



Faculty of Health Sciences
Bachelor of Science (Honours) in Biomedical Sciences/ Bachelor of Science
(Honours) in Industrial Pharmaceutical Sciences/ Bachelor of Science (Honours)
in Cosmeceutical Sciences

Ethics, Research Methodology and Statistics-IPS 3243/BCS 3244/ BMS 3243

3rd Year 2nd Semester
Batch 06
End Semester SEQ Examination

Date: 12th November 2025

Time: 09.00 am – 12.00 noon (Three Hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
 - Answer **ALL** questions.
 - You should write legibly in black or blue ink
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QUESTION 01

(100 Marks)

- 1.1. Explain “sample” in statistics? (10 marks)
- 1.2. Discuss two (02) probability sampling techniques. (20 marks)
- 1.3. Compare discrete and continuous data, including examples. (30 marks)
- 1.4. Match each of the following examples to the correct scale of measurement (Nominal, Ordinal, Interval, Ratio). (40 marks)
 - 1.4.1. Blood type
 - 1.4.2. Temperature in Celsius
 - 1.4.3. Income in dollars
 - 1.4.2. Pain severity scale (mild, moderate, severe)

QUESTION 02

(100 Marks)

- 2.1. Analyze the following SPSS output based on a hypothetical test developed for a study on the relationship between caffeine consumption and sleep quality among university students. (Include sample size, relationship between the variables, and any statistical significance indicated in the output) (30 marks)

Tests of Normality				
	Kolmogorov-Smirnov ^a		Shapiro-Wilk	
	Statistic	df	Statistic	df
Caffeine Consumption (mg/day)	.067	120	.989	.435
Sleep Quality Score	.073	120	.984	.297
* This is a lower bound of the true significance.				
^a Lilliefors Significance Correction				

2.2. A smartphone-repair technician wants to estimate the average cost to fix a model of smartphone in the workshop. She inspects 25 phones and finds that the average repair cost is \$145.00 with a sample standard deviation of \$35.00.

2.2.1. Find the table value for a 95% confidence interval with the appropriate degrees of freedom. (30 marks)

2.2.2 Calculate the 95% confidence interval for the true mean repair cost. (40 marks)

QUESTION 03

(100 Marks)

3.1. A psychologist is interested in determining whether a new mindfulness-based training program reduces stress levels compared to a traditional relaxation method. Two independent groups of university students, each consisting of 20 participants, are assessed for their post-intervention stress scores.

3.1.1. Select the appropriate statistical test for the analysis? (20 marks)

3.1.2. Construct the null and alternative hypotheses for this test. (20 marks)

3.1.3. If the p-value obtained from the statistical analysis is 0.015, what inference should the researcher draw regarding the effectiveness of the two intervention programs, based on a 0.05 level of significance? (20 marks)

3.2. Mention the ethical guidelines relevant to each of the following research situations:

3.2.1. Conducting experiments involving human participants. (20 marks)

3.2.2. Falsification of data (20 marks)

QUESTION 04

(100 Marks)

4.1. A sports scientist investigates the effect of three different training programs on athletic endurance (measured as running time in minutes until exhaustion).

Participants are divided into three groups: Program X, Program Y, and Program Z.

The study is conducted at a 95% confidence level.

Group	Program X	Program Y	Program Z
Sample size	10	10	10

Mean endurance time (minutes)	32.5	36.8	41.2
Standard Deviation (minutes)	4.0	3.5	5.0

4.1.1. Using the above data on sample size, mean scores, and standard deviation, complete the ANOVA table and calculate the F-value. (60 marks)

Source	SS	df	MS	F
Between	196.27	2	98.13	
Within	135.60	27		
Total	331.87	29		

4.1.2. State the conclusion based on the ANOVA results and F-value calculated.

(40 marks)

QUESTION 05

(100 Marks)

5.1 Discuss the tools and databases that support the process of conducting a comprehensive literature review. (40 marks)

5.2 State three (03) principal characteristics of clearly formulated research objective. (10 marks)

5.3 Outline the main steps involved in applying the scientific method. (20 marks)

5.4 A researcher intends to investigate whether the use of interactive learning software leads to higher academic achievement compared to traditional classroom instruction among secondary school students. Formulate the null and alternative hypotheses for this study. (30 marks)

QUESTION 06

(100 Marks)

6.1 Compare prevalence and incidence. (30 marks)

6.2 Discuss three (3) tools of measurement: rate, ratio, and proportion with an example. (30 marks)

6.3 Explain the concept of cohort study design. (20 marks)

6.4 Differentiate the cross-sectional and case control study in epidemiology. (20 marks)

Equations

- Variance

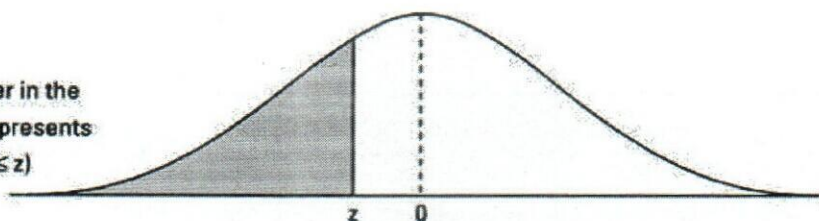
$$S^2 = \frac{\sum X^2 - \frac{(\sum X)^2}{n}}{n-1}$$

- Confidence interval

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

[illegible]

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 $\alpha = 0.05$ for $F(df_1, df_2)$																			
	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

Faculty of Health Sciences
B.Sc. (Hons) Biomedical Sciences/B.Sc. (Hons) Industrial Pharmaceutical Science/
B.Sc. (Hons) Cosmetic Science
Pharmacology II / Cosmetic Pharmacology II
BMS 3213/ IPS3213 / BCS 3213
3rd Year 2nd Semester
Batch 06
SEQ Examination

Date: 3rd November 2025

Time: 09.00 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.

Question 01

(100 Marks)

- 1.1 Compare the clinical effects of short-acting insulin with long-acting insulin. (40 Marks)
- 1.2 Analyze how sitagliptin causes a low risk of hypoglycemia when compared to sulphonylurea. (30 Marks)
- 1.3 Justify how propylthiouracil reduces thyroxine activity in a patient. (30 Marks)

Question 02

(100 Marks)

- 2.1 Discuss how metformin's action contribute to the reduction of hyperglycemia. (30 Marks)
- 2.2 Compare acarbose with metformin. (30 Marks)
- 2.3 Relate the action of the thyroxine drug in controlling symptoms of hypothyroidism. (30 Marks)
- 2.4 List the side effects of sulphonylurea. (10 Marks)

Question 03

(100 Marks)

Apply your knowledge of steroids in the treatment of;

- 3.1 Bronchial asthma (30 Marks)
- 3.2 Autoimmune diseases (30 Marks)
- 3.3 Transplantation (40 Marks)

Question 04

(100 Marks)

- 4.1 List the side effects of anti-psychotic drugs. (40 Marks)
- 4.2 Justify how Selective Serotonin Reuptake Inhibitors (SSRIs) work to relieve depression. (30 Marks)
- 4.3 Analyze how levodopa increases dopamine levels in Parkinson's disease. (30 Marks)

Question 05**(100 Marks)**

- 5.1 Discuss how topical corticosteroids reduce inflammation in dermatological conditions. (40 Marks)
- 5.2 Analyze how topical retinoids help in the treatment of acne. (30 Marks)
- 5.3 Compare how physical and chemical sunscreens protect the skin. (30 Marks)

Question 06**(100 Marks)**

- 6.1 Relate the mechanism of action oxytocin and prostaglandins in induction of labour. (40 Marks)
- 6.2 Analyze why prolonged use of NSAID cause gastric ulceration. (20 Marks)
- 6.3 Relate anti-inflammatory action of NSAID, to the use in Rheumatoid arthritis. (20 Marks)
- 6.4 Justify and explain the use of opioids in severe pain management. (20 Marks)

Faculty of Health Sciences
Bachelor of Science Honors in Industrial Pharmaceutical Science/ Bachelor of
Science Honors in Cosmetic Sciences
IPS 3224 Pharmaceutical Engineering II/ BCS 3253 Cosmetic Technology III
Batch 06
3rd Year 2nd Semester
End Semester Examination - SEQ

Date : 06th of November 2025

Time : 9.00 a.m. - 12.00 noon (Three hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** essay type questions.
- Answer **ALL** the questions.
- Final answers should be given legibly in black or blue ink.

Question 01

(100 marks)

- 1.1 What is 'impact' mechanism of milling? (20 marks)
- 1.2 State **four (04)** machines/ instruments used in milling. (20 marks)
- 1.3 Mention the construction and function of hammer mill. (30 marks)
- 1.4 Outline **two (02)** methods used to analyze the particle size distribution. (30 marks)

Question 02

(100 marks)

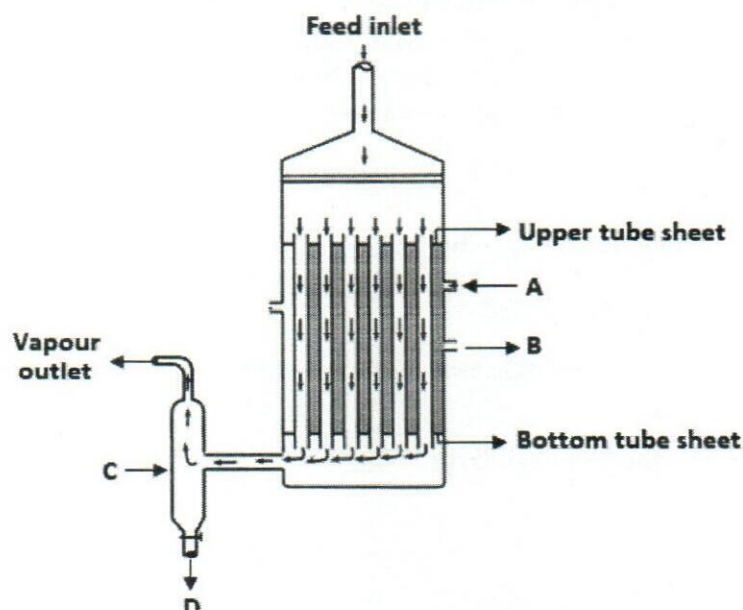
- 2.1 What are the uses of industrial heat exchangers? (20 marks)
- 2.2 State Newton's law of cooling using an equation. Define all the terms. (20 marks)
- 2.3 Calculate the rate of heat transfer through a stainless-steel vessel wall that is 2.0 cm thick and has a surface area of 1200 mm². The inner surface temperature is 120.5 °C, while the outer surface temperature is 50 °C. Thermal conductivity of stainless steel is 50.2 Wm⁻¹K⁻¹. (30 marks)
- 2.4 Outline the use of steam to sterilize pharmaceutical and cosmetic products. (30 marks)

Question 03

(100 marks)

- 3.1 State the influence of following factors on evaporation.
 - 3.1.1 Temperature (15 marks)
 - 3.1.2 Altitude (15 marks)
- 3.2 An industrial evaporator is used to concentrate a solution from 22.5% to 75% of non-volatile solid at 100 kg/h feed rate. Calculate the rate of product collected. (20 marks)

- 3.3 Differentiate single effect evaporators and multiple effect evaporators, using simple diagrams (your diagrams should be appropriately labeled.) (25 marks)
- 3.4 A schematic diagram of an industrial evaporator is given below.



- 3.4.1 Identify the above machine. (05 marks)
- 3.4.2 Identify the parts indicated A - D. (20 marks)

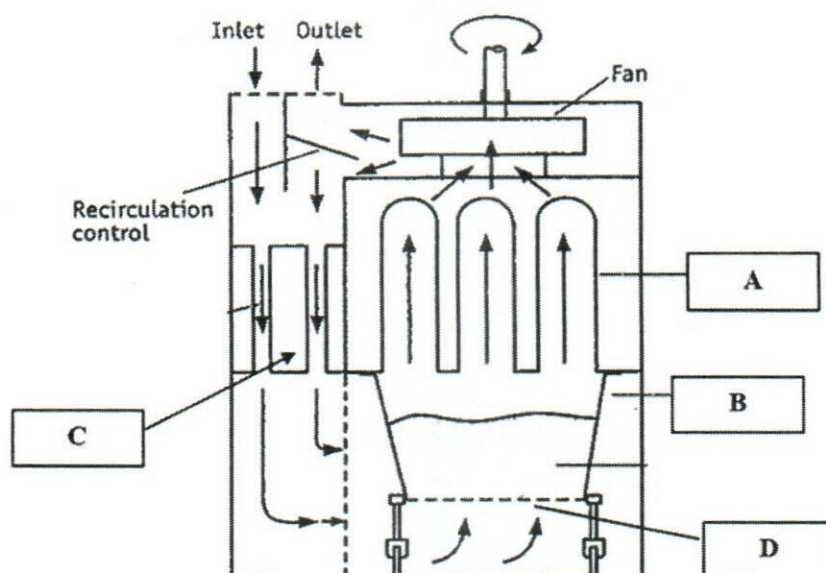
Question 04 (100 marks)

- 4.1 List **five (05)** industrial applications of distillation. (25 marks)
- 4.2 Why does some solvents show deviations from the Raoult's law? (25 marks)
- 4.3 Saturated vapour pressures of acetone and chloroform at 55 °C are 742 mmHg and 633 mmHg respectively. What are the mole fractions of acetone and chloroform in a mixture at the same temperature, if the total pressure is 680 mmHg? (25 marks)
- 4.4 Vacuum distillation is a usual separation method used in various industries. Outline the working mechanism of vacuum distillation. (25 marks)

Question 05 (100 marks)

- 5.1 Define the following terms.
- 5.1.1 Free moisture content (FMC) (10 marks)
 - 5.1.2 Equilibrium moisture content (EMC) (10 marks)
- 5.2 A sample of a pharmaceutical powder weighing 2.000 g is heated at 105 °C until a constant weight of 1.890 g is obtained. Calculate the percentage loss on drying (LOD) of the sample. (20 marks)
- 5.3 What is the main principle of freeze-drying? (20 marks)

5.4 A diagram of a pharmaceutical machine is given below.



5.4.1 Identify A, B, C, and D of the given equipment.

(5 x 4 marks)

5.4.2 State the mechanism of the above equipment.

(20 marks)

Question 06

(100 marks)

6.1 Identify the type of mixing of following, based on the behavior of materials.

(10 x 3 marks)

6.1.1 Mixing of drug powder and excipients in tablet formulation

6.1.2 Oil and water in emulsions

6.1.3 Alcohol and water mixture

6.3 Draw a diagram to show the nature of a random mixture.

(20 marks)

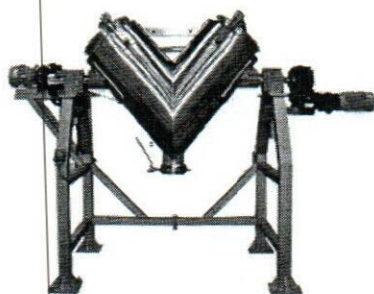
6.3 State how the particle size of powders affects the tendency of de-mixing of a pharmaceutical powder mixture.

(20 marks)

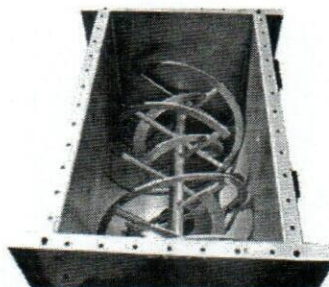
6.4 Identify the equipment given below.

(10 x 3 marks)

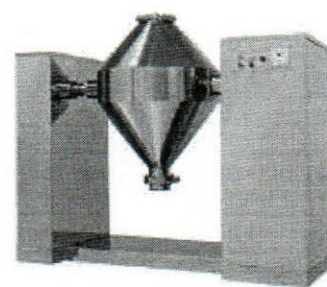
6.4.1



6.4.2



6.4.3



Faculty of Health Sciences
B.Sc. (Hons) Biomedical Sciences/B.Sc. (Hons) Industrial Pharmaceutical Science/
B.Sc. (Hons) Cosmetic Science
Pharmacology II / Cosmetic Pharmacology II
BMS 3213/ IPS3213 / BCS 3213
3rd Year 2nd Semester
Batch 06
SEQ Examination

Date: 3rd November 2025

Time: 09.00 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.

Question 01

(100 Marks)

- 1.1 Compare the clinical effects of short-acting insulin with long-acting insulin. (40 Marks)
- 1.2 Analyze how sitagliptin causes a low risk of hypoglycemia when compared to sulphonylurea. (30 Marks)
- 1.3 Justify how propylthiouracil reduces thyroxine activity in a patient. (30 Marks)

Question 02

(100 Marks)

- 2.1 Discuss how metformin's action contribute to the reduction of hyperglycemia. (30 Marks)
- 2.2 Compare acarbose with metformin. (30 Marks)
- 2.3 Relate the action of the thyroxine drug in controlling symptoms of hypothyroidism. (30 Marks)
- 2.4 List the side effects of sulphonylurea. (10 Marks)

Question 03

(100 Marks)

Apply your knowledge of steroids in the treatment of;

- 3.1 Bronchial asthma (30 Marks)
- 3.2 Autoimmune diseases (30 Marks)
- 3.3 Transplantation (40 Marks)

Question 04

(100 Marks)

- 4.1 List the side effects of anti-psychotic drugs. (40 Marks)
- 4.2 Justify how Selective Serotonin Reuptake Inhibitors (SSRIs) work to relieve depression. (30 Marks)
- 4.3 Analyze how levodopa increases dopamine levels in Parkinson's disease. (30 Marks)

Question 05**(100 Marks)**

- 5.1 Discuss how topical corticosteroids reduce inflammation in dermatological conditions. (40 Marks)
- 5.2 Analyze how topical retinoids help in the treatment of acne. (30 Marks)
- 5.3 Compare how physical and chemical sunscreens protect the skin. (30 Marks)

Question 06**(100 Marks)**

- 6.1 Relate the mechanism of action oxytocin and prostaglandins in induction of labour. (40 Marks)
- 6.2 Analyze why prolonged use of NSAID cause gastric ulceration. (20 Marks)
- 6.3 Relate anti-inflammatory action of NSAID, to the use in Rheumatoid arthritis. (20 Marks)
- 6.4 Justify and explain the use of opioids in severe pain management. (20 Marks)

librmy



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Faculty of Health Sciences
Bachelor of Science (Honours) in Biomedical Sciences/ Bachelor of Science
(Honours) in Industrial Pharmaceutical Sciences/ Bachelor of Science (Honours)
in cosmeceutical Sciences

Ethics, Research Methodology and Statistics-IPS 3243/BCS 3244/ BMS 3243

3rd Year 2nd Semester
Batch 05-Special Repeat

End Semester SEQ Examination

Date: 04th December 2024

Time: 09.00 am – 12.00 noon (Three Hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
 - Answer **ALL** questions.
 - You should write legibly in black or blue ink
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Question 01

(100 Marks)

1.1. What is meant by “population”?

(10 marks)

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1.2. Compare quantitative and qualitative variables, including examples.

(20 marks)

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1.3. Provide two examples for each of the following data scales.

Nominal, Ordinal, Ratio, Interval

(30 marks)

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1.4. Outline two non-probability sampling and probability sampling methods.

(40 marks)

Question 02

(100 Marks)

2.1. Analyze the following SPSS output based on a hypothetical test developed for a study on stress levels among university students. Include considerations of sample size and any statistical significance indicated in the output.

(30 marks)

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
points	.113	20	.200*	.967	20	.699

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

2.2. A biomedical researcher investigated the effect of a drug on liver cells, using cell cultures at different drug concentrations. A linear regression analysis was performed using SPSS.

2.2.1. Identify the dependent and independent variables in this study. (20 marks)

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.942 ^a	.888	.877	5.33791

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	47.333	3.774		12.540	.000
	concen_drug	.613	.069	.942	8.900	.000

[illegible]

(100 Marks)

3.1.1. What is the appropriate statistical test for the analysis? (20 marks)

[illegible]

3.1.2. Construct the null and alternative hypotheses for this test. (20 marks)

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3.1.3. If the p-value obtained is 0.045, what conclusion should the researcher make about the scores? (20 marks)

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3.2. Mention the ethical guideline relevant to each of the following research scenarios:

3.2.1. Animal testing in biomedical research (20 marks)

3.2.2. Publishing study results (20 marks)

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Question 04 (100 Marks)

4.1. A university is studying student performance based on time spent studying for a module. Three study groups were formed: low, moderate, and high.

Apply 95% confidence interval.

Category	Low	Middle	High
Sample size	10	10	10
Mean	65	70	80
Standard Deviation	10	12	15

4.1.1. Define the null and alternative hypotheses for comparing performance across these groups. (20 marks)

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4.1.2. Using the above data on sample size, mean scores, and standard deviation, complete the ANOVA table and calculate the F-value. (60 marks)

Source	SS	df	MS	F
Between	1166.67			
Within				
Total	5486.67			

4.1.3. State the conclusion based on the ANOVA results and F-value calculated. (20 marks)

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Question 05 (100 Marks)

5.1 State the key phases involved in designing a research study. (20 marks)

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5.2 List the different tools that can assist in conducting a literature review. (20 marks)

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5.3 Mention five essential attributes of a well-defined research objective. (20 marks)

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5.4 A researcher is examining whether a high-protein diet leads to greater weight loss than a standard diet over six months. Formulate the null and alternative hypotheses for this study.

(40 marks)

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Question 06

(100 Marks)

6.1 What is "Incidence" and explain its application in epidemiology? (35 marks)

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6.2 Define three main measures: prevalence, incidence, and mortality rate. (30 marks)

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6.3 Mention the concept of an observational study design. (25 marks)

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6.4 State two types of observational epidemiological study designs. (10 marks)

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Equations

- Variance

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

- Confidence interval

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

Tables

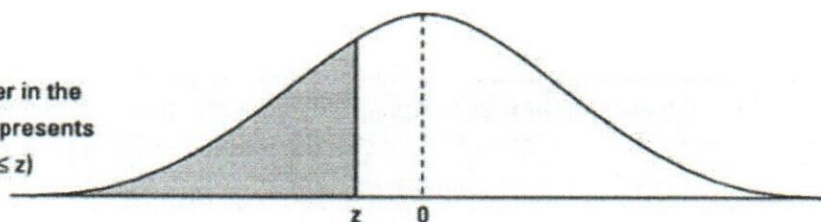
T table

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	12.921
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
-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 $\alpha = 0.05$ for $F(df_1, df_2)$																			
	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

Faculty of Health Sciences
Bachelor of Science Honors in Industrial Pharmaceutical Science/ Bachelor of
Science Honors in Cosmetic Sciences
IPS 3224 Pharmaceutical Engineering II/ BCS 3253 Cosmetic Technology III
Batch 05
3rd Year 2nd Semester
End Semester (Resit) Examination - SEQ

INDEX NUMBER:

Date : 29th of November 2024

Time : 9.00 a.m. - 12.00 noon (Three hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** the questions on this paper itself.
- Final answers should be given legibly in black or blue ink.

Question 01

(100 marks)

1.1 State **four (04)** machines/ instruments used in the particle size separation.

(20 marks)

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1.2 What is 'impact' mechanism of milling?

(25 marks)

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1.3 Write an equation to show Rittinger's law of size reduction. Define each term.

(25 marks)

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1.4 Briefly outline the construction and function of hammer mill.

(30 marks)

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Question 02

(100 marks)

2.1 List **four (04)** needs of thermal energy in pharmaceutical industry.

(20 marks)

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2.2 Outline the advantages of using electricity for industrial heating purposes.

(20 marks)

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2.3 Inner side of a steel machine wall is at 120 °C, while the outside side is at 65 °C. The wall has a thickness of 0.88 cm and an area of 1112 mm². (Thermal conductivity of steel = 50.2 Wm⁻¹K⁻¹)

2.3.1 Calculate the heat transfer rate through the steel machine wall.

(25 marks)

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2.3.2 Write **two (02)** assumptions you made during the calculations.

(10 marks)

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2.4 List the characteristics of saturated steam.

(25 marks)

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Question 03

(100 marks)

3.1 Indicate the influence of surface area of media on boiling point.

(20 marks)

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3.2 Differentiate 'evaporation' and 'boiling'.

(25 marks)

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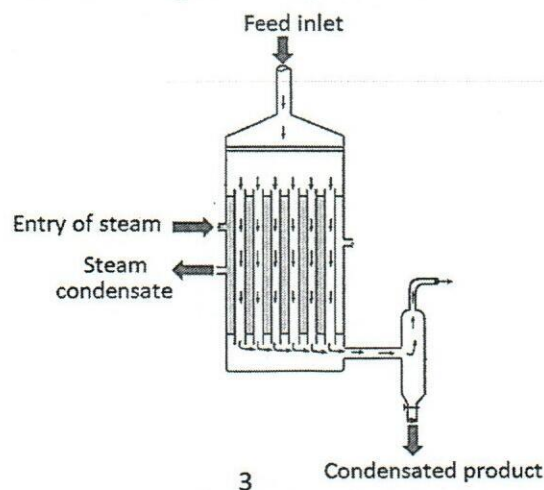
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3.3 A schematic diagram of an industrial evaporator is given below.



3.3.1 Identify the above machine.

(05 marks)

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3.3.2 List **two (02)** other types of evaporators used for industrial purposes.

(10 marks)

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3.4 An industrial evaporator is used to concentrate a solution from 10% to 73% of non-volatile solid at 100 kg/h feed rate. Calculate the rate of product collected.

(40 marks)

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Question 04

(100 marks)

4.1 What is azeotropy?

(20 marks)

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4.2 State characteristics of an ideal solution.

(20 marks)

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4.3 Simple distillation is a common separation method used in various industries. Describe the working mechanism of simple distillation. (30 marks)

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4.4 "Steam distillation is used for separation of volatile compounds with limited solubility in water." Justify this statement with the mechanism of steam distillation. (30 marks)

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Question 05 (100 marks)

5.1 State **five (05)** factors that affect the drying. (10 marks)

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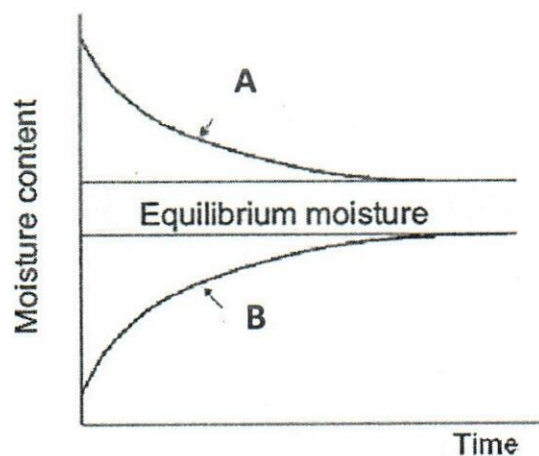
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5.2 Moisture content vs time curve of a solid material is given below.



5.2.1 Identify **A** and **B** in the graph.

(20 marks)

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5.2.2 What is equilibrium moisture content?

(30 marks)

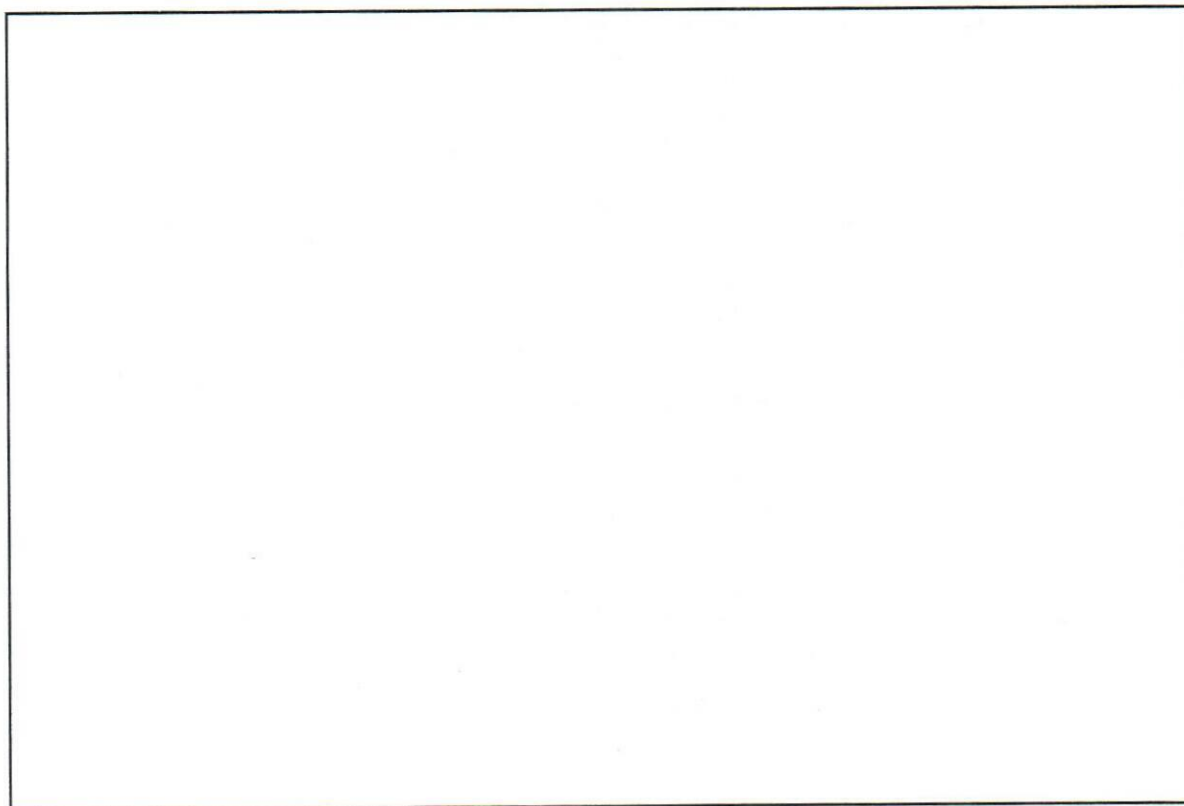
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5.3. Draw the drying rate curve and label each period.

(40 marks)



Question 06

(100 marks)

6.1 How does mixing affects for the uniformity of composition of pharmaceutical products?

(30 marks)

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6.2 State **three (03)** mechanisms of mixing.

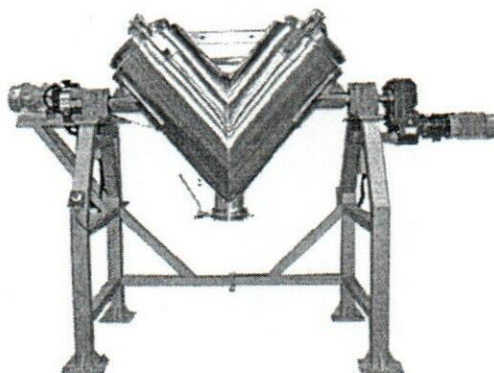
(15 marks)

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6.3 A commonly used mixing machine is given below.



6.3.1 Identify the mixer given in the above image.

(20 marks)

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6.3.2 State **one (01)** usage of this mixer.

(10 marks)

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6.4 State the function of a homogenizer giving an example.

(25 marks)

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Faculty of Health Sciences

B.Sc. (Hons) Biomedical Sciences/B.Sc. (Hons) Industrial Pharmaceutical Sciences/

B.Sc. (Hons) Cosmetic Science

Pharmacology II / Cosmetic Pharmacology II

BMS 3213/ IPS3213 / BCS 3213

3rd Year 2nd Semester

Batch 05

Special Repeat SEQ Examination

Date: 28th November 2024

Time: 09.00 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.

Question 01

(100 Marks)

Describe the mode of action of,

1.1 Insulin

(25 Marks)

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1.2 Thyroxine

(25 Marks)

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1.3 Glipizide

(25 Marks)

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1.4 Propylthiouracil

(25 Marks)

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Question 02**(100 Marks)**

2.1 What are the adverse effects of steroid drugs?

(40 Marks)

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2.2 List **two (02)** antibiotics used for skin diseases**(20 Marks)**

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2.3 Briefly indicate the pharmacological effects of oral contraceptive pills.

(20 Marks)

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2.4 Name **two (02)** clinical uses of minipill.**(20 Marks)**

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Question 03**(100 Marks)**

3.1 What is the mode of action of metformin?

(30 Marks)

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3.2 List the other drugs which can be used diabetes.

(10 Marks)

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3.3 Name different types of antidiabetic drugs used parenterally. (30 Marks)

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3.4 What are the precautions you would like to consider during dispensing the combined oral contraceptive pills? (30 Marks)

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Question 04 (100 Marks)

4.1 List the drug preparations used for dermatological treatments. (25 Marks)

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4.2 What is a barrier preparation? (20 Marks)

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4.3 What are the clinical uses of emollient? (25 Marks)

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4.4 List the stepwise drug management of acne. (30 Marks)

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Question 05 (100 Marks)

5.1 Classify the types of migraine. (25 Marks)

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5.2 Name the drugs used for prophylaxis of migraine. (25 Marks)

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5.3 What is the mode of action of one drug you mentioned in 5.2? (25 Marks)

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5.4 List the drugs used for parkinsonism. (25 Marks)

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Question 06**(100 Marks)**

6.1 What is the mode of action of Benzodiazepine?

(25 Marks)

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6.2 List the clinical uses of diazepam,

(25 Marks)

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6.3 List the drug groups used for anxiety,

(25 Marks)

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6.4 What is the difference between a major analgesic and a minor analgesic?

(25 Marks)

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PAST PAPERS

Faculty	Department / Section/Division
Not Applicable	Learning Resource Centre

Past Papers

Faculty of Health Sciences

General Papers

(Year 3 – Semester 2)

Document Control & Approving Authority

Senior Director – Quality Management & Administration

1st Issue Date: 2017.01.30

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Revision Date: 18.09.2024

Validated by: Librarian

10 JUL 2024



Faculty of Health Sciences

Bachelor of Science (Honours) in Biomedical Sciences/ Bachelor of Science (Honours) in Industrial Pharmaceutical Sciences/ Bachelor of Science (Honours) in cosmeceutical Sciences

IPS 3243/BMS 3243/BCS 3244

Ethics, Research Methodology and Statistics

3rd Year 2nd Semester-Batch 05

End Semester SEQ Examination

Date : 07.06.2024
Time : 9.00 A.M – 12.00 P.M (3 HOURS)

INSTRUCTIONS TO CANDIDATES

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

QUESTION 01

(100 Marks)

1.1 Define the term of Scientific research.

(10 marks)

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1.2 Mention the basic operations of the systematic research.

(20 marks)

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1.3 Compare and contrast the types of data used for the research with an example. (30 marks)

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1.4 What is meant by scientific misconduct in ethical consideration?

(40 marks)

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QUESTION 02**(100 marks)**

The Finance Department of company 'X' is analyzing the annual performance scores of the employees, based on the duration of the service to the company. The three groups were prepared based on the duration of the service: Short (Less than 1 year), middle (1-5 years) and long (more than 6 years). The finance department is required to check whether category long has performed well in the annual performance evaluation.

Apply 5% significant level.

Category	Short	Middle	Long
Sample size	15	12	15
Mean	65	75	80
Standard Deviation	1.5	2.2	5.3

2.1. Mention the null and alternative hypothesis.

(20 marks)

2.2. Calculate the grand mean for the above data.

(20 marks)

2.3. Complete the following table based on the provided information and Find the F value.

(45 marks)

Source	SS	df	MS	F
Between	1740.1722			
Within				
Total	2218.1722			

2.4. State the conclusion.

(15 marks)

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QUESTION 03

(100 Marks)

A repair worker required to estimate the cost of repairing one vehicle that was on the garage. He plans to repair 25 cars, and the average repair is \$10,000. The standard deviation of the 25-car sample is \$2,000.

3.1. Find the table value of 98% confidence interval.

(20 marks)

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3.2. Calculate true mean cost of repair as a range.

(40 marks)

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A Lecturer wanted to find out whether the students in the classroom performed well in viva examination. Hence, He sampled 20 students from one batch and the scores of viva examination had been reported as follows.

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

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
Confidence Interval= 95%

3.3. Calculate the percentage of data values within ± 1 and within ± 2 standard deviation from the mean.
(40 marks)

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QUESTION 04 **(100 Marks)**

4.1 State the steps of scientific method. (20 marks)

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4.2 State the useful techniques used to select a good research topic. (20 marks)

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4.3 Define the term of “research hypothesis” and state the three main characteristics of a good hypothesis. (30 marks) 00067

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4.4. Mention the null and alternative hypothesis for following research questions.

4.4.1. A researcher is conducting an experiment to find whether a plant extract A has better antimicrobial property over the commercially available soap. (30 marks)

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QUESTION 05 (100 Marks)

5.1 What is “Prevalence”. (35 marks)

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5.2 State the three tools of measurements; rate, ratio, and proportion. (30 marks)

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5.3 What is meant by study design? (25 marks)

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5.4 State the basic 2 types of Epidemiological study designs. (10 marks)

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(100 Marks) 00067

(30 marks)



(40 marks)

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
v	.231	5	.200 ^a	.881	5	.314

a. Lilliefors Significance Correction

6.3 In our sample dataset, students reported their typical time to run a mile, and whether they were an athlete. Suppose we want to know if the average time to run a mile is different for athletes versus non-athletes. This involves testing whether the sample means for mile time among athletes and non-athletes in your sample are statistically different. You can use an Independent Samples T Test to compare the mean mile time for athletes and non-athletes. After running the test, the following output was generated. Describe the output mainly in terms of A and B.

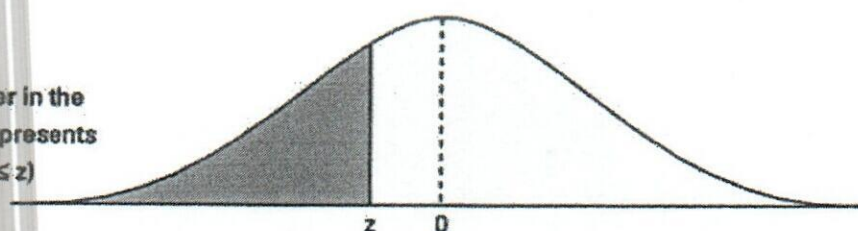
(30 marks)

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Mile time	Equal variances assumed	102.98	.000	13.475	390	.000	0:02:14	0:00:10	0:01:55	0:02:34
	Equal variances not assumed			15.047	315.846	.000	0:02:14	0:00:08	0:01:57	0:02:32

A normal distribution curve is shown with a horizontal axis. The mean is marked as 0 with a vertical dashed line. A point z is marked on the axis to the right of 0. The area under the curve to the left of z is shaded gray, representing the cumulative probability $P(Z \leq z)$.

[illegible]

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 $\alpha = 0.05$ 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

B.Sc. (Hons) Biomedical Sciences/B.Sc. (Hons) Industrial Pharmaceutical Sciences/

B.Sc. (Hons) Cosmetic Science

Pharmacology II / Cosmetic Pharmacology II

IPS3213 / BCS 3213 / BMS 3213

3rd Year 2nd Semester

Batch 05

End Semester SEQ Examination

Date: 03rd June 2024

Time: 09.00 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.

Question 01

(100 Marks)

Describe the mode of action of,

a. Metformin,

(25 Marks)

b. Sitagliptin,

(25 Marks)

c. Glipizide,

(25 Marks)

d. Carbimazole,

(25 Marks)

Question 02**(100 Marks)**

2.1. What are the adverse effects of anticancer drugs?

(40 Marks)

2.2 List two antibiotics used as cytotoxic drugs,

(20 Marks)

2.3 Briefly indicate the pharmacological effects of Tamoxifen in breast carcinoma,

(20 Marks)

2.4 Name two examples for group B targeted cytotoxic drugs,

(20 Marks)

Question 03**(100 Marks)**

3.1 What is the mode of action of oestrogen?

(30 Marks)

3.2 List the clinical uses of oestrogen and its products,

(10 Marks)

3.3 Name differences between combined pill and mini pill,

(40 Marks)

3.4 What are the precautions you would like to consider during dispensing the combined oral contraceptive pills?

(30 Marks)

Question 04**(100 Marks)**

4.1 List the drug preparations used for dermatological treatments,

(25 Marks)

4.2 What is a barrier preparation?

(10 Marks)

4.3 What are the clinical uses of emollient?

(20 Marks)

4.4 List topical antifungals used in clinical practice,

(20 Marks)

4.5 List the stepwise drug management of acne,

(25 Marks)

Question 05**(100 Marks)**

5.1 Classify the types of migraine,

(20 Marks)

5.2 Name the drugs used for acute migraine.

(20 Marks)

5.3 What is the mode of action of one drug you mentioned in 5.2.?

(25 Marks)

5.4 What is meant by prophylaxis?

(20 Marks)

5.5 List the drugs used for prophylaxis of migraine.

(15 Marks)

Question 06**(100 Marks)**

6.1 What is the mode of action of Benzodiazepine?

(20 Marks)

6.2 List the clinical uses of benzodiazepines,

(10 Marks)

6.3 List one example for short-acting intermediate-acting and long-acting benzodiazepines,

(30 Marks)

6.4 List the drug groups used for anxiety,

(20 Marks)

6.5 What is the difference between a major analgesic and a minor analgesic?

(20 Marks)

**Faculty of Health Sciences****Bachelor of Science Honours in Biomedical Science/ Bachelor of Science
Honours in Industrial Pharmaceutical Science/ Bachelor of Science Honours in
Cosmetic Science****BMS 3213/CS 3213/IPS 3213 Pharmacology II****3rd Year 2nd Semester****End Semester SEQ Examination****4th Batch**

Date : 04th September 2023
Time : 09.00 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 01

- 1.1. Describe the clinical uses of Benzodiazepine (30 marks)
- 1.2. Describe action of general anesthetics (30 marks)
- 1.3. Name the drugs used for the induction of anesthesia (20 marks)
- 1.4. State two drugs used to local anesthesia (20 marks)

Question 02

- 2.1. Write an account on first and second generation antidepressants (25 marks)
- 2.2. What are the advantages of second generation drugs over first generation? (25 marks)
- 2.3. List the drugs for antipsychotics and clinical uses (25 marks)
- 2.4. Compare two generations of antipsychotics (25 marks)

Question 03

- 3.1. What are the two types of commercial thyroxine available in the market? (20 marks)
- 3.2. What is your advice to patient taking thyroxine? (20 marks)
- 3.3. Describe mode of action of one anti-thyroid drug (25 marks)
- 3.4. List the examples for NSAID in relieving inflammation and briefly indicate the site of action (35 marks)

Question 04

- 4.1 Describe drugs used in acne (25 marks)
- 4.2. Name two keratolytics used in Dermatology treatment (25 marks)
- 4.3. List the antibiotics used in the dermatology (25 marks)
- 4.4. List the types of steroids used in dermatitis (25 marks)

Question 05

- 5.1. What are the clinical uses testosterone preparations? (25 marks)
- 5.2. List two adverse effects of above (20 marks)
- 5.3. Indicate types of immunomodulators (30 marks)
- 5.4. Describe the mode of action of one group you mentioned in 5.3 (25 marks)

Question 06

- 6. Describe the,
 - 6.1. difference between Soluble insulin and insulin glargine (25 marks)
 - 6.2. metformin (25 marks)
 - 6.3. action of Sitagliptin (25 marks)
 - 6.4. side effects and storage of insulin (25 marks)



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Faculty of Health Sciences
Bachelor of Science (Honours) in Biomedical Sciences/ Bachelor of Science
(Honours) in Industrial Pharmaceutical Sciences/ Bachelor of Science
(Honours) in cosmeceutical Sciences

Ethics, Research Methodology and Statistics
BMS/IPS/CS 3244

3rd Year 2nd Semester
Batch 04

End Semester SEQ Examination

Date: 13th of September 2023

Time: 09.00 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
-

Question 01

(100 Marks)

- 1.1. What is "sample"? (10 marks)
- 1.2. Compare the qualitative and quantitative data. (20 marks)
- 1.3. Write two examples for each data type mentioned below.
Nominal, ordinal, ratio and interval (30 marks)
- 1.4. Briefly explain two probability sampling methods.. (40 marks)

Question 02

(100 Marks)

- 2.1. Comment on the analysis of following SPSS output with the developed hypothesis for the test. (30 marks)

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
v	.231	5	.200*	.881	5	.314

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

2.2. A Biomedical scientist expected to do a toxicity analysis experiment using fish as trial organisms with a drug to be tested. He tested the mortality percentage of the fish after 24 hours of exposure with relevant to different concentrations of test drug in $\mu\text{g/L}$. A linear regression analysis was run from SPSS software package, for a collected dataset.

2.2.1. Define the dependent and independent variables. (20 marks)

2.2.2. Comment on the following analysis results of regression analysis. (50 marks)

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.942 ^a	.888	.877	5.33791

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	47.333	3.774		12.540	.000
	concen_drug	.613	.069	.942	8.900	.000

Question 03

(100 Marks)

3.1. A lecturer wanted to compare the scores for the module "Ethics, Research Methodology and Statistics" in two batches of CINEC students to analyze whether the mean score in two batches are significantly different or not.

3.1.1. What is the statistical test that she should perform to analyze the results ? (20 marks)

3.1.2. Construct the hypotheses for the test that you mentioned in 3.1.1. (20 marks)

3.1.3. If she got a p value of 0.065 by performing the test that you mentioned in 3.1.1; what should be her conclusion on marks of two batches of students ? (20 marks)

3.2. State the **ONE** research ethic per each of following.

3.2.1. When conducting a drug testing with wistar rats

3.2.2. When publishing a manuscript

3.2.3. When giving authorships for a final research paper

3.2.4. When reviewing a manuscript as a reviewer (40 marks)

Question 04**(100 Marks)**

4.1. A university is analyzing the performance of the students, based on the duration of the study for the module of statistics. The three groups were prepared based on the time spent on studying daily; low (Less than 1 hour), middle (less than 5 hours) and high (less than 12 hours). University is required to check whether category high perform well during the examination.

Apply 5% confidence interval.

Category	Low	Middle	High
Sample size	7	9	8
Mean	75.71	75.71	75.71
Standard Deviation	17.63	17.63	17.63

4.1.1. Mention the null and alternative hypothesis. (20 marks)

4.1.2. Complete the following table based on the provided information and Find the F value.

(60 marks)

Source	SS	df	MS	F
Between	1902			
Within				
Total	5288			

4.1.3. State the conclusion. (20 marks)

Question 05**(100 Marks)**

5.1. What are the steps of scientific method? (20 marks)

5.2. Mention FRIENDS framework on developing a good research topic. (20 marks)

5.3. List five characteristics of a good hypotheses. (20 marks)

5.4. A researcher is conducting an experiment to find whether a plant extract A has better antimicrobial property over the commercially available soap (B). Write the null and alternative hypothesis for the above research question? (40 marks)

Question 06**(100 Marks)**

6.1. State the basic 3 types of Epidemiological study designs (30 marks)

6.2. Briefly describe the following diagrams regarding the epidemiological studies (20 marks)

6.3. Briefly describe the Retrospective Cohort Study according to the timeline (30 marks)

6.4. State two types of data summarization methods for each the followings (20 marks)

6.4.1. Numerical Summaries

6.4.2. Graphical Summaries

Annexure

F-table of Critical Values of $\alpha = 0.05$ 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