Library

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Higher Diploma in Biomedical Science

HD 2243 – Biostatistics and Bioinformatics

2nd year 2nd semester – Batch 2

Assignment-Special Repeat

Date	:	**30th September 2024**
Time	:	**1:30 p.m. to 2:30 p.m.**

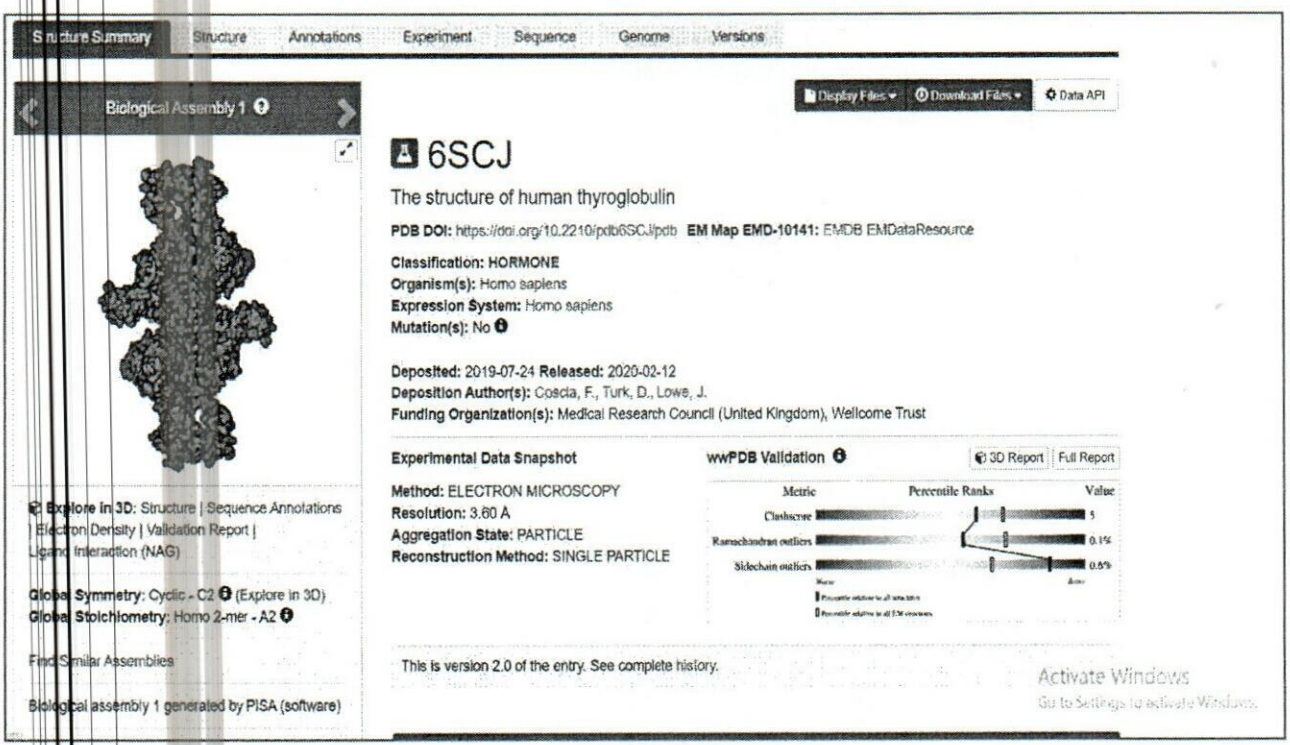
INSTRUCTIONS TO CANDIDATES

- This question paper consists of **TWO** questions.
- Answer ALL questions.
- You should write answers in lined papers legibly in black or blue ink.

Question 01 **(100 Marks)**

The figure mentioned below are the output from the biological databases.

A.



B.

GenBank

Homo sapiens insulin (INS) gene, complete cds

GenBank: AH002844.2

FASTA Graphics

Go to:

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LOCUS       AH002844               4969 bp    DNA     linear   PRI 10-JUN-2016
DEFINITION  Homo sapiens insulin (INS) gene, complete cds.
ACCESSION   AH002844 J00265 J00268
VERSION     AH002844.2
KEYWORDS    GC rich region; insulin; polymorphic variation; tandem repeat.
SOURCE      Homo sapiens (human)
  ORGANISM  Homo sapiens
            Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi;
            Mammalia; Eutheria; Euarchontoglires; Primates; Haplorrhini;
            Catarrhini; Hominidae; Homo.
REFERENCE   1  (bases 2414 to 2610)
  AUTHORS   Bell,G.I., Swain,W.F., Pictet,R., Cordell,B., Goodman,H.M. and
            Rutter,W.J.
  TITLE     Nucleotide sequence of a cDNA clone encoding human preproinsulin
  JOURNAL   Nature 282 (5738), 525-527 (1979)
   PUBMED   503234
REFERENCE   2  (bases 1925 to 3715)
  AUTHORS   Bell,G.I., Pictet,R.L., Rutter,W.J., Cordell,B., Tischer,E. and
            Goodman,H.M.
  TITLE     Sequence of the human insulin gene
  JOURNAL   Nature 284 (5751), 26-32 (1980)
   PUBMED   6243748
REFERENCE   3  (bases 2411 to 2610)
  AUTHORS   Sures,I., Goeddel,D.V., Gray,A. and Ullrich,A.
  TITLE     Nucleotide sequence of human preproinsulin complementary DNA
  JOURNAL   Science 208 (4439), 57-59 (1980)
   PUBMED   6927840
REFERENCE   4  (bases 1928 to 3651)
  AUTHORS   Ullrich,A., Dull,T.J., Gray,A., Brosius,J. and Sures,I.
  TITLE     Genetic variation in the human insulin gene
  JOURNAL   Science 209 (4456), 612-615 (1980)
   PUBMED   6248962
REFERENCE   5  (bases 1 to 4969)
  AUTHORS   Bell,G.I., Pictet,R. and Rutter,W.J.
  TITLE     Analysis of the regions flanking the human insulin gene and
            sequence of an Alu family member
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C.

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ID   CAA01254; SV 1; linear; unassigned DNA; PAT; SYN; 167 BP.
XX
PA   A15938.1
XX
DT   28-MAR-1994 (Rel. 39, Created)
DT   28-MAR-1994 (Rel. 39, Last updated, Version 1)
XX
DE   synthetic construct partial Human insulin
XX
KW   .
XX
OS   synthetic construct
OC   other sequences; artificial sequences.
XX
RN   [1]
RA   Brange J.J.V., Norris K., Hansen M.T.;
RT   "Insulin analogues and method of preparing the same.";
RL   Patent number EP0214826-A2/34, 18-MAR-1987.
RL   NOVO-NORDISK A/S;
RL   NOVO NORDISK A/S;
RL   NOVO NORDISK A/S.
XX
DR   MD5; 3752018308c6aa9975c21ee673eaa51c.
XX
FH   Key             Location/Qualifiers
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FT   source          1..167
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FT                   /mol_type="unassigned DNA"
FT                   /db_xref="taxon:32630"
FT   CDS             A15938.1:<1..167
FT                   /codon_start=3
FT                   /transl_table=11
FT                   /product="Human insulin"
FT                   /protein_id="CAA01254.1"
FT                   /translation="RFVNQHLCGSHLVEALYLVCGERGFFYTPKAAKGIVEQCCTSICS
FT                   LYQLENYCN"
XX
SQ   Sequence 167 BP; 41 A; 38 C; 36 G; 52 T; 0 other;
     aaagattcgt taaccaacac ttgtgcggtt cccacttggt tgaagctttg tacttggttt        60
     gcggtgaaag aggtttcttc tacactccta aggctgctaa gggtattgtc gaacaatgct       120
     gtacctccat ctgctccttg taccaattgg aaaactactg caactag                    167
//
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1.1. List main types of biological databases available on the internet. (30 marks)

1.2. Identify above databases (A,B and C) differentiate the features of three outputs. (70 marks)

Question 02 **(100 marks)**

Mention the information that you could retrieve from the FASTA output given below.

FASTA

Dengue virus 3 isolate 2086_NIMS_HYD NS1 gene, partial cds

GenBank: KF301600.1

GenBank Graphics

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>KF301600.1 Dengue virus 3 isolate 2086_NIMS_HYD NS1 gene, partial cds
GGTGTGCTAGAGAGTGACATGATCATTCCAAAGAGTCTAGCTGGTCCTATTTCGCAACACAACTACAGGC
CCGGGTACCACACTCAAACGGCAGGACCCTGGCACTTAGGAAAATTGGAGCTGGACTTCAACTATTGTGA
AGGAACAACAGTTGTCATCACAGAAAACTGTGGGACAAGAGGCCCATCATTGAGAACGACAACAGTGTCA
GGAAAGTTGATACACGAATGGTGTTGCCGCTCGTGCACACTTCCTCCTCTGCGATACATG
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LIBRARY

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Faculty of Health Sciences

Higher Diploma in Biomedical Science

HD 2243 – Biostatistics and Bioinformatics

2nd year 2nd semester – Batch 2

End Semester SEQ Examination-

Special Repeat

Date : **30th September 2024**

Time : **9.00 a.m. to 12.00 p.m.**

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer ALL questions.
- You should write answers in lined papers legibly in black or blue ink.

Question 01 **(100 Marks)**

1.1. Define the term "Data". (20 marks)

1.2. State the four types of level of measurements and give an example of each. (20 marks)

1.3. Differentiate the continuous data and discrete data using examples. (30 marks)

1.4 Compare and contrast the primary and secondary sources with an example of each. (30 marks)

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Question 02 **(100 Marks)**

A microbiologist investigated the presence of bacteria in water samples collected from various river sites. After incubating the samples on a nutrient-rich medium for 48 hours, the following numbers of Colony Forming Units (CFU) per milliliter were recorded:

12, 28, 101, 42, 79, 53, 16, 24, 19, 31, 26, 36, 75, 90, 21

2.1. Compute the mean, mode, and median of the CFU data. (30 marks)

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2.2. Find the variance and standard deviation for these measurements. (50 marks)

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2.3. Mention the key characteristics of a normal distribution curve. (20 marks)

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Question 03 **(100 Marks)**

The weights of students in a college are normally distributed with a population standard deviation of 6.2 kg. A random sample of 50 students had a mean weight of 70 kg.

3.1. Estimate the population mean with 90% and 95% confidence intervals. (40 marks)

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3.2. List five essential characteristics of a strong research question. (20 marks)

3.3. Differentiate the independent and dependent variables and provide an example of each type.

(40 marks)

Question 04 **(100 Marks)**

A company is assessing the effectiveness of various employee training programs on improving productivity. The manager has noticed that employees who undergo a particular training program seem to have higher productivity levels. To explore this observation, an ANOVA test is performed to determine whether the training program has a significant impact on productivity outcomes.

The ANOVA table of the analysis is provided below.

Source	SS	df	MS	F
Between	2000	3	?	?
Within	3000	29	?	
Total	5000	32		

4.1. Calculate the Mean Square (MS) values. (40 marks)

4.2. Determine the F value. (20 marks)

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4.3. Find the critical value at the significance level of 0.05. (20 marks)

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4.4. Interpret the results and state the decision of the test. (20 marks)

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Question 05 **(100 Marks)**

5.1. List nucleotide and protein sequence databases available on the internet.

(30 marks)

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5.2. Name five online resources provided by the National Library of Medicine accessible through PubMed. (30 marks)

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5.3. Differentiate the key features of Genbank and EMBL output formats. (40 marks)

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Question 06 **(100 Marks)**

6.1. State the purpose of "Sequence alignment". (30 marks)

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6.2. State the main bioinformatics tool used for sequence alignment. (30 marks)

6.3. Mention are the two main types of sequence alignment. (40 marks)

Equations

- Variance

$$S^2 = \frac{\sum X^2 - \frac{(\sum X)^2}{n}}{n-1}$$

- **Confidence interval**

$$\overline{x} \pm z\frac{s}{\sqrt{n}}$$

- **ANOVA table**

Summary ANOVA

Source	Sum of Squares	Degrees of Freedom	Variance Estimate (Mean Square)	*F* Ratio
Between	SS_B	$K-1$	$MS_B = \frac{SS_B}{K-1}$	$\frac{MS_B}{MS_W}$
Within	SS_W	$N-K$	$MS_W = \frac{SS_W}{N-K}$	
Total	$SS_T = SS_B + SS_W$	$N-1$		

Tables

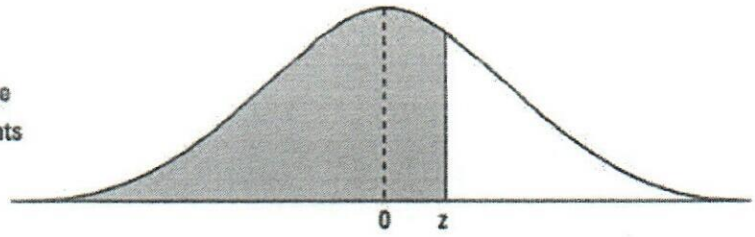
T table

t-test 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	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
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
Z	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%
	Confidence Level										

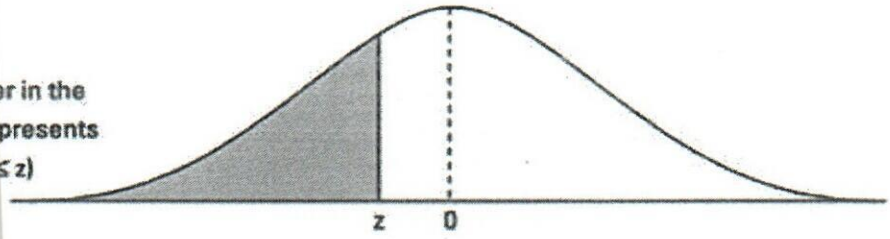
Z table

Number in the table represents $P(Z \leq z)$



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.5	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998
3.6	.9998	.9998	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999

Number in the table represents $P(Z \leq z)$



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
−3.6	.0002	.0002	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001
−3.5	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002
−3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
−3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
−3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
−3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
−3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
−2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
−2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
−2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
−2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
−2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
−2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
−2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
−2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
−2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
−2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
−1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
−1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
−1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
−1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
−1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
−1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
−1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
−1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
−1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
−1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
−0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
−0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
−0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
−0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
−0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
−0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
−0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
−0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
−0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
−0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

F-Table

F-table of Critical Values of α = 0.05 for F(df1, df2)																			
	DF1=1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
DF2=1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	243.91	245.95	248.01	249.05	250.10	251.14	252.20	253.25	254.31
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.37
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11	2.07
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.11	2.06	2.01
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.06	2.01	1.96
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.02	1.97	1.92
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90	1.84
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.15	2.07	2.03	1.98	1.94	1.89	1.84	1.78
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.86	1.81	1.76
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.84	1.79	1.73
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.15	2.07	1.99	1.95	1.90	1.85	1.80	1.75	1.69
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.13	2.06	1.97	1.93	1.88	1.84	1.79	1.73	1.67
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.12	2.04	1.96	1.91	1.87	1.82	1.77	1.71	1.65
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.10	2.03	1.94	1.90	1.85	1.81	1.75	1.70	1.64
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68	1.62
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58	1.51
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47	1.39
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35	1.25
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.32	1.22	1.00

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Faculty of Health Sciences
Higher Diploma in Biomedical Sciences
HD 2223 - Pharmacology
2nd Batch
Special Repeat SEQ Examination - 2nd Year 2nd Semester

Date: 26th September 2024
Time: 09.00 am – 12.00 pm – Three Hours

Question 01 **(100 Marks)**

1.1 Name the components of Pharmacokinetics. **(25 Marks)**

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1.2 State the two types of drug metabolism. **(25 Marks)**

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1.3 What is the role of albumin in drug transport in blood? **(25 Marks)**

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1.4 What are the types of drug elimination kinetic ? **(25 Marks)**

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Question 02 **(100 Marks)**

2.1 What are the receptors in the sympathetic system? **(25 Marks)**

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2.2 Compare followings

2.2.1. Salmeterol and salbutamol **(25 Marks)**

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2.2.2. Adverse effect and side effect **(25 Marks)**

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2.3 Give one example of drug adverse effects. **(25 Marks)**

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Question 03 **(100 Marks)**

3.1 List drug groups used for general anaesthesia. **(50 Marks)**

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3.2 What are the drugs used for local anaesthesia? **(50Marks)**

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Question 04 **(100 Marks)**

4.1 List the drugs in an oral contraceptive pills. **(25 Marks)**

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4.2 What you do mean by placebo tablets in oral contraceptive pill packet? **(50 Marks)**

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4.3 State the advice which will be given to patient who needs oral contraceptive pills. **(25 Marks)**

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Question 05 **(100 Marks)**

5.1 What are the drugs used for hyperthyroidism ? **(25 Marks)**

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5.2 What are the clinical features of hyperthyroidism? **(50 Marks)**

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5.3 List the different types of insulin. **(25 marks)**

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Question 06 **(100 Marks)**

6.1 What are the types of receptors of the sympathetic system ? **(30 Marks)**

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6.2 List the clinical uses of adrenaline. **(30 Marks)**

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6.3 State the receptors blocked by propranolol. **(10 Marks)**

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6.4 What is the mode of action of propranolol? **(30 Marks)**

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CINEC CAMPUS
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Faculty of Health Sciences

Higher Diploma in Biomedical Science

HD 2233 – Biostatistics and Bioinformatics

2nd year 2nd semester – Batch 2

Assignment

Date	:	**16th August 2024**
Time	:	**1:30 p.m. to 2:30 p.m.**

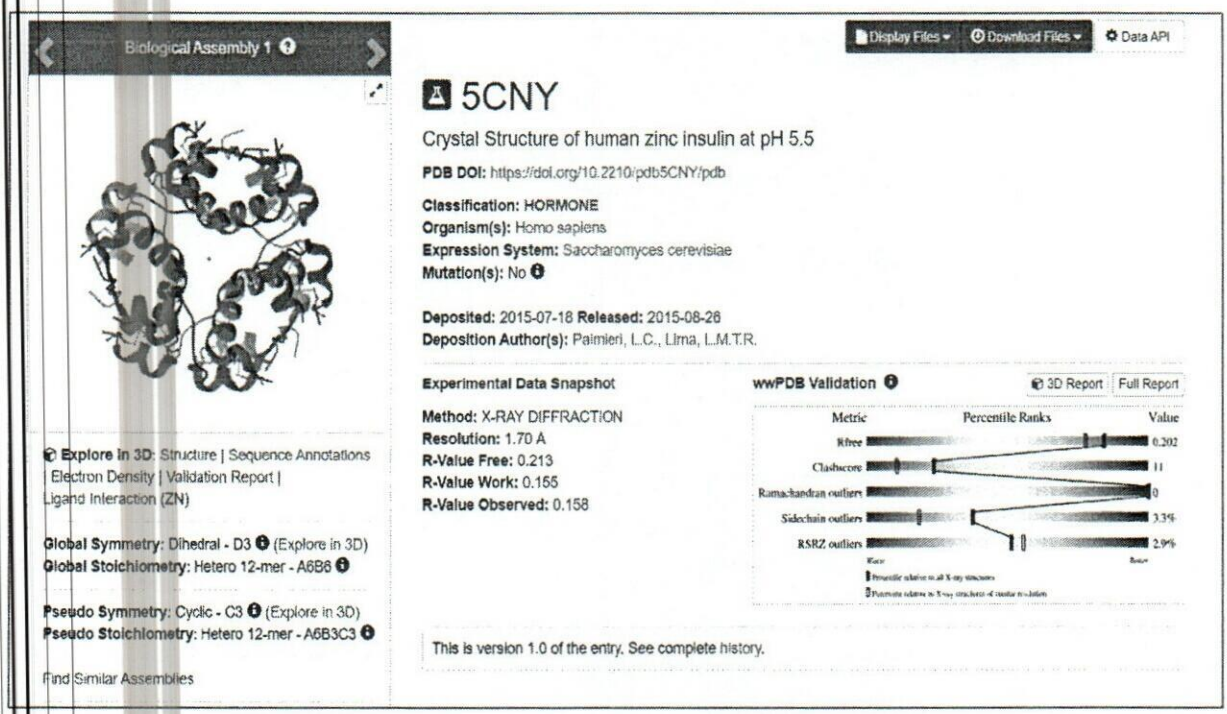
INSTRUCTIONS TO CANDIDATES

- This question paper consists of **TWO** questions.
- Answer ALL questions.
- You should write answers in lined papers legibly in black or blue ink.

Question 01 **(100 Marks)**

The figure mentioned below are the output from the biological databases.

A.



B.

GenBank

Human IFN-gamma polypeptide coding sequence

GenBank: A34532.1

FASTA Graphics

Go to:

```
LOCUS       A34532                  847 bp    RNA     linear   PAT 18-JUN-1996
DEFINITION  Human IFN-gamma polypeptide coding sequence.
ACCESSION   A34532
VERSION     A34532.1
KEYWORDS    .
SOURCE      Homo sapiens (human)
  ORGANISM  Homo sapiens
            Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi;
            Mammalia; Eutheria; Euarchontoglires; Primates; Haplorrhini;
            Catarrhini; Hominidae; Homo.
REFERENCE   1  (bases 1 to 847)
  AUTHORS   Schollmeier,K., Kreimeyer,A. and Daum,L.
  TITLE     Gamma-interferon derivatives, process for their manufacture,
            vectors and medicines obtained therefrom
  JOURNAL   Patent: EP 0306870-A2 9 15-MAR-1989;
            BASF Aktiengesellschaft
FEATURES             Location/Qualifiers
     source          1..847
                     /organism="Homo sapiens"
                     /mol_type="unassigned RNA"
                     /db_xref="taxon:9606"
     gene            <1..561
                     /gene="IFN-gamma"
     CDS             <1..561
                     /gene="IFN-gamma"
                     /codon_start=1
                     /product="gamma-interferon"
                     /protein_id="CAA02176.1"
                     /translation="DQLDTRTTDFNFFGLILSETMKYTSYILAFQLCIVLGSLGCYCQ
                     DPYVKEAENLKKYFNAGHSDVADNGTLFLGILKNWKEESDRKIMQSQIVSFYFKLFKN
                     FKDDQSIQKSVETIKEDMNVKFFNSNKKKRDDFEKLTNYSVTDLNVQRKAIHELIQVM
                     AELSPAAKTGKRKRSQMLFRGRRASQ"
```

C.

```
ID   CAA01254; SV 1; linear; unassigned DNA; PAT; SYN; 167 BP.
XX
PA   A15938.1
XX
DT   28-MAR-1994 (Rel. 39, Created)
DT   28-MAR-1994 (Rel. 39, Last updated, Version 1)
XX
DE   synthetic construct partial Human insulin
XX
KW   .
XX
OS   synthetic construct
OC   other sequences; artificial sequences.
XX
RN   [1]
RA   Brange J.J.V., Norris K., Hansen M.T.;
RT   "Insulin analogues and method of preparing the same.";
RL   Patent number EP0214826-A2/34, 18-MAR-1987.
RL   NOVO-NORDISK A/S;
RL   NOVO NORDISK A/S;
RL   NOVO NORDISK A/S.
XX
DR   MD5; 3752018308c6aa9975c21ee673eaa51c.
XX
FH   Key             Location/Qualifiers
FH
FT   source          1..167
FT                   /organism="synthetic construct"
FT                   /mol_type="unassigned DNA"
FT                   /db_xref="taxon:32630"
FT   CDS             A15938.1:<1..167
FT                   /codon_start=3
FT                   /transl_table=11
FT                   /product="Human insulin"
FT                   /protein_id="CAA01254.1"
FT                   /translation="RFVNQHLCGSHLVEALYLVCGERGFFYTPKAAKGIVEQCCTSICS
FT                   LYQLENYCN"
XX
SQ   Sequence 167 BP; 41 A; 38 C; 36 G; 52 T; 0 other;
     aaagattcgt taaccaacac ttgtgcggtt cccacttggt tgaagctttg tacttggttt        60
     gcggtgaaag aggtttcttc tacactccta aggctgctaa gggtattgtc gaacaatgct       120
     gtacctccat ctgctccttg taccaattgg aaaactactg caactag                     167
//
```

1.1.State the three main types of biological databases available on the internet. (30 marks)

1.2. Identify above databases (A,B and C) differentiate the features of three outputs.

(70 marks)

Question 02 **(100 marks)**

Mention the information that you could retrieve from the FASTA output given below.

Homo sapiens mRNA for KIR3DL2 protein (KIR3DL2 gene), isolate human, allele KIR3DL2-011:01

GenBank: LT934502.1

GenBank Graphics

```
>LT934502.1 Homo sapiens mRNA for KIR3DL2 protein (KIR3DL2 gene), isolate human, allele
KIR3DL2-011:01
ATGTCGCTCACGGTCGTCAGCATGGCGTGCGTTGGGTTCTTCTTGCTGCAGGGGGCCTGGCCACTCATGG
GTGGTCAGGACAAACCCTTCCTGTCTGCCCGGCCCAGCACTGTGGTGCCTCGAGGAGGACACGTGGCTCT
TCAGTGTCACTATCGTCGTGGGTTTAACAATTTCATGCTGTACAAAGAAGACAGAAGCCACGTTCCCATC
TTCCACGGCAGAATATTCCAGGAGAGCTTCATCATGGGCCCTGTGACCCCAGCACATGCAGGGACCTACA
GATGTCGGGGTTCACGCCCACACTCCCTCACTGGGTGGTCGGCACCCAGCAACCCCGTGGTGATCATGGT
CACAGGAAACCACAGAAAACCTTCCCTCCTGGCCCACCCAGGGCCCCTGCTGAAATCAGGAGAGACAGTC
ATCCTGCAATGTTGGTCAGATGTCATGTTTGAGCACTTCTTTCTGCACAGAGAGGGGATCTCTGAGGACC
CCTCACGCCTCGTTGGACAGATCCATGATGGGGTCTCCAAGGCCAACTTCTCCATCGGTCCCTTGATGCC
TGTCCTTGCAGGAACCTACAGATGTTATGGTTCTGTTCCTCACTCCCCCTATCAGTTGTCAGCTCCCAGT
GACCCCCTGGACATCGTGATCACAGGTCTATATGAGAAACCTTCTCTCTCAGCCCAGCCGGGCCCCACGG
TTCAGGCAGGAGAGAACGTGACCTTGTCCTGTAGCTCCTGGAGCTCCTATGACATCTACCATCTGTCCAG
GGAAGGGGAGGCCCATGAACGTAGGCTCCGTGCAGTGCCCAAGGTCAACAGAACATTCCAGGCAGACTTT
CCTCTGGGCCCTGCCACCCACGGAGGGACCTACAGATGCTTCGGCTCTTTCCGTGCCCTGCCCTGCGTGT
GGTCAAACTCAAGTGACCCACTGCTTGTTTCTGTCACAGGAAACCCTTCAAGTAGTTGGCCTTCACCCAC
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ACCAAGAGCCTGCGGGGGACAGAACAGTGAATAGGCAGGACTCTGATGAACAAGACCCTCAGGAGGTGAT
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GCCCTAACAGATACCAGCGTGTACACGGAACTTCCAAATGCTGAGCCCAGATCCAAAGTTGTCTCCTGCC
CACGAGCACCACAGTCAGGTCTTGAGGGGGTTTTCTAG
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Faculty of Health Sciences

Higher Diploma in Biomedical Science

HD 2233 – Biostatistics and Bioinformatics

2nd year 2nd semester – Batch 2

End Semester SEQ Examination

Date : **16th August 2024**

Time : **9.00 a.m. to 12.00 p.m.**

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer ALL questions.
- You should write answers in lined papers legibly in black or blue ink.

Question 01 **(100 Marks)**

A microbiologist studied the growth of bacteria in samples from different soil sites. After incubating the samples on a selective medium for 48 hours, the following numbers of Colony Forming Units (CFU) per milliliter were recorded:

10, 22, 95, 38, 89, 67, 12, 22, 15, 20, 22, 30, 60, 85, 18.

1.1. Compute the mean, mode, and median of the CFU data. (30 marks)

1.2. Find the variance and standard deviation for these measurements. (50 marks)

1.3. State the key characteristics of a normal distribution curve. (20 marks)

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Question 02 **(100 Marks)**

2.1. Define the term "Variable". (20 marks)

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2.2. State the different types of data on the numerical variables and give an example of each. (20 marks)

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2.3. Differentiate the quantitative data and qualitative data using examples. (30 marks)

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2.4 Depending on the source of data collection, sources of data could be classified as primary and secondary sources. Compare and contrast the primary and secondary sources with an example of each. (30 marks)

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Question 03 **(100 Marks)**

The heights of students in a high school are normally distributed with a population standard deviation of 4.5 cm. A random sample of 40 students had a mean height of 160 cm.

3.1. Estimate the population mean with 90% and 95% confidence intervals. (40 marks)

.....
.....
.....

3.2. Identify five key features of a well-formulated hypothesis. (20 marks)

3.3. State the role of the null hypothesis in scientific research. (20 marks)

3.4. Differentiate the independent and dependent variables and provide an example of each type. (20 marks)

Question 04 **(100 Marks)**

A university is evaluating the impact of different study methods on the final exam scores in a Mathematics course. The instructor has observed that students who use a specific study method tend to perform better. To investigate this, an ANOVA test is conducted to examine whether the study method affects final exam scores.

The ANOVA table of the analysis is provided below.

Source	SS	df	MS	F
Between	2000	3	?	?
Within	4000	30	?	
Total	6000	33		

4.1. Calculate the Mean Square (MS) values. (40 marks)

4.2. Determine the F value. (20 marks)

4.3. Find the critical value at the significance level of 0.05. (20 marks)

4.4. Interpret the results and state the decision of the test. (20 marks)

Question 05 **(100 Marks)**

5.1. State two nucleotide and protein sequence databases available on the internet. (20 marks)

5.2. State five NCBI databases accessible through ENTREZ. (20 marks)

5.3. Differentiate the features of Genbank and EMBL output formats. (20 marks)

5.4. List two DNA sequence analysis tools used for gene prediction and drug discovery. (40 marks)

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Question 06 **(100 Marks)**

6.1. Define the term of "Sequence alignment". (20 marks)

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6.2. State the main bioinformatics tool used for sequence alignment. (20 marks)

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.....

6.3. Refer to the following substitution matrix and calculate the score for sequence A given below. (60 marks)

	C	T	A	G
C	+1	-1	-1	-1
T	-1	+1	-1	-1
A	-1	-1	+1	-1
G	-1	-1	-1	+1

ATGGCG Query Sequence

Sequence A- ATGGCG

ATG-AG the score=.....

A-TGAG the score=.....

Equations

- Variance

$$S^2 = \frac{\sum X^2 - \frac{(\sum X)^2}{n}}{n-1}$$

- **Confidence interval**

$$\overline{x} \pm z\frac{s}{\sqrt{n}}$$

- **ANOVA table**

Summary ANOVA

Source	Sum of Squares	Degrees of Freedom	Variance Estimate (Mean Square)	*F* Ratio
Between	SS_B	$K-1$	$MS_B = \frac{SS_B}{K-1}$	$\frac{MS_B}{MS_W}$
Within	SS_W	$N-K$	$MS_W = \frac{SS_W}{N-K}$	
Total	$SS_T = SS_B + SS_W$	$N-1$		

Tables

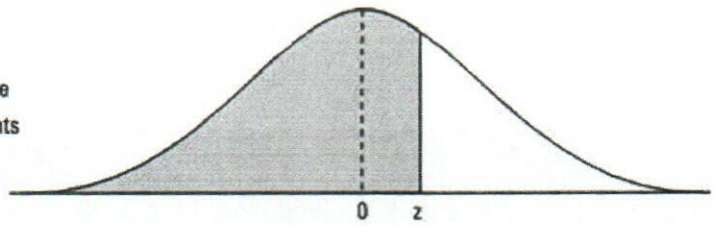
T table

t-test 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	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
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
Z	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%
	Confidence Level										

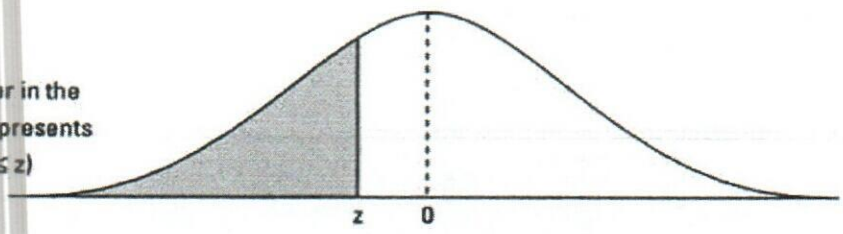
Z table

Number in the table represents $P(Z \leq z)$



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.5	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998
3.6	.9998	.9998	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999

Number in the table represents $P(Z \leq z)$



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.6	.0002	.0002	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001
-3.5	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

F-Table

F-table of Critical Values of α = 0.05 for F(df1, df2)																			
	DF1=1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
DF2=1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	243.91	245.95	248.01	249.05	250.10	251.14	252.20	253.25	254.31
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.37
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11	2.07
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.11	2.06	2.01
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.06	2.01	1.96
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.02	1.97	1.92
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90	1.84
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.15	2.07	2.03	1.98	1.94	1.89	1.84	1.78
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.86	1.81	1.76
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.84	1.79	1.73
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.15	2.07	1.99	1.95	1.90	1.85	1.80	1.75	1.69
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.13	2.06	1.97	1.93	1.88	1.84	1.79	1.73	1.67
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.12	2.04	1.96	1.91	1.87	1.82	1.77	1.71	1.65
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.10	2.03	1.94	1.90	1.85	1.81	1.75	1.70	1.64
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68	1.62
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58	1.51
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47	1.39
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35	1.25
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.32	1.22	1.00

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences
Higher Diploma in Biomedical Science
End Examination - 2nd batch
HD 2233 Pathology
2nd Year 2nd Semester

Date: 15th of August 2024
Time: 09.00 am – 12.00 pm – Three Hours

Question 01 **(100 Marks)**

1.1 Write five differences between acute inflammation and chronic inflammation. **(25 Marks)**

1.2 Compare regeneration and repair **(25 Marks)**

1.3 List **five (05)** cardinal signs of inflammation **(25 Marks)**

1.4 Write a short note on coagulative necrosis **(25 Marks)**

Question 02 **(100marks)**

2.1 Write short notes on the following

2.1.1 Atrophy **(25 Marks)**

2.1.2 Hypertrophy **(25 Marks)**

2.1.3 Hyperplasia **(25 Marks)**

2.1.4 Metaplasia **(25Marks)**

Question 03 **(100 Marks)**

3.1 Name **four (04)** signs and symptoms of gastritis **(40 Marl**

3.2 Name **three (03)** complications of peptic ulcer **(30 Marks)**

3.3 Write **three (03)** risk factors for intestinal neoplasms **(30 Marks)**

Question 04 **(100 Marks)**

4.1 What is Atherosclerosis? **(30 Marks)**

4.2 Name **two (02)** complications of atherosclerosis **(30 Marks)**

4.3 Name **four (04)** clinical signs and symptoms of Acute Renal Failure **(40 Marks)**

Question 05 **(100 Marks)**

5.1 What is Dysmenorrhea? **(30 Marks)**

5.2 What is Amenorrhea? **(30 Marks)**

5.3 What are the signs and symptoms of Pelvic Inflammatory Disease? **(40 Marks)**

Question 06 **(100 Marks)**

6.1 Name the types of intra-cranial haemorrhages **(40 Marks)**

6.2 Write a brief description on **any Two (02)** of the following given topics **(60 Marks)**

1. Osteoporosis
2. Hyperthyroidism
3. Diabetes mellitus
4. Chronic renal failure

***

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences
Higher Diploma in Biomedical Sciences
HD 2213 – Fundamentals of Laboratory Management
2nd Year 2nd Semester
HD BMS Batch 02
End Semester SEQ Examination

Date : 12th of August 2024
Time : 09.00 am – 11.00 a.m (Two Hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **FOUR** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.

QUESTION 01 **(100 marks)**

1.1. State **three (03)** types of physical resources in a laboratory. (15 marks)

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1.2. State the key practices involved in the effective management of equipment in a microbiology laboratory. (40 marks)

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1.3. Write the importance of the calibration of laboratory equipment. (30 marks)

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1.4. Compare the accuracy of burette and graduated cylinders used in the laboratories. (15 marks)

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QUESTION 02 **(100 marks)**

2.1. You have given concentrated stock solution of 12 moldm^{-3} HCl in 2.5 L.

2.1.1. Calculate the volume required from the stock solution of concentrated HCl to prepare 250 ml of 0.2 moldm^{-3} HCl solution. (20 marks)

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2.1.2. State the safety precautions that should be taken when handling concentrated HCl. (20 marks)

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2.2. You have given a 10X concentrated buffer solution and you need to prepare 1 liter of a 1X working solution.

2.2.1. Calculate the dilution factor. (20 marks)

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2.2.2. Calculate the volume required from the stock solution. (20 marks)

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2.3.3. How you would verify the accuracy of the prepared 1X buffer solution ? (20 marks)

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QUESTION 03 **(100 marks)**

3.1. List 05 (five) events in the pre-analytical phase. (10 marks)

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3.2. Outline the effect of sample collection variables on the final report of the investigation. (30 marks)

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3.3. State the types of errors that can happen in the analytical phase of the testing process. (30 marks)

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3.4. State the actions that can be taken to minimize the errors mentioned in 3.3. (30 marks)

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QUESTION 04 **(100 marks)**

4.1 State the four (04) key managerial functions. (10 marks)

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4.2 Delegation of responsibilities is important for the smooth functioning of a laboratory. Briefly explain your views on this opinion using the knowledge of managerial functions. (30 marks)

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4.3. Imagine ass the laboratory manager you have decided to upgrade the available three-part hematology analyzer to a five-part hematology analyzer.

4.3.1. Outline the factors that need to be considered before conducting the above procedure. (30 marks)

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4.3.2. Outline the process of purchasing the new haematology analyzer for the laboratory. (30 marks)

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences
Higher Diploma in Biomedical Sciences
Pharmacology – HD 2223
2nd Batch
End Examination - 2nd Year 2nd Semester

Date: 13th August 2024
Time: 09.00 am – 12.00 – Three Hours

Question 01 **(100 Marks)**

1.1 What is ADME in Pharmacokinetics? **(25 Marks)**

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1.2 State the two types of drug metabolism. **(25 Marks)**

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1.3 How drugs are transported in blood? **(25 Marks)**

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1.4 What is the elimination kinetic of alcohol? **(25 Marks)**

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Question 02 **(100 Marks)**

2.1 What is meant by sympathomimetic drugs? Give examples **(25 Marks)**

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2.2 Compare followings

2.2.1. Salmeterol and salbutamol. **(25 Marks)**

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2.2.2. Adverse effect and side effect. **(25 Marks)**

2.3 List the types of adverse effects. **(25 Marks)**

Question 03 **(100 Marks)**

3.1 List drugs groups used for general anaesthesia. **(30 Marks)**

3.2 What are the drugs used for local anaesthesia? **(25 Marks)**

3.3 List three drugs used for depression. **(20 Marks)**

3.4 List the side effects of the drugs you mentioned in 3.3. **(25 Marks)**

Question 04 **(100 Marks)**

4.1 List the drugs in an oral contraceptive pills. **(25 Marks)**

4.2 What you do mean by placebo tablets in oral contraceptive pill packet ? **(25 Marks)**

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4.3 State the advice which will be given to patient who needs oral contraceptive pills. **(30 Marks)**

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4.4 State the other contraceptive devices. **(20 Marks)**

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Question 05 **(100 Marks)**

5.1 What is the drug used for hypothyroidism ? **(25 Marks)**

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5.2 What are the clinical features of hypothyroidism? **(25 Marks)**

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5.3 What are the drugs used for the treatment for hyperthyroidism & indicate the mode of action? **(25 Marks)**

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5.4 List the different types of insulin and oral hypoglycaemic drugs **(25 marks)**

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Question 06 **(100 Marks)**

6.1 What are the types of receptors of sympathetic system ? **(20 Marks)**

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6.2 List the clinical uses of adrenaline **(30 Marks)**

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6.3 State the receptors blocked by propranolol. **(10 Marks)**

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6.4 What is the mode of action of propranolol? **(25 Marks)**

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6.5 Explain why propranolol is not given in patients with bronchial asthma. **(15 Marks)**

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Higher Diploma in Biomedical Science

Fundamentals of Laboratory Management

HD2213

2nd year 2nd semester –Batch 01

Repeat End Semester Examination- SEQ Examination

Duration 2 hrs

INDEX NUMBER:

Date	:	**13.02.2023**
Time	:	**09.00 am – 11.00 am (2 hours)**

INSTRUCTIONS TO CANDIDATES

- This question paper consists of FOUR questions.
- Answer ALL questions.
- You should write legibly in black or blue ink
- You are not allowed to take out the examination papers.

Question 01 **(100 marks)**

1.1 State three types of laboratories (15 marks)

1.2 State five topics that are contained in a standard operating procedure. (25 marks)

1.3 State four types of laboratory waste. (20 marks)

1.4 Briefly describe two methods of disposing of laboratory chemical waste. (20 marks)

1.5 State two things that should be considered when considering the safety of a laboratory. (20 marks)

Question 02 **(100 marks)**

2.1 How many grams of Sodium chloride (NaCl) should you use to make 37 ml of a **1.0 moldm^{-3} solution? (Na – 23 g/mol, Cl - 35.5 g/mol)** (20 marks)

2.2 How do you make a 1:300 dilution of a bacillus spore sample? (20 marks)

2.3 Find the dilution factor if 2.5 ml of a stock solution is combined with 7.5 ml of water. (20 marks)

2.4 How would you prepare 3% (W/V) NaCl solution in 100ml of water **(w/v = weight (of a solute) per final solution volume)** (20 marks)

2.5 A rainwater sample has a H^+ concentration of 1×10^{-5}. Find the pH of the rainwater. **$pH = -\log([H^+])$** (20 marks)

Question 03 **(100 marks)**

3.1 Define record retention (10 marks)

3.2 What are the elements of a patient order form for a test? (20 marks)

3.3 Describe 3 components of analytical phase to monitor for ensuring the reliability of results. (30 marks)

3.4 State the features of Standard Operating Procedures. (10 marks)

3.5 Describe the patient's rights which covered by Patient's Bill of Rights. (30 marks)

Question 04 **(100 marks)**

4.1 What is a Laboratory Information Management System (LIMS)? (10 marks)

4.2 State the advantages of LIMS within a clinical laboratory. (10 marks)

4.3 Describe different sections of laboratory report of a test. (30 marks)

4.4 Mention the cost-effective measures which taken by clinical laboratory management. (20 marks)

4.5 Draw a Microbiology Laboratory floor plan and by referring to your plan state how to prevent contamination and provide protection to the laboratory worker. (30 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

HIGHER DIPLOMA IN BIOMEDICAL SCIENCES

HD2233

Pathology of Diseases

2nd year 2nd Semester

End Semester SEQ Examination-Resit

INDEX NUMBER: .....

Date	**: 15 of February 2023**
Time	**: 9.00 a.m. – 12.00 p.m. (Three hours)**

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.

Question 1 **(100 marks).**

1.1 Name 4 types of Cystic Diseases of the Kidneys (20 marks)

1.2 Write a short note on Chronic Kidney Disease (30 marks)

1.3 List the clinical signs and symptoms of Eclampsia (20 marks)

1.4 Define the following disease conditions.

1.4.1 Vaginal candidiasis (15 marks)

1.4.2 Hypospadias (15 marks)

Question 2 **(100 marks)**

2.1 Write short Notes of the followings

2.1.1 Talipes Equinovarus (clubbed foot) (25 marks)

2.1.2 Gout (25 marks)

2.1.3 Cushing's disease (25 marks)

2.1.4 Grave's disease (25 marks,

Question 3 **(100 marks)**

Briefly describe the followings.

3.1 Giant cells in chronic inflammation (25 marks)

3.2 Coagulative necrosis (25 marks)

3.3 Caseous necrosis (25 marks)

3.4 Apoptosis (25 marks)

Question 4 **(100 marks)**

4. 1 Briefly describe the pathological changes in following stages of lobar pneumonia.

4.1.1 Congestion (20 marks)

4.1.2 Red Hepatisation (20 marks)

4.1.3 Gray Hepatisation. (20 marks)

4.1.4 Stage of Resolution (20 marks)

4.2 Briefly describe on emphysema (20 marks)

Question 5 **(100 marks)**

5.1 List cardinal signs of inflammation. (10 marks)

5.2 Compare followings.

5.2.1 acute inflammation and chronic inflammation (30 marks)

5.2.2 Dry gangrene and wet gangrene. (30 marks)

5.2.3 Regeneration & Repair. (30 marks)

Question 6 **(100 marks)**

Write short notes on followings.

6.1 Hypertrophy (25 marks)

6.2 Hyperplasia (25 marks)

6.3 Atrophy (25 marks)

6.4 Metaplasia (25 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Higher Diploma in Biomedical Science

HD 2243 – Biostatistics and Bioinformatics

2nd year 2nd semester – Batch 1

End Semester SEQ Examination

INDEX NUMBER: .....

Date : **23th December 2022**

Time : **9.00 a.m. to 12.00 p.m.**

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer ALL questions.
- You should write answers in lined papers legibly in black or blue ink.
- You are not allowed to take out the examination papers.

Question 01 **(100 Marks)**

Assume that a research student wanted to find out whether the current crisis in Sri Lanka has significantly influenced on malnourishment of the children younger than 5 years. He sampled 20 children from a selected MOH area and the weight data observed were as follows.

10, 18, 8, 12, 11, 17, 12, 15, 13, 9, 10, 14, 12, 9, 9, 14, 16, 12, 15, 11

A statistical analysis performed has analyzed the following for the data set.

Mean=12.35; Median= 12; Mode=12; Standard deviation= 2.852; Variance= 8.134; Skewness=0.24

1.1. Estimate the population mean with 95% confidence Intervals. (30 marks)

1.2. What percentage of data values are actually within ±1and within ±2 standard deviation of the mean. (50 marks)

1.3. Comment on distribution of data considering the skewness. (20 marks)

Question 02 **(100 Marks)**

A biomedical scientist wanted to identify the bacteria species in a water sample taken from a pond. Therefore he plated the water samples taken from different sampling sites on Nutrient Agar. After 24 hours of incubation, the number of Colony Forming Units (CFU)/ mL, that he observed are as follows:

7, 16, 121, 51, 101, 81, 1, 16, 9, 11, 16

2.1. Find the mean, mode, median of this data. (30 marks)

2.2. Calculate the variance and standard deviation. (50 marks)

2.3. State the characteristic features of a normal distribution (20 marks)

Question 03 **(100 Marks)**

3.1. What does it mean by "Research Hypothesis"? (10 marks)

3.2. List five characteristics of a good hypothesis. (20 marks)

3.3. Mention the difference between null and alternative hypothesis. (20 marks)

3.4. State the null and alternative hypothesis for the following research problem.

Obesity is a major health problem in Sri Lanka. A researcher is conducting research to show that people may be able to lose more weight on a low carbohydrate diet than on a low-fat diet.

Research Problem: Does the data suggest that, people are able to lose more weight on a low carbohydrate diet than on a low-fat diet on average? (50 marks)

Question 04 **(100 Marks)**

4.1. What is "Data"? (10 marks)

4.2. Compare the data types of discrete and continuous data. (20 marks)

4.3. Order the following data types according to their statistical importance.

Nominal, ordinal, ratio and interval (20 marks)

4.4. List the two examples for each of the above-mentioned data types. (50 marks)

Question 05 **(100 Marks)**

A university is assessing the performance of the students based on the semester end results for the subjects of Biology, Chemistry and Physics. The instructor has noticed that the students who are having higher attendance in Biology are more likely to perform well in other two subjects.

The instructor requires to check whether that there is an effect from the attendance of Biology to the results. The ANOVA table of the statistical analysis is mentioned below.

Source	SS	df	MS	F
Between	1900	2	?	?
Within	3355	21	?	
Total	5255	23		

5.1. Find the values of Mean Square (MS). (40 marks)

5.2. Calculate the F value. (20 marks)

5.3. Mention the critical value at the significance level of 0.05. (20 marks)

5.4. State the conclusion and the decision of the test. (20 marks)

Question 06 **(100 Marks)**

6.1. What are the common data formats used in the biological databases? (10 marks)

6.2. State the difference between the FASTA format and PLAIN TEXT format. (20 marks)

6.3. List the information appear in the NCBI GENBANK format. (30 marks)

6.4. Mention the uses of regression analysis in statistics. (40 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Higher Diploma in Biomedical Science

HD 2243 – Biostatistics and Bioinformatics

2nd year 2nd semester – Batch 1

Assignment

INDEX NUMBER:

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Date	:	**23th December 2022**
Time	:	**1:30 p.m. to 2:30 p.m.**

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **TWO** questions.
- Answer ALL questions.
- You should write answers in lined papers legibly in black or blue ink.
- You are not allowed to take out the examination papers.

Question 01 **(100 Marks)**

The figure mentioned below are the output from the biological databases.

A.

Escherichia coli O25b:H4 chromosome, complete genome

GenBank: CP015085.1

FASTA Graphics

```
LOCUS       CP015085              5289898 bp    DNA     circular BCT 15-JUN-2016
DEFINITION  Escherichia coli O25b:H4 chromosome, complete sequence.
ACCESSION   CP015085
VERSION     CP015085.1
DBLINK      BioProject: PRJNA316859
            BioSample: SAMN04605558
KEYWORDS    .
SOURCE      Escherichia coli O25b:H4
  ORGANISM  Escherichia coli O25b:H4
            Bacteria; Proteobacteria; Gammaproteobacteria; Enterobacterales;
            Enterobacteriaceae; Escherichia.
```

B.

```
ID   A00145; SV 1; linear; unassigned RNA; PAT; MAM; 678 BP.
XX
AC   A00145;
XX
DT   22-MAR-1993 (Rel. 35, Created)
DT   14-APR-2005 (Rel. 83, Last updated, Version 3)
XX
DE   B.taurus BoIFN-alpha A mRNA
XX
KW   interferon alpha.
XX
OS   Bos taurus (cattle)
OC   Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi; Mammalia;
OC   Eutheria; Laurasiatheria; Cetartiodactyla; Ruminantia; Pecora; Bovidae;
OC   Bovinae; Bos.
XX
RN   [1]
RP   1-678
RA   ;
RT   ;
RL   Patent number GB2157697-A/1, 30-OCT-1985.
XX
```

1.1. Mention the common features of the above-mentioned flat file output.

1.2. State the database which would provide the following result.

A-.....

B-.....

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Higher Diploma in Biomedical Science

HD 2233 – Biostatistics and Bioinformatics

2nd year 2nd semester – Batch 1

Assignment (Repeat)

Date	:	**16th February 2023**
Time	:	**1:30 p.m. to 2:30 p.m.**

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **TWO** questions.
- Answer ALL questions.
- You should write answers in lined papers legibly in black or blue ink.

Question 01 **(100 Marks)**

The figure mentioned below are the output from the biological databases.

A.

Penicillium chrysogenum Wisconsin 54-1255 complete genome, contig Pc00c22

FASTA Graphics

```
LOCUS       AM920437            6387817 bp    DNA     linear   PLN 27-FEB-2015
DEFINITION  Penicillium chrysogenum Wisconsin 54-1255 complete genome, contig
            Pc00c22.
ACCESSION   AM920437
VERSION     AM920437.1
DBLINK      BioProject: PRJEA27927
            BioSample: SAMEA2272345
KEYWORDS    .
SOURCE      Penicillium rubens Wisconsin 54-1255
  ORGANISM  Penicillium rubens Wisconsin 54-1255
            Eukaryota; Fungi; Dikarya; Ascomycota; Pezizomycotina;
            Eurotiomycetes; Eurotiomycetidae; Eurotiales; Aspergillaceae;
            Penicillium; Penicillium chrysogenum species complex.
REFERENCE   1  (bases 1586311 to 1588650)
  AUTHORS   Gouka,R.J., van Hartingsveldt,W., Bovenberg,R.A., van Zeijl,C.M.,
            van den Hondel,C.A. and van Gorcom,R.F.
  TITLE     Development of a new transformant selection system for Penicillium
            chrysogenum: isolation and characterization of the P. chrysogenum
            acetyl-coenzyme A synthetase gene (facA) and its use as a
            homologous selection marker
```

B.

```
ID   A00145; SV 1; linear; unassigned RNA; PAT; MAM; 678 BP.
XX
AC   A00145;
XX
DT   22-MAR-1993 (Rel. 35, Created)
DT   14-APR-2005 (Rel. 83, Last updated, Version 3)
XX
DE   B.taurus BoIFN-alpha A mRNA
XX
KW   interferon alpha.
XX
OS   Bos taurus (cattle)
OC   Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi; Mammalia;
OC   Eutheria; Laurasiatheria; Cetartiodactyla; Ruminantia; Pecora; Bovidae;
OC   Bovinae; Bos.
XX
RN   [1]
RP   1-678
RA   ;
RT   ;
RL   Patent number GB2157697-A/1, 30-OCT-1985.
XX
```

1.1. State the type of database. (20 marks)

1.2. Mention the example of the databases which would provide the following result.

A-.....

B-..... (80 marks)

Question 02 **(100 marks)**

Mention the information that you could retrieve and the main components of the following FASTA output.

Aspergillus niger supercontig An01

GenBank: AM270980.1

GenBank Graphics

```
>AM270980.1 Aspergillus niger supercontig An01
GATCATACAAATCATCCCCTTGGCCTCTGTTAGCCTTCTGCGATCTATCGTGCTCGGAGCAGCTGCAAGC
CCCGCCAAGTGACAATCCGAAACGGACTCAATAAGATTTGGCGTTGTCGACTTCATTTCAGTTCCGCCGA
CCTTCCAGCTGCAGCTATCGACTGTCGAAGCCGACCCTCCACGAGTCAAACAGATTGGAAACGATAATAA
ACCGATCTCCCGAGATAAGAATGGCGCTTTGGTCAAACATGAAGGCGTGAGTGAACACTCTGCTGACTTC
ATGTAAGTGAGGAGAATATCGCTAAATGTGATACGGACATGACATTAGACTTGCAACAGAAAGAATAATA
CATGCAGGTCCGAGATGAACAACGAGACAAACCTTGTGTGGTGCTCAACATAGTTTGCTAATAGAAACGT
GATTGACCGTCACATGGCTCCTTGACTGTCTAGATACATCCGGCTGATCATACTTTGTTCTAGTGTATCC
ATGACGGAGAAAAGTGCATTTATGATTTTTATGATCGATCTGTTGAATGCCAATAGGCACTTGCGGCTGG
CCGGCGGAATTGGAAAGGAGCAGGTAGCACTCAACATCAGAGGTGTAACAACCAGCGAACCCATTCAACG
TTGGAGTCATTTATTGTTTATCTCCGCTCTAGTTTCAGTTTCCTCTCGCGACTTGCTTGTTTGTATCTGA
GTAAGCACCCGATAATAAAGTAGTTGTCATCACTGGCTTGAAAAATCAAACAATTACTCGCATCTCGCGA
GAAAGAACAGACTGCTCGTAACAAGCAAGCAAACGCCAAGCTCTTATTCAGATAACATTACTGGATCCCC
TTCTGCTATCTGATTTATTTAGTGACTGGTCCCGGGCCCGAAGCCGCCACCCTGTGCCACCTCATTTTAA
GCGGGAGGTCGTAACGCTCGGGCTCAATTCTCTGTTCAAGAACGCCCCTAAGGCCAATCGACAGCCGCCA
AACAGTGCAGCCTGGATGGCGGTCTGACCAGGGACACTGAGTATAAATGAATCCTGGAGCCGTCTATGTA
GGCCACGTCACAAGCCTTATAACCACCTCAAGTTGGACTGGATATCAATGATCCGGATCCAGTCCTTTGC
TCAACACCCTTAGAACAAATTTATAGTTGTCAAGCAGTGTTGCCTGGGTGGCAGTCCCATCGGGGGCATT
GGGTGATGAATACTTCGTAAAACCCATCATACTGCTACACCACGAGCTTGTCAGACCTGTGGCCTTCCAA
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Beyond A Graduate

Faculty of Health Sciences

Higher Diploma in Biomedical Science

HD 2233 – Biostatistics and Bioinformatics

2nd year 2nd semester – Batch 1

End Semester SEQ Examination- Repeat

Date : **16th February 2023**

Time : **9.00 a.m. to 12.00 p.m.**

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer ALL questions.
- You should write answers in lined papers legibly in black or blue ink.

Question 01 **(100 Marks)**

A biomedical scientist wanted to identify the bacteria species in a water sample taken from a pond. Therefore, he plated the water samples taken from different sampling sites on Nutrient Agar. After 24 hours of incubation, the number of Colony Forming Units (CFU)/ mL, that he observed are as follows:

7, 16, 120, 51, 102, 81, 8, 16, 9, 11, 16, 24, 53, 76,12

1.1. Find the mean, mode, median of this data. (30 marks)

1.2. Calculate the variance and standard deviation. (50 marks)

1.3. State the characteristic features of a normal distribution. (20 marks)

Question 02 **(100 Marks)**

2.1. What is "Statistics"? (10 marks)

2.2. Compare the data types of discrete and continuous data with an example for each. (20 marks)

2.3. Order the following data types according to their statistical importance.

Nominal, ordinal, ratio and interval (10 marks)

2.4. List the one for each of the above-mentioned data types. (60 marks)

Question 03 **(100 Marks)**

Assume that a research student wanted to find out whether the current crisis in Sri Lanka has significantly influenced on malnourishment of the children younger than 6 years. He sampled 20 children from a selected MOH area and the weight data observed were as follows.

10, 18, 8, 12, 11, 17, 12, 15, 13, 9, 10, 14, 12, 9, 9, 14, 16, 12, 15, 11

A statistical analysis performed has analyzed the following for the data set.

Median= 12; Mode=12; Variance= 8.134; Skewness=0.24

3.1. Calculate the mean and standard deviation. (20 marks)

3.2. Estimate the population mean with 95% confidence Intervals. (30 marks)

3.3. What percentage of data values are actually within ±1and within ±2 standard deviation of the mean. (50 marks)

Question 04 **(100 Marks)**

4.1. List five characteristics of a good hypothesis. (20 marks)

4.2. Mention the importance of null hypothesis on research. (20 marks)

4.3. Differentiate the independent and dependent variable and provide the example for each type. (60 marks)

Question 05 **(100 Marks)**

A school is assessing the performance of the advanced level students based on the term end results for the subjects of IT, Management and Statistics. The instructor has noticed that the students who are having higher assignment marks in Statistics are more likely to perform well in other two subjects.

The instructor requires to check whether that there is an effect from the assignment marks of statistics to the term end results. The ANOVA table of the statistical analysis is mentioned below.

Source	SS	df	MS	F
Between	1500	2	?	?
Within	3211	22	?	
Total	5342	24		

5.1. Find the values of Mean Square (MS). (40 marks)

5.2. Calculate the F value. (20 marks)

5.3. Mention the critical value at the significance level of 0.05. (20 marks)

5.4. State the conclusion and the decision of the test. (20 marks)

Question 06 **(100 Marks)**

6.1. What are the components of the Bioinformatics? (10 marks)

6.2. Mention three nucleotide sequence databases available on the internet. (20 marks)

6.3. Write the information appear in the NCBI FASTA format. (30 marks)

6.4. List two protein databases and database mining tools. (40 marks)

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

HIGHER DIPLOMA IN BIOMEDICAL SCIENCES
HD2233
Pathology of Diseases
2nd year 2nd Semester

End Semester SEQ Examination-Resit

INDEX NUMBER: .....

Date	**: 15 of February 2023**
Time	**: 9.00 a.m. – 12.00 p.m. (Three hours)**

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.

Question 1 **(100 marks).**

1.1 Name 4 types of Cystic Diseases of the Kidneys (20 marks)
1.2 Write a short note on Chronic Kidney Disease (30 marks)
1.3 List the clinical signs and symptoms of Eclampsia (20 marks)
1.4 Define the following disease conditions.
1.4.1 Vaginal candidiasis (15 marks)
1.4.2 Hypospadias (15 marks)

Question 2 **(100 marks)**

2.1 Write short Notes of the followings
2.1.1 Talipes Equinovarus (clubbed foot) (25 marks)
2.1.2 Gout (25 marks)
2.1.3 Cushing's disease (25 marks)
2.1.4 Grave's disease (25 marks)

Question 3 **(100 marks)**

Briefly describe the followings.
3.1 Giant cells in chronic inflammation (25 marks)
3.2 Coagulative necrosis (25 marks)
3.3 Caseous necrosis (25 marks)
3.4 Apoptosis (25 marks)

Question 4 **(100 marks)**

4. 1 Briefly describe the pathological changes in following stages of lobar pneumonia.
4.1.1 Congestion (20 marks)
4.1.2 Red Hepatisation (20 marks)
4.1.3 Gray Hepatisation. (20 marks)
4.1.4 Stage of Resolution (20 marks)
4.2 Briefly describe on emphysema (20 marks)

Question 5 **(100 marks)**

5.1 List cardinal signs of inflammation. (10 marks)
5.2 Compare followings.
5.2.1 acute inflammation and chronic inflammation (30 marks)
5.2.2 Dry gangrene and wet gangrene. (30 marks)
5.2.3 Regeneration & Repair. (30 marks)

Question 6 **(100 marks)**

Write short notes on followings.

6.1 Hypertrophy (25 marks)
6.2 Hyperplasia (25 marks)
6.3 Atrophy (25 marks)
6.4 Metaplasia (25 marks)

Library

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Higher Diploma in Biomedical Sciences

HD 2223 Pharmacology

Batch 01

2nd year 2nd Semester End Repeat Examination SEQ

INDEX NUMBER: .....

Date : **14th February 2023**

Time : **9.00 am – 12.00 pm (Three Hours)**

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.

Question 01 **(100 Marks)**

Describe briefly

1.1. Drug absorption (50 marks)
1.2. Drug metabolism (50 marks)

Question 02 **(100 Marks)**

2.1. List the types of drug interactions (30 marks)
2.2. Describe the importance of drug interactions (30 marks)
2.3. Describe the pharmacovigilance (40 marks)

Question 03 **(100 Marks)**

Describe

3.1. Agonist (50 marks)
3.2. Antagonist (50 marks)

Question 04 **(100 Marks)**

4.1. What is ADME? (40 marks)
4.2. How drugs are distributed in the body? (30 marks)
4.3. What is volume of distribution? (30 marks)

Question 05 **(100 Marks)**

5. Describe the drug treatment in
5.1. Liver impairment (50 marks)
5.2. Renal impairment (50 marks)

Question 06 **(100 Marks)**

Briefly describe drug administration in

6.1. Elderly patients (40 marks)
6.2. Children (30 marks)
6.3. Pregnancy (30 marks)