of \$240,000. Three vendors are willing to provide the part. Vendor "A" has a price of \$20 per unit for any volume up to 30,000 units. Vendor "B" has a price of \$22 per unit for demand of 1,000 units or less, and \$18 per unit for larger quantities. Vendor "C" offers a price of \$21 per unit for the first 1,000 units, and \$19 per unit for additional units.  
If the manager anticipates an annual volume of 10,000 units, which alternative would be best from a cost standpoint? For 20,000 units, which alternative would be best?  
(08 Marks)
- (c) The owner of logistics firm, is contemplating adding a new project, which will require leasing a new vehicle for a monthly payment of \$6000. Variable costs would be \$2.00 per each contract, and they earn \$7.00 from each .
- How many contracts must have in order to break even? (02 Marks)
  - What would the profit (loss) be for 1,000 contracts in a month? (02 Marks)
  - How many contracts must have to realize a profit of \$4,000? (04 Marks)
  - For 2,000 contracts, and a profit target of \$5,000, what price should be charged per contract? (04 Marks)



## Colombo International Nautical and Engineering College

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BSc (Hons.) in Logistics and Transportation

Course CODE: COM551

### Question 06

The production manager has developed an aggregate forecast:

Month	Jan	Feb	Mar	Apr	June	July	Aug	Total
Forecast	50	44	55	60	50	40	51	350

Use the following information to develop aggregate plans.

Regular Production cost	Rs. 80 per Unit
Overtime Production cost	Rs. 120 per Unit
Regular capacity	Rs. 40 units per month
Overtime capacity	8 units per month
Subcontracting cost	Rs. 140 per Unit
Subcontracting capacity	12 units per month
Holding cost	Rs. 10 per unit per month
Back -order cost	Rs. 20 per Unit
Beginning Inventory	0 units

Develop an aggregate plan using each of the following guidelines and compute the total cost for each plan. Which plan has the lowest total cost?

Use a combination of backlogs, subcontracting, and inventory to handle variations in demand. (25 Marks)



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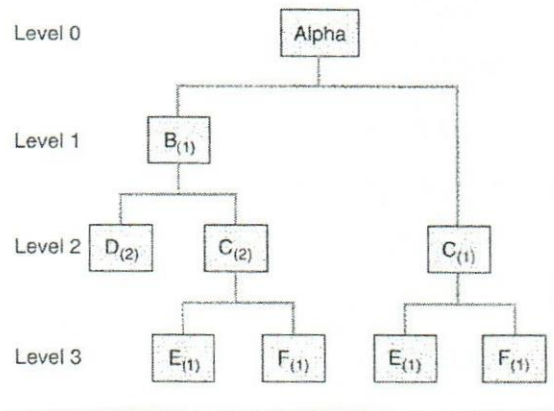
Department of Logistics & Transport

BSc (Hons.) in Logistics and Transportation

Course CODE: COM551

### Question 07

Using the product structure for Alpha below, and the following lead times, quantity on hand, and master production schedule, prepare a net MRP table for Alphas.



Item	Lead Time	Quantity on hand
Alpha	1	10
B	2	20
C	3	0
D	1	100
E	1	10
F	1	50

MPS for Alpha

Period	6	7	8	9	10	11	12	13
GR			50			50		100

(25 Marks)

-----END OF THE QUESTION PAPER-----



## Colombo International Nautical and Engineering College

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Course CODE: COM551

### Formula Sheet

#### Simple Moving Average

$$F_{t+1} = \frac{D_t + D_{t-1} + \dots + D_{t-n+1}}{n}$$

$D_t$  : actual demand in period  $t$

$n$  : number of periods in the average

#### 1. Weighted Moving Average

$$T_{t+1} = W_1 D_1 + W_2 D_{t-1} + \dots + W_n D_{t-n+1}$$

#### 2. Exponential Smoothing

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

$F_t$  = new forecast

$F_{t-1}$  = previous forecast

$\alpha$  = smoothing (or weighting) constant ( $0 \leq \alpha \leq 1$ )

#### 4. Trend Projections

$$y = a + bx$$

$y$  = computed value of the variable to be predicted

$a$  = y-axis intercept

$b$  = slope of the regression line

$x$  = the independent variable

$$b = \frac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n\bar{x}^2} \quad a = \bar{y} - b\bar{x}$$

#### 5. Exponential Smoothing with Trend Adjustment

$$F_t = \alpha (A_{t-1}) + (1-\alpha) (F_{t-1} + T_{t-1})$$

$$T_t = \beta (F_t - F_{t-1}) + (1-\beta) T_{t-1}$$

$$FIT_t = F_t + T_t$$



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Faculty of Management, Humanities and Social Sciences

Department of Logistics & Transport

BSc (Hons.) in Logistics and Transportation

Course CODE: COM551

Year 3 Semester I

REPEAT EXAMINATION

Airline Business Management – LTAM3202

- This paper consists of SEVEN questions on FIVE (05) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2020.01.16

Pass mark: 50%

Time: 02 Hours

### Question 01 (Compulsory)

- (a) What is the difference between Hub/Spoke System & Point to point System?  
(08 Marks)
- (b) "Fleet planning is a Long term issue for an Airline". Are you agreeing with the statement? Please explain your answer.  
(08 Marks)
- (c) What is the Fleet Assignment Process?  
(04 Marks)
- (d) Provide names of 3 Aircrafts Manufactures & their most popular Aircraft types?  
(05 Marks)

### Question 02

- (a) Define the term "Flight Delay" in aviation industry & provide reasons for flight Delays.  
(06 Marks)
- (b) What are the core functions of Flight Operations Department?  
(06 Marks)



- (c) Mention 5 key responsibilities of **Flight Dispatcher**? (05 Marks)
- (d) Classify Disruptions according to the **Time Frame & Location**? (08 Marks)

### Question 03

You are the Manager of "Indo Passenger care" which is the ground handling agency of Hyderabad Airport. Within the Peak time of the Airport, 3 different large Air lines are operating to the Airport. As the Ground Handler your objective is to maximize the passenger movement. Below Table provides the number of passenger can be handled by each gate for each Airline during the Peak time.

Number of Passengers	G1	G2	G3
Aircraft A	200	280	190
Aircraft B	150	300	160
Aircraft C	400	210	200

- (a) State the Operations Research technique/algorithm can be used to optimize the passenger movements. (03 Marks)
- (b) Define the Decision variables & state assumptions (if available). (04 Marks)
- (c) Identify the Objective of the Problem and construct the mathematical function for Objective (06 Marks)
- (d) Write down all constraints (as equations) according to the model. (12 Marks)

### Question 04

- (a) "Why is it important to meet customer needs in aviation?" Briefly Explain. (04 Marks)
- (b) What is meant by "**Human Factor**" in Aviation context? (04 Marks)



- (c) Name three "Error Models" and briefly explain two of them. (08 Marks)
- (d) What are the four pillars of **Inter Personal Communication**? Explain one of them. (09 Marks)

### Question 05

- (a) Identify various factors that influence airline passenger demand and describe their effects on passenger demand with relevant examples (06 Marks)
- (b) What causes of seat spoilage in the airline revenue management? How do airlines overcome this problem? (04 Marks)

### Question i to iv is based on the below scenario

- (c) Assume that, AsiaJet is one of the largest full service scheduled airline in South Asian region. CMB airport is the main hub for AsiaJet and it operates several routes to India, China, Japan and Maldives. Assume that, AsiaJet operates to ABC and YYX destinations in Asian region. Below tables show, performance records of CMBABC vv, and CMBXYZ vv routes, as a route inventory management analyst, answer question no 1 to 4 based on below tables.

Route	CMB/ABC/CMB			
Month	Total accepted number of passengers	Total Passenger Revenue (USD)	Leg Seats Available (Including Return Sector)	Oneway Distance(CMBABC)
Jan,16	8350	918500	9000	800km
Feb,16	8150	937250	9000	800km

Route	CMB/XYZ/CMB			
Month	Total accepted number of passengers	Total Passenger Revenue (USD)	Leg Seats Available (Including Return Sector)	Oneway Distance(CMBXYZ)



Jan,16	6875	1546875	9000	700km
Feb,16	6650	1463000	9000	700km

- (i) Calculate passenger cabin factors for each route for each month  
(02 Marks)
- (ii) Calculate RASK for each route for each month  
(03 Marks)
- (iii) Calculate YRPK for each route for each month  
(03 Marks)
- (iv) What type of strategies that can be taken to improve each route performance on pricing and revenue management perspective (State your assumptions)  
(07 Marks)

### Question 06

The emergence of Low Cost Carriers (LCC) has changed the competitive stance in the airline industry across the world. Comparatively a different business model from the Full Service Carriers (FSC), it has created a different market segment of passengers whom are willing to fly with no frills and low price across the world, starting from US to EU to Asia.

- (a) Distinguish the main product fractures of Full Service Carriers and Low-Cost Carriers  
(08 Marks)
- (b) How full service carriers can response to the growth of low cost carriers in terms of airline business model/Product features? explain your answer with examples and justifications  
(12 Marks)
- (c) Due to high competition in the airline industry, full services airlines are finding new ways of ancillary revenue opportunities. Exam new ways of ancillary revenue opportunities for a full service airline which operate in the south Asian region  
(05 Marks)





**Question 07**

- (a) In analyzing a firm's marketing environment, it is usual to use the model known as PESTE analysis. This model categorises the factors in the marketing environment under the five headings of Political, Economic, Social, Technological and Environmental. Discuss the impact of each factor to the airline industry  
(08 Marks)
- (b) Why Frequent flyer programmes are important for airlines (03 Marks)
- (c) Economists describe the airline industry as closely approximating an oligopolistic market structure. Explain the characteristics of an oligopolistic industry related to airline industry (05 Marks)
- (d) What are the 3 largest passenger airline alliance in the world? List 3 benefits for the airline passengers from airline alliance (06 Marks)
- (e) What are the market segmentation variable of air freight market (03 Marks)

-----END OF THE QUESTION PAPER-----



# Colombo International Nautical and Engineering College

CINEC Campus

Faculty of Management, Humanities and Social Sciences

Department of Logistics & Transport

BSc (Hons.) in Logistics and Transportation

Course CODE: COM551

Year 3 Semester I

REPEAT EXAMINATION

International Economics – LTIE3201

- This paper consists of SEVEN questions on THREE (03) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2020.01.15

Pass mark: 50%

Time: 02 Hours

## Question 01: (Compulsory)

Explain that theory of Absolute Advantage and the Theory of Comparative Advantage using below information.

Suppose that there are two nations; European Union (EU) and China and they are two goods: cheese and pepper. Assume that the EU needs 10 labor hours to produce 1kg of cheese and 20 labor hours to produce 1kg of pepper. China, on the other hand, needs 20 labor hours to produce 1kg of cheese and 5 labor hours to produce 1kg of pepper.

(25 Marks)

## Question 02

There are two countries namely A and B and can produce two commodities of product X and Y. Us can produce product X in lower opportunity cost than country UK while UK can produce product Y in lower opportunity cost than UK. Consider the Ricardian model and derive the Offer curves for the both nations.

(25 Marks)



## Colombo International Nautical and Engineering College

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BSc (Hons.) in Logistics and Transportation

Course CODE: COM551

### Question 03

- (a) Explain the term factor abundance and factor intensity with appropriate examples (10 Marks)
- (b) Illustrate H-O model and H-O-S model with appropriate example. (15 Marks)

### Question 04

“There are economic cost an economic benefits of import tariff” explain with appropriate diagrams and figures (25 Marks)

### Question 05

Discuss the difference between Trade Creating Custom Union and Trade Diverting Custom Union with appropriate examples. (25 Marks)

### Question 06

- (a) Illustrate the ways of domestic currency depreciation in foreign exchange market (10Matrks)
- (b) What do you meant by foreign exchange arbitrage (05 Marks)
- (c) Explain that the relationship between national accounting calculations and the Balance of Payment of the country (10 Marks)



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**Question 07**

**Write short note on any five (5) of the following**

- (a) Factor price equalization theory
- (b) Rate of effective Protection
- (c) Forward Exchange Rate
- (d) Marshall -Lerner condition
- (e) J curve effect
- (f) REER and NEER

(5x5 =25 Marks)

-----END OF THE QUESTION PAPER-----



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Year 3 Semester I

REPEAT EXAMINATION

Operational Research – LTOR 3206

- This paper consists of SEVEN (07) questions on SIX (06) pages.
- Answer FOUR (04) Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2020.03.10

Pass mark: 50%

Time: 02 Hours

### Question 01 (Compulsory)

Logi-pulse warehouse has the following minimal daily requirements of workers:

Period	Clock time (24 Hrs)	Number of workers required
1	6.00 am to 10.00 am	72
2	10.00 am to 2.00pm	77
3	2.00 pm to 6.00 pm	85
4	6.00 pm to 10.00 pm	68
5	10.00 pm to 2.00 am	25
6	2.00 am to 6.00 am	23

Workers report to the warehouse at the beginning of each period and work for 08 consecutive hours. Formulate this problem as a Linear Programming problem to



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minimise the total number of workers to meet the labour requirement of the warehouse throughout the day. (25 Marks)

### Question 02

A manufacturer of packing materials manufactures two different types of packing tins; type A and type B. Major production facilities involved are cutting and joining. The cutting department can process 300 type A tins or 500 type B tins per hour. The joining department can process 500 type A tins or 300 type B tins per hour. If the contribution towards profit for type A tin is the same as that of a type B tin (USD 1),

Find the optimum production level using graphical method. (25 Marks)

### Question 03

Use simplex method to solve the following LP problem. (25 Marks)

$$\text{Max } Z = 3X_1 + 5X_2 + 4X_3$$

Subject to the constraints

$$2X_1 + 3X_2 \leq 8$$

$$2X_2 + 5X_3 \leq 10$$

$$3X_1 + 2X_2 + 4X_3 \leq 15$$

$$X_1, X_2, X_3 \geq 0$$



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#### Question 04

Use 2 phase method and solve the following Linear Programming Problem by clearly stating the phase I objective function. (25 Marks)

$$\text{MIN } Z = 4X_1 + X_2$$

Subject to:

$$3X_1 + X_2 = 3$$

$$4X_1 + 3X_2 \geq 6$$

$$X_1 + 2X_2 \leq 4$$

$$X_1, X_2 \geq 0$$

#### Question 05

$$\text{MAX } z = 3X_1 + 6X_2 + 4X_3$$

Subject to

$$X_1 + 2X_2 + X_3 \leq 10$$

$$3X_1 + 3X_2 + 2X_3 \leq 10$$

$$X_1, X_2, X_3 \geq 0$$

- (a) Construct the dual problem, for this primal problem. (05 Marks)  
(b) Solve the primal and dual problems using any appropriate method. (20 Marks)



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### Question 06

(a). A company has three production factories (Sources)  $S_1$ ,  $S_2$  and  $S_3$  with production capacity of 9, 7 and 18 units per week respectively. These units are to be shipped to four warehouses (Destinations)  $D_1$ ,  $D_2$ ,  $D_3$ , and  $D_4$  with requirement of 5, 8, 7 and 14 units per week respectively. The transportation costs (in Rupees) per unit between factories to warehouses are given in the below table.

	D1	D2	D3	D4	Supply
S1	19	30	50	10	9
S2	70	30	40	60	7
S3	40	8	70	20	18
Demand	5	8	7	14	

- (a) Formulate this transportation problem as an LP model to minimize the total transportation cost. (05 Marks)
- (b) Find initial transportation cost using North West Corner method (05 Marks)
- (c) Find the optimum solution using any appropriate method. (10 Marks)
- (d) Show optimal transport schedule in a pictorial format. (05 Marks)





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## Question 07

### CASE I

Mr. Seneviratne is a system administrator of leading company, responsible for training non-IT staff members individually of the company for new software platform. As the IT literacy of staff members are different, training requirement of the staff members are also different. He schedules all his training sessions for 30-minutes. Some of the staff members take more or less than 30 minutes depending on the type of training requested. The following summary shows the various categories of training, their probabilities and the time actually needed to complete the training.

Table 7.01

CATEGORY OF TRAINING	TIME REQUIRED	PROBABILITY OF THE CATEGORY
Backup emails	45 minutes	0.40
Monthly backup of SAP system	60 minutes	0.15
Web browsing and email basics	15 minutes	0.15
OS installation	45 minutes	0.10
Troubleshooting	15 minutes	0.20

Simulate the training session of Mr. Seneviratne for **FOUR** hours and determine average waiting time for the staff members as well as the idleness of the trainer Mr. Seneviratne.



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Assume that all staff members show up at the IT department at exactly their scheduled arrival time starting at 8.00 am. Use below random numbers for simulation run.

40 82 11 34 25 66 17 79

## CASE II

Mr. Seneviratne is planning to recruit a trainee IT assistant on contract basis to reduce the waiting time of his staff members. But this Trainee is performing

- Web browsing and email basics
- Troubleshooting
- OS installations ONLY

Anyway if both of the trainees available, staffmembers are preferred Mr. Seneviratne, as he is more experienced person.

Simulate training sessions again for FOUR hours, and compare the average waiting time of patients in both cases.

What are recommendations that you suggest to Mr. Seneviratne in recruiting trainee person according to the results of your simulation?

(25 Marks)

----- **END OF THE QUESTION PAPER** -----



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Year 3 Semester I

## REPEAT EXAMINATION

### Environmental and Social Impacts of Transport and Logistics - LTEL 3205

- This paper consists of SEVEN (07) questions on TWO (02) pages.
- Answer FOUR questions including question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly.

Date: 2020.01.21

Pass mark: 50%

Time: 02 Hours

#### Question 01 (Compulsory)

(a) Give an elaborated and summarized view the on MERPOL Convention.

(b) How would you describe Greenhouse gases (GHG) of the atmosphere?

(25 Marks)

#### Question 02

Explain in detail, how would the maritime transportation effect to impact or pollute the marine environment?

(25 Marks)

#### Question 03

Along with a brief description to below, list down 6 threats each may contribute to damage the marine environment

(25 Marks)

- a) Dry Cargo Ships
- b) Tankers ships
- c) RoRo ships
- d) Passenger Ships



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## Question 04

Under Coastal Management Systems in Sri Lanka, give brief introduction to the following, their importance and the threats they face upon in the event of a maritime disaster. (25 Marks)

- a) Lagoons & Estuaries
- b) Seagrass Beds
- c) Mangroves
- d) Coral Reefs
- e) Salt Marshes

## Question 05

List down 8 threats to the marine and coastal environment you could anticipate upon a spillage of 50% of crude oil cargo from a fully laden ULCC. (25 Marks)

## Question 06

Briefly discuss the factors to be considered under its "determinants" and "fluctuations" on maritime transportation "costs", and what we can do to control and standardize.

(25 Marks)

## Question 07

What is ballast water, and how would ballast water be of a harm to the seas / maritime waters? (25 Marks)

-----END OF THE QUESTION PAPER-----



Year 3 Semester I

SEMESTER END EXAMINATION

Transport Planning and Logistics Management – LTTM3208

- This paper consists of SEVEN (07) questions on SEVEN (07) pages.
- Answer FOUR (04) Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2019.09.12

Pass mark: 50%

Time: 02 Hours

**Question 01: (Compulsory)**

- (a) State three factors that could have impact on pricing freight movement services. (03 Marks)
- (b) Briefly explain the role of the following players in the freight movement services.  
I. The sender (shipper)  
II. The freight forwarder  
III. The carrier (06 Marks)
- (c) Define the following terminologies commonly used in transportation network.  
I. Link  
II. Node  
III. Flow  
IV. Path  
V. Cycle  
VI. Tree (06 Marks)
- (d) Briefly explain the usage of Dijkstra's algorithm in transportation network. (04 Marks)
- (e) Assume that the number of truck trips at a given location on an average weekday was 8,000 in 2005 and 10,000 in 2010. Estimate the number of truck trips for the



year 2020. (Hint - Use simple growth factor method based on historic traffic trends)

(02 Marks)

- (f) Briefly discuss the term 'generalized cost' in terms of freight transportation that is highly useful for planning trip distribution and mode choice.

(04 Marks)

### Question 02

- (a) Explain three parameters that could be used to measure the efficiency of a transportation network.

(06 Marks)

- (b) Compare and contrast linear network with grid network in transportation network topologies.

(08 Marks)

- (c) Compare and contrast centrifugal network with centripetal network in transportation network structures.

(06 Marks)

- (d) Discuss two advantages of having an efficient freight transport system through railways in Sri Lanka.

(05 Marks)

### Question 03

- (a) State three objectives of transportation in logistics management.

(03 Marks)

- (b) Describe three contributions that containerization has made to the change of era in international trade.

(06 Marks)

- (c) Determine the shortest paths between node 5 to node 4 on transportation network shown below in Q3-c. The distance between nodes are stipulated in the network. The last distance matrix and the last predecessor node matrix obtained after using Floyd's algorithm to the network are shown by  $D_5$  and  $Q_5$  respectively.

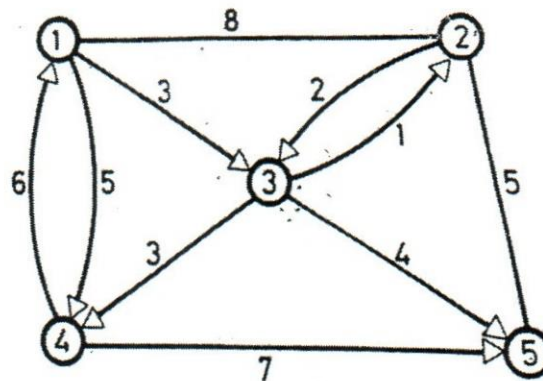


Figure Q3-c: Transportation network to which Floyd's algorithm applied.

Table Q3-c1: The last distance matrix ( $D_5$ )

i \ j	1	2	3	4	5
1	0	4	3	5	7
2	8	0	2	5	5
3	9	1	0	3	4
4	6	10	9	0	7
5	13	5	7	10	0

Table Q3-c2: The last predecessor node matrix ( $Q_5$ )

I \ J	1	2	3	4	5
1	0	3	1	1	3
2	2	0	2	3	2
3	2	3	0	3	3
4	4	3	1	0	4
5	2	5	2	3	0

- (d) Determine the minimum spanning tree for the transportation network shown in figure Q3-d. (02 Marks)

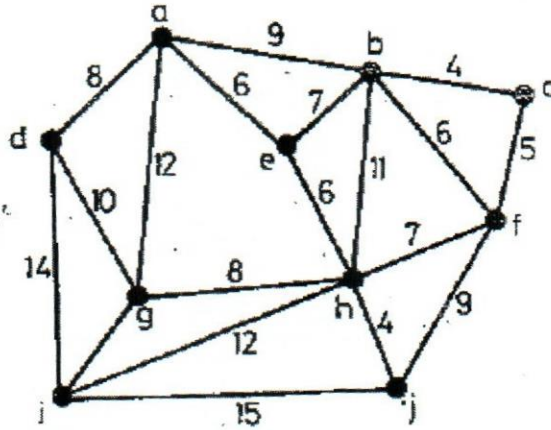


Figure Q3-d: Transportation network for which minimum spanning tree to be found

(08 Marks)

- (e) Compare and contrast the features of rail mode versus road mode for freight transportation using three elements.

(06 Marks)

### Question 04

- (a) State two functionalities of transportation in terms of freight movement. (02 Marks)
- (b) Justify the argument that number of odd degree nodes in a non-oriented network is always even. (08 Marks)
- (c) Find the total flow through the network shown in Q4-c when the node 1 is the source and node 4 is the sink. Flows between nodes are shown in the figure.

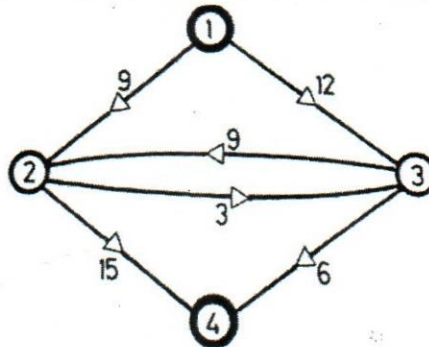






Figure Q4-c: Transportation network flow conservation law to be applied

d) Describe three factors affecting goods movement globally.

(06 Marks)

(09 Marks)

### Question 05

a) Identify two factors that contribute for the economic development of a country.

(02 Marks)

b) Determine the maximum flow between node s and node t of the transportation network shown in figure Q5-b1. Capacities of individual branches are shown on the figure. The very last modified capacity matrix is shown in table Q5-b1.

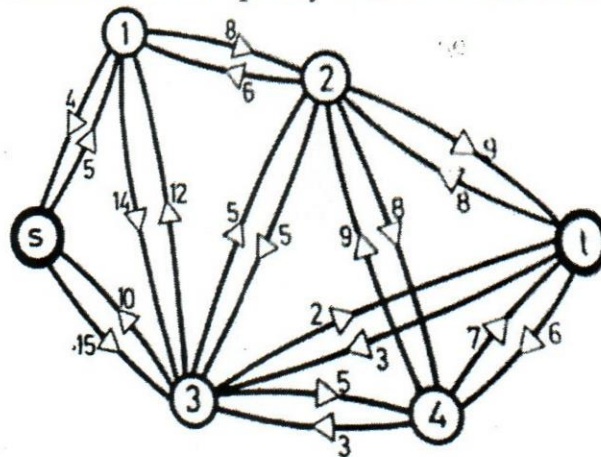


Figure Q5-b1: The transportation network for which maximum flow to be found between node s and node t



Table Q5-b1: The very last modified capacity matrix

t \ s	S	1	2	3	4	T
s	0	0	0	2	0	0
1	9	0	2	15	0	0
2	0	12	0	10	6	0
3	23	11	0	0	0	0
4	0	0	11	8	0	0
t	0	0	17	5	13	0

- (06 Marks)
- c) Describe three ways that freight transportation helps for the economic development.
- (06 Marks)
- d) Define the Volumetric Weight used in air transportation freight pricing.
- (03 Marks)
- e) Define the following terminologies used in freight transport planning.
- I. Freight trip generation
  - II. Freight trip distribution
  - III. Freight modal split
  - IV. Freight trip assignment

(08 Marks)

### Question 06

- (a) State the weakness of growth factor modelling used to estimate freight trip generation.
- (03 Marks)
- (b) Solve the Chinese Postman problem for a tour which starts and finishes in node A of the oriented transportation network shown in Figure Q6-b.



## Year 3 Semester I

## REPEAT EXAMINATION

## Transport Planning and Logistics Management – LTTM3208

- This paper consists of SEVEN (07) questions on SIX (06) pages.
- Answer FOUR (04) Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2020.01.19

Pass mark: 50%

Time: 02 Hours

**Question 01: (Compulsory)**

- (a) State briefly the role of planning transportation in logistics management. (03 Marks)
- (b) Briefly explain the implication on economic rationality behind choices of freight movement. (06 Marks)
- (c) Define the following terminologies commonly used in transportation network.
- I. Link
  - II. Node
  - III. Flow
  - IV. Path
  - V. Cycle
  - VI. Tree
- (06 Marks)
- (d) Briefly explain the usage of Dijkstra's algorithm in transportation network. (04 Marks)
- (e) Briefly explain the conservation law on transportation network taking into consideration the flows of network. (Hint - both centroid and intermediate nodes have to be considered) (02 Marks)
- (f) Briefly discuss the term 'generalized cost' in terms of freight transportation that is highly useful for planning trip distribution and mode choice.



- (f) Briefly discuss the term 'generalized cost' in terms of freight transportation that is highly useful for planning trip distribution and mode choice. (04 Marks)

### Question 02

- (a) State each example for the following transportation networks  
I. Linear network  
II. Grid network (04 Marks)
- (b) Explain two (02) advantages of hub and spoke network. (06 Marks)
- (c) Describe three (03) indexes that can be used to measure the efficiency of the transport network. (06 Marks)
- (d) Differentiate topology versus typology using two (02) each examples. (05 Marks)
- (e) Discuss two advantages of having an efficient freight transport systems through railways in Sri Lanka. (04 Marks)

### Question 03

- (a) Assume that the number of truck trips at a given location on an average weekday was 10,000 in 2005 and 15,000 in 2010. Estimate the number of truck trips for the year 2020. (Hint - Use simple growth factor method based on historic traffic trends) (04 Marks)
- (b) Find the total flow through the network shown in Q3-b when the node 1 is the source and node 4 is the sink. Flows between nodes are shown in the figure.

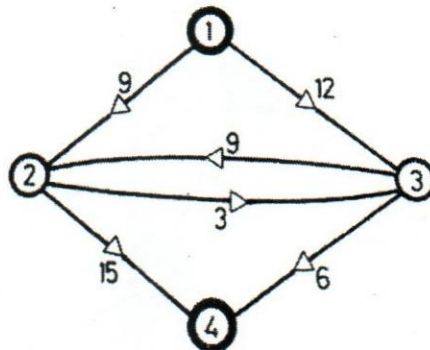


Figure Q3-b: Transportation network flow conservation law to be applied (03 Marks)

- (c) Determine the Minimum Spanning Tree (MST) for the transportation network shown in figure Q3-c.

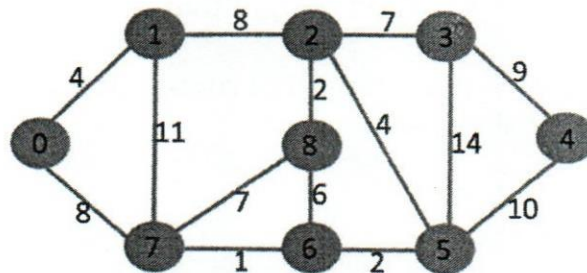


Figure Q3-c: Transportation network to which MST to be found (18 Marks)

**Question 04**

- (a) State two functionalities of transportation in terms of freight movement. (02 Marks)
- (b) Find the shortest route from the origin O to the destination T for the network shown in figure Q4-b using Dijkstra's Algorithm. The travel cost between nodes are stipulated in the figure.

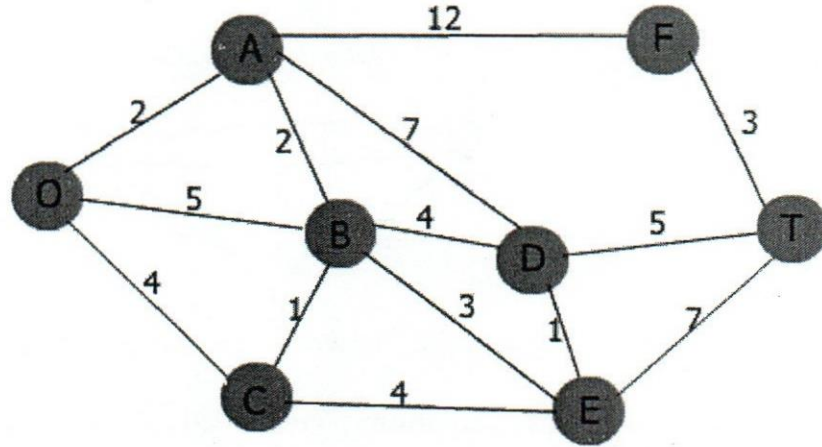


Figure Q4-b: Network to which shortest paths to be found out using Dijkstra Algorithm

(17 Marks)

- (c) Identify three contributions that containerization has made to the change of era in international trade.

(06 Marks)

**Question 05**

- (a) Fill the table Q5-a shown below using the modal characteristics of transportation modes.

Table Q5-a: Table to be filled

Mode	Advantage (01)	Disadvantage (01)
Rail		
Highway		
Water		
Pipeline		
Air		

(05 Marks)

- (b) Determine the maximum flow between node s and node t of the transportation network shown in figure Q5-b. Capacities of individual branches are shown on the figure.

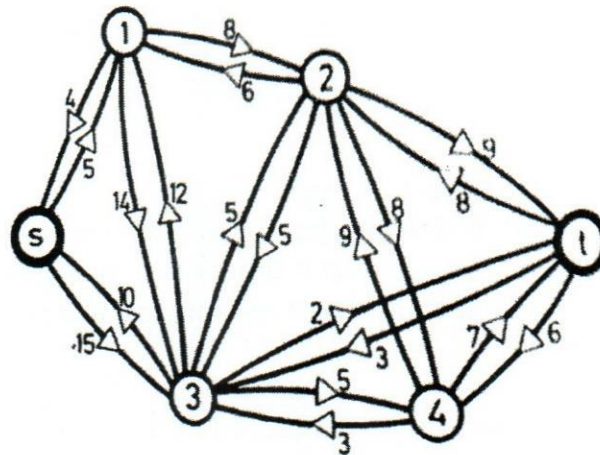


Figure Q5-b: The transportation network for which maximum flow to be found between node s and node t

(14 Marks)

- (c) State three factors that might have contributed to the decline of freight movement by Sri Lanka Railway's during the last three decades.

(06 Marks)

**Question 06**

- (a) Identify two factors that contribute for the economic development of a country. (02 Marks)
- (b) Solve the Chinese Postman problem for a tour which starts and finishes in node a of the transportation network shown in Figure Q6-b.

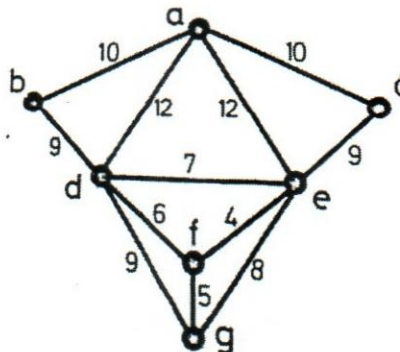


Figure Q6-b: Non oriented network for solving the Chinese Postman problem

(14 Marks)



- (c) Describe three ways that freight transportation helps for the economic development.

(09 Marks)

**Question 07**

Write short notes for the following.

- (a) Two (02) factors affecting freight movement globally
- (b) Two (02) factors that affect pricing of freight movements
- (c) Transportation as a means of minimizing temporal, financial and environmental resource cost
- (d) Main actors in freight movement
- (e) Two difficulties in collecting freight related data.

(05 X 05 =25 Marks)

-----END OF THE QUESTION PAPER-----





Year 3 Semester I

REPEAT EXAMINATION

Operational Research – LTOR3206

- This paper consists of SEVEN (07) on FIVE (05) pages.
- Answer FOUR (04) Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2020.01.18

Pass mark: 50%

Time: 02 Hours

**Question 01 (Compulsory)**

The production manager of a chemical plant is attempting to devise a shift pattern for his workforce. Each day of every working week is divided into three eight-hour shift periods (00:01-08:00, 08:01-16:00, 16:01-24:00) denoted by night, day and late respectively. The plant must be manned at all times and the minimum number of workers required for each of these shifts over any working week is as below:

Shift	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Night	5	3	2	4	3	2	2
Day	7	8	9	5	7	2	5
Late	9	10	10	7	11	2	2

The union agreement governing acceptable shifts for workers is as follows:

1. Each worker is assigned to work *either* a night shift *or* a day shift *or* a late shift and once a worker has been assigned to a shift they must remain on the same shift every day that they work.
2. Each worker works four consecutive days during any seven day period.



In total, there are currently 60 workers.

Formulate the production manager's problem as a linear program. (25 Marks)

### Question 02

Solve the given LP model using graphical method (25 Marks)

$$\text{Max } Z = 100 X_1 + 100 X_2$$

$$10X_1 + 5X_2 \leq 80$$

$$6X_1 + 6X_2 \leq 66$$

$$4X_1 + 8 X_2 \geq 24$$

$$5X_1 + 6X_2 \leq 90$$

$$X_1, X_2 \geq 0$$

### Question 03

A firm manufactures two products P1 and P2 on 3 machines M1, M2 and M3. The manufacturing times, profit margins and machine capacities are as follows.

		Machines			Profit
		M1	M2	M3	
products	P1	0.25	0.4	0	3
	P2	0.5	0.2	0.8	2
Machine Capacity		40	40	40	

Find the optimum production schedule using Simplex method. (25 Marks)



### Question 04

- (a) Explain when we need to use 2 phase method. (05 Marks)
- (b) Use 2 phase method and solve the following Linear Programming Problem by clearly stating the phase I objective function. (20 Marks)

$$\text{MAX } Z = 2X_1 + 5X_2$$

Subject to:

$$3X_1 + 2X_2 \geq 6$$

$$2X_1 + X_2 \leq 2$$

$$X_1, X_2 \geq 0$$

### Question 05

$$\text{MAX } z = 4X_1 + 2X_2 + 6X_3$$

Subject to

$$2X_1 + X_2 + X_3 \leq 10$$

$$2X_1 + 3X_2 + 3X_3 \leq 10$$

$$X_1, X_2, X_3 \geq 0$$

- (a) Construct the dual problem, for this primal problem. (05 Marks)
- (b) Solve the **primal and dual problems** using any appropriate method. (20 Marks)



### Question 06

Consider a transportation problem where items should be transported from 03 factories to 3 warehouses.

Table 5.1

		Warehouse			Supply
		W1	W2	W3	
Factories	F1	5	4	3	100
	F2	8	4	3	300
	F3	9	7	5	300
Demand		300	200	200	700

- (a) Using North West Corner method, find the initial transportation schedule. (05 Marks)
- (b) Find the optimal transportation schedules using any appropriate method. (16 Marks)
- (c) Evaluate the minimum transportation cost. (04 Marks)

### Question 07

A farmer has 10 acres of agricultural land and is cultivating tomatoes on the entire land. Due to fluctuation in water availability, the yield per acre differs. The probability distribution yields are given below:

- (a) The farmer is interested to know the yield for the next 12 months if the same water availability exists. Simulate the average yield using the following random numbers 50, 28, 68, 36, 90, 62, 27, 50, 18, 36, 61 and 21, given in table.

(10 Marks)



Table 7.1

Yield of tomatoes per acre	probability
200	0.15
220	0.25
240	0.35
260	0.13
280	0.12

Table 7.2

Price per Kg	probability
5.00	0.05
6.50	0.15
7.50	0.30
8.00	0.25
10.00	0.25

- (b) Due to fluctuating market price, the price per kg of tomatoes varies from Rs. 5.00 to Rs. 10.00 per kg. The probability of price variations is given in the Table below. Simulate the price for next 12 months to determine the revenue per acre. Also find the average revenue per acre. Use the following random numbers 53, 74, 05, 71, 06, 49, 11, 13, 62, 69, 85 and 69. (15 Marks)

-----END OF THE QUESTION PAPER-----



## Colombo International Nautical and Engineering College

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Faculty of Management, Humanities and Social Sciences

Department of Logistics & Transport

BSc (Hons.) in Logistics and Transportation

Course CODE: COM551

Year 3 Semester I

REPEAT EXAMINATION

Production and Operations Management – LTPM3207

- This paper consists of SEVEN questions on THREE (03) pages.
- Answer FOUR Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2020.01.17

Pass mark: 50%

Time: 02 Hours

### Question 01 (Compulsory)

(a) Freight car loadings over a 12-year period at a busy port are as follows;

Table 1:1 - Car Loadings

Week	Number	Week	Number	Week	Number
1	220	7	350	13	460
2	245	8	360	14	475
3	280	9	400	15	500
4	275	10	380	16	510
5	300	11	420	17	525
6	310	12	450	18	541

- Determine a linear trend line for freight car loadings. (03 Marks)
- Use the trend equation to predict loadings for weeks 20 and 21. (03 Marks)
- The manager intends to install new equipment when the volume exceeds 800 loadings per week. Assuming the current trend continues, the loading volume will reach that level approximately in which week? (04 Marks)



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CINEC Campus

Faculty of Management, Humanities and Social Sciences

Department of Logistics & Transport

BSc (Hons.) in Logistics and Transportation

Course CODE: COM551

- (b) A farming cooperative manager wants to estimate relatives for grain shipments, based on the data shown (quantities are in metric tons)

Table 1:2 - Quarter Grain Shipments

Year	QUARTER			
	1	2	3	4
1	200	451	100	200
2	225	456	125	212
3	210	500	123	202
4	241	472	101	256
5	195	525	152	233

Determine quarter relatives.

(15 Marks)

### Question 02

- (a) Identify two different types of functions of Production System Design and Production System Operation. (05 Marks)
- (b) Briefly define the term "Service Operations". (05 Marks)
- (c) Briefly explain three types of Manufacturing operations. (06 Marks)
- (d) Explain three types of production facilities. (09 Marks)

### Question 03

- (a) Identify and briefly explain two types of researches in Operations Management. (05 Marks)
- (b) Identify five reasons for product and service design and explain one of those. (06 Marks)