(3 Hours) Total Marks:70

Note: All Questions are **compulsory.**
Use of **simple calculators** is allowed.
Figures at the right indicate **full marks**.

Q1. (a) Attempt any 7 [2 marks each]: **[14]**

(i) If Mode = 40.1, Median = 38.5, then the approximate value of Mean is
(a)39.3 (b)837.75 (c)37.7 (d)37.76

(ii) The observation which occurs maximum number of times is
(a) AM (b) Median (c) Mode (d) None

(iii) If 75% of the items lies above 60 and 75% of the items lies below 68.25, then co-efficient of Quartile deviation is:
(a) 0.0843 (b) 0.0643 (c) 0.0720 (d)0.0543

(iv) If Mode=195.2, Median=198.4, then the approximate value of mean is
(a) 200 (b) 250 (c) 210 (d) 225

(v) If the mean and coefficient of variation are 10 and 5 respectively. Then the standard deviation is
(a) 10 (b) 50 (c) 0.5 (d) 5

(vi) For a set of data distribution, mean=76.5, S.D=4.56 and mode=72, then the Karl Pearson's co-efficient of skewness is
(a) 0.9868 (b) 0 (c) 2.9857 (d) None of these

(vii) Two dice are thrown. The probability that the sum of members appearing is more than 10 is;
(a) 1/18 (b) 1/12 (c) 1/6 (d) None of these

(viii) If the probability of a defective bulb is 0.25, the mean and variance of the distribution of defective bulbs in a total of 100 is:
(a) 25 , 10 (b) 100, 18.25 (c) 200 and 18.75 (d) 25, 18.75

(ix) The mean of a sample of 400 items taken from a large population is 10 with standard deviation 2.3. Then the upper limit of 95% confidence for population mean is:
(a)10.325 (b) 10.525 (c) 10.225 (d) 10.625

(b) Attempt any 1 **[1]**

(x) To test the hypothesis of equality among several variables the best measure is:
(a) Z-test (b) t-test (c) Chi-square test (d) ANOVA

(xi) In hypothesis test 'Type-I' error means:
(a) Reject H_0 when H_0 is true (b) Reject H_0 when H_0 is false
(c) Accept H_0 when H_0 is true (d) Accept H_0 when H_0 is false

Q.2 (a) Attempt any 2[4 marks each] **[8]**

(i) The following are the marks of three students A, B,C in 4 subjects P,Q,R and S respectively. The weights of the subjects are given. Decide which of the three students is the best.

	P	Q	R	S
Marks of A	28	30	40	20
Marks of B	35	25	20	15
Marks of C	30	35	30	20
Weight	4	3	2	1

(ii) Calculate the 3^{th} decile (D_3) and 67^{th} percentile(P_{67}) for the following data.

Marks	0 - 10	10 - 20	20 – 30	30 - 40	40 - 50	50 - 60
No. of students	4	2	18	22	21	19

(iii) The following table gives the platelets count (in lakh/cmm) from the analysis of the blood samples of five different days in pathology laboratory. Find the average platelets count per patient.

Days	1	2	3	4	5
Platelets count	0.50	0.75	1.00	1.43	1.8
No. of patients	65	80	95	90	70

(b) Attempt any 1 [3 marks] **[3]**

(i) The mean of marks scored by 300 students in the subject of statistics is 45. The mean of the top 100 of them was found to be 70 and the mean of the last 100 was known to be 20. What is the mean of the remaining 100 students?

(ii) Find the missing value of the variate for the following distribution whose mean is 31.87

x	12	20	27	33	-	54
f	8	16	48	90	30	8

Q.3. (a) Attempt any 2[4 marks each] **[8]**

(i) The first of the two samples had 150 items with mean 16 and S.D 4. If the whole group has 250 items with mean 15.6 and variance 13.44, find the mean and S.D of the second group.

(ii) The daily high blood pressure of a patient on the last 25 days are given below.
Find the Mean Deviation and Median and its coefficient:

B.P(mmHg):	102	106	110	114	118	122
No. of days :	3	3	5	8	4	2

(iii) Calculate the standard deviation for the following data giving the bursting pressure of polythene bags.

Bursting Pressure (in kg.)	5-10	10-15	15-20	20-25	25-30
No. of bags	2	8	25	54	11

(b) Attempt any 1 [3 marks] **[3]**

(i) Discuss the Merits and Demerits of Arithmetic Mean..

(ii) Discuss skewness and kurtosis.

Q.4. (a) Attempt any 2 [4 marks each] **[8]**

(i) Find mean, variance and standard deviation of the following probability distribution.

x :	2	4	6	8	10
P(X) :	0.3	0.2	0.2	0.2	0.1

(ii) The four raw moments of a frequency distribution are 2, 20, 40 and 200 respectively. Comment on the nature of skewness and kurtosis.

(iii) Find the Bowley's co-efficient of Skewness for the following data:

Class	0 - 10	10 - 20	20 - 30	30- 40	40- 50
Frequency	5	8	10	5	2

(b) Attempt any 1 [3 marks] **[3]**

(i) Find k and hence find the expected value of a random variable x and variance for the probability distribution:-

x	2	3	4	5
P(x)	0.1	k	0.4	0.3

(ii) Three unbiased coins are tossed simultaneously. Write down the sample space of the experiment.
Also ,find the probability of getting;
(a) Exactly two heads.
(b) At least two heads.
(c) At the most two heads.

Q.5 (a) Attempt any 2 [4 marks each] **[8]**

(i) A company produces hand gloves. 3 percent are found to be defective. If a sample of 10 is taken, what is the probability that (i) 2 of the are defective (ii) none is defective (iii) at least one of them is defective.

(ii) The probability that a man aged 50 years will die within the next year is 0.001. Find the probability that within the next year, out of 1000 such persons:
(i) exactly 2 will die (ii) at most one will die.
Given $e^{-0.1} = 0.9050$, $e^{-1} = 0.3679$, $e^{-0.01} = 0.99$)

(iii) The life time of a certain kind of pace maker has a mean of 300 days and a standard deviation of 35 days. Assuming that the distribution of life times is normal, find the probability of life time of pace makers is;
(1) more than 370 days. (2) less than 265 days
[Given that area between z=0 and z=2 is 0.4772, Given that area between z=0 and z=1 is 0.3413.]

(b) Attempt any 1 [3 marks] **[3]**

(i) Fit a straight line of the form $y = a + bx$ for the following data:

X	8.8	11.6	14.4	17.2	20
Y	1	2	3	4	5

(ii) Fit an exponential curve $y = ab^x$, from the following data:

Year:	2000	2001	2002	2003	2004
Income (in lakhs):	16	27	33	45	52

Estimate the income for the year 2005.

Q.6 (a) Attempt any 2 [4 marks each] **[8]**

(i) Two batches of tablets were prepared using disintegrating agents A or B. Dissolution was determined on randomly selected tablets with the following results.

	No. of Samples	Mean	Variance
Type A	7	44.2857	23.0629
Type B	6	39	22

Do you think that there is a significant difference in effect due to disintegrant A and B.
(Given that the table value of t at 5% l.o.s. with 12 d.f is 2.18)

(ii) In a random sample of 600 tablets manufactured by machine 57 are found to be defective. Manager of the company claims that tablet machine produced only 30% defective tablets. Can we say that manager's claim is supported by sample at 5% l.o.s.? Table value at 5% l.o.s is 1.96.

(iii) A random sample of 4 batteries each 4 different samples were tested for any difference in their average life with the following results.

Brands			
A	B	C	D
12	14	12	14
15	17	19	21
18	12	20	25
10	19	23	20

Use ANOVA table to check if there is any significant difference in the average life of the four brands at 5% level

$F_{0.05}(3,12) = 3.49$

(b) Attempt any 1 [3 marks] **[3]**

(i) From a random sample of size n=9 is drawn from normal population gave the following observations:

72, 74, 68, 70, 61, 63, 69, 73 and 71.

To test: $H_0 : \sigma^2 = 36$ V_s $H_1 : \sigma^2 \neq 36$ (Use at 10% l.o.s.)

(Given that table value of χ^2 with 8 d.f at 5% l.o.s. is 2.306)

(ii) A drug was given to 10 patients. Changes in their blood pressure were recorded as follows: 6,3,-2,4,-3,4,6,0,0,2.

Is it reasonable to believe that consumption of the drug affected the blood pressure . [Given that t = 2.262 at 5% l.o.s at 9 df]

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Time : 3 Hours **Marks: 70**

Q.1 Answer the following

a.	Explain scope of Pharmaceutical microbiology	1
b.	Define and give significance of Thermal Death Point	1
c.	Draw a diagram of bacterial spore	1
d.	Name the causative agent of tetanus	1
e.	Name the media used for sterility testing	1
f.	Define numerical aperture	1
g.	Explain the term Retroviruses	1
h.	Explain Biological Indicators & give two examples	2
i.	Name any two protozoan infections with the causative agent	2
j.	Name any two chlamydial infections with the causative agent	2
k.	Write functions of flagella and pilli	2

Q.2 a) Explain dark field microscopy using a neat labelled diagram with its applications 4

b) Discuss dry heat sterilization with respect to method, the mechanism of action and applications 4

c) Explain different methods of preservation of bacteria 3

Q.3 a) Draw a diagram of

i) Chick embryo cultivation of viruses

ii) Lytic cycle of bacteriophage 4

b) Discuss in detail phenol coefficient test of disinfectant evaluation 4

c) Distinguish between bacteria and viruses 3

Q.4 a) Explain pure culture techniques for isolation of bacteria 4

b) Discuss in detail infections caused by rickettsia 4

c) With suitable example explain selective media 3

Q.5 a) Discuss in detail gaseous sterilization 4

b) Write a note on alcohol as a disinfectant 4

c) Explain commercial uses of algae 3

Q.6 a) write a note on identification of bacteria on the basis of morphological characteristics 4

b) Explain phases of bacterial growth cycle 4

c) Explain the principle of Gram staining technique 3

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(3 Hours) **[Total Marks: 70]**

N.B.: 1. All questions are compulsory
2. Figures to right indicate full marks

Q1) A] Answer the following questions (09)

a. Briefly discuss the following terms: Conformation, Trans annular strain, Ring Flipping

b. Give distinguishing test for primary, secondary and tertiary aromatic amines

c. Draw possible resonating structures for the following compounds

i) Naphthalene ii) Anthracene iii) Phenanthrene

B] Give the products for the following reactions (Any six) (06)

1. 2 Moles of C_6H_5CHO $\xrightarrow{\text{Strong NaOH}}$

2. C_6H_5Br $\xrightarrow[2.\ CO_2,\ H_3O^+]{1.\ Mg}$

3. C_2H_5COCl $\xrightarrow{\text{t-BuOH}}$

4. Phenol + $CHCl_3$ $\xrightarrow{OH^-,\ Heat}$

5. Naphthalene $\xrightarrow[450\ -500\ \text{Deg. C}]{O_2,\ V_2O_5}$

6. Acetaldehyde + CH_3NO_2 $\xrightarrow{OH^-}$

7. Aniline $\xrightarrow[2.\ CuCN]{1.\ NaNO_2,\ HCl,\ \ 0-5\ \text{Deg. C}}$

Q2)A] Give the mechanism of any two rearrangements (04)

i) Hoffman Rearrangement

ii) Steven Rearrangement

iii) Pinacol- pinacolone

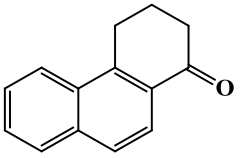
B] Complete the following reaction pathway (03)

i) $C_6H_5CH{=}CHCH_2OH \xrightarrow[EtOH]{\text{Raney Ni/ } H_2}$

ii) $C_6H_5COCH_3 \xrightarrow[CHCl_3]{CF_3CO_3H}$

iii) $C_6H_5COCl \xrightarrow{NaBH_4}$

C] Attempt the following conversions (04)

i)  $\xrightarrow[ii)\ H_3O^+]{i)\ EtMgBr}$ **A** $\xrightarrow[ii)Pd/C,\ heat]{i)\ H^+,\ -H_2O}$ **B**

ii) **C** $\xleftarrow{O_2/V_2O_5,\ 500^oC}$ **naphthalene** $\xrightarrow{HNO_3,\ H_2SO_4,\ 60^oC}$ **D**

Q3)A] Draw all possible structures of **Cis-1,3-dimethyl cyclohexane** and **Trans-1,3-dimethyl cyclohexane** and state which is most stable and why? [03]

B] Draw important conformers of n-butane and arrange them in the order of relative stability [02]

C] Covert the following [06]

i) 3-Methylaniline to 3- methylbenzoic acid

ii) Phenol to ethylphenyl ether

iii) Benzil to benzilic acid

Q4) A] Discuss any two synthetic methods for synthesizing 2-pentanone **OR** ethyl methyl ether [04]

B] Write structures of products formed (04)

i) Anthracene $\xrightarrow{HNO_3/Ac_2O}$ A + B

ii) Phenanthrene + $CH_3COCl \xrightarrow[AlCl_3,\ 0\ Deg.\ C]{}$

iii) Naphthalene + $H_2SO_4 \xrightarrow{160\ Deg.\ C}$

C] State True or False [03]

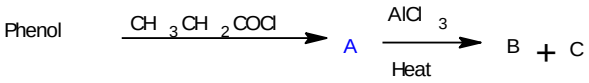
a. 1,4-dimethylcyclohexane is optically active

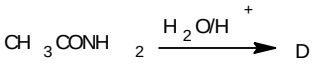
b. 1-t-butylcyclohexane prefers axial conformation

c. Cis cyclohexan-1,3-diol prefers diaxial conformation

Q5) A] Complete the following reaction pathway (04)

a.



b. 

B) Give the mechanism of acid catalyzed Beckman's rearrangement using suitable example (04)

C) Explain Hinsberg's test for aliphatic amines with suitable examples (03)

Q6)A] Convert the following (Any 2) (04)

a. Benzaldehyde to cinnamic acid

b. Salicyladehyde to o-hydroxybenzene

c. Napthalene to naphthalene-2-sulfonic acid

B] Complete the following reactions (03)

i) Ethyl benzoate $\xrightarrow{\text{n-Butanol/ H}^+}$

ii) Benzoic acid $\xrightarrow{PCl_3}$

iii) Aniline $\xrightarrow{CH_3Br}$

C] Write reactions to show steps involved <u>in conversion of 4-chlorobenzoic acid</u> to (04)

I) sodium 4-chlorobenzoate

ii) 4-chloro benzamide

iii) 4-chloro benzyl alcohol

iv) 4-chloro benzoyl chloride

Q. P. Code: 40386

[Time: Three Hours] **[Marks: 70]**

NB: 1. Please check whether you have got the right question paper.
2. All questions are compulsory
3. Figures to right indicate full marks
4. Draw neat labelled diagram, write chemical reaction and give example wherever necessary
5. Attempt answer of each main question on new page

Q.1 a) Explain the terms **(05)**

I. Iodimetry
II. %W/V
III. Back titration
IV. Replacement Titration
V. Standard reduction potential

b) Answer the following **(10)**

I. Discuss iodate titration
II. Balance following reaction
(a) $MnO_4^- + H_2O_2 \rightarrow Mn^{+2} + O_2 + H_2O$ (b) $IO_3^- \rightarrow I^+$
III. Discuss types of coulometric titration
IV. What is decomposition potential?
V. Distribution coefficient of a solute X between water and ether is 8. If 10 ml of an aqueous solution of the compound is extracted with 30 ml of ether, what percentage of the original solute will be found in aqueous and ether layer after equilibrium.

2. a) Answer the following : **(4)**

I. Give principal, indicator and reactions used in Assay of NaCl
II. Give principle and reactions for precipitation titration involving formation of coloured precipitate.

b) Write short note on- **(4)**

I. Preparation and stability of KFR
II. Biamperometric Titration

c) Give solvent, titrant and indicator used for non-aqueous titration **(3)**

3. a) Give therapeutic category, uses and assay of **(4)**

I. Soluble aspirin tablet
II. Dried aluminium hydroxide gel

b) Write short note on **(4)**

I. Polarogram

II. Half wave potential

c) Discuss back Iodometric titration with suitable example. **(3)**

Q.4 a) What is neutralization curve. Explain any one type of curve with example. **(4)**

OR

What is neutralization indicator. Explain any one theory of indicator.

b) What is gravimetry? Explain co-precipitation and re-precipitation with suitable example **(4)**

c) Give principle, indicator and titrant for the assay of hydrogen peroxide and paracetamol. **(3)**

Q.5 a) Discuss factors influencing liquid-liquid extraction and enlist ways to minimize it. **(4)**

b) write short notes on **(4)**

I. Determination of aluminium by back titration

II. pM indicators

c) An analyst analysed sample of crocin tablet. The content of paracetamol in each of five replicate analysis was as follows. **(3)**

499.5, 501.6, 501.2, 498.8, 500.4

Calculate Median and RSD for the given data.

Q. 6. a) Answer the following **(4)**

I. Give principle and reactions involved in the assay of Sulphacetamide sodium

OR

Explain the principle of oxygen flask combustion method.

II. In Kjeldahl's method, ammonia obtained from 0.88 g of an organic compound completely neutralize 80 ml of M/20 H_2SO_4. What is the percentage nitrogen in the compound?

b) Solve **(4)**

I. Calculate the pOH of the solution in which $[H]^+ = 5X10^{-6}$

II. Find the hydroxyl ion concentration for pH = 4.55

C) Answer the following

I. Draw the structure of Ni-DMG complex. **(3)**

II. Calculate gravimetric factor involved in gravimetric determination of Aluminium as $Al\text{-}(C_9H_6NO)_3$

Atomic weight: C:12, H:1, O:16, N:14, Al:27

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Time : 3 Hours **Marks : 70**

NB: 1. All questions are compulsory
2. Figures to the right indicate full marks

Q 1 a Comment on the kinetic stability of dispersed systems. 3
b Enlist the different factors affecting skin penetration. 2
c Define suppositories. Give the advantages of suppositories. 3
d State the problems associated with blood products. 2
e Explain how sterility of ligature is evaluated. 3
f State the applications of emulsions. 2

2 a Enlist the quality control tests for suspensions. Explain any two quality control tests in detail. 4

OR

Discuss the various equipment used in formulation of emulsions. 4

b Classify suppository bases. Explain the desirable properties of suppository bases. 4
c Explain Non-absorbable sutures of animal origin. 3

3 a Explain the following: i) Wetting ii) Electrical double layer 4
b Elaborate on Albumin preparations or Red Cell Concentrate. 4
c Outline the liquefaction test for suppositories. 3

4 a Explain raw materials used in Semisolid preparations. 4
b Enlist various methods of selection of emulsifiers and explain any one in detail. 4
c Elaborate on Dextran as plasma substitute. 3

OR

c Write a note on Molecular weight requirements for dextran and labelling criteria for dextran. 3

5 a Discuss any one method of suspension preparation. 4
b Elaborate on large scale manufacturing of ointments. 3
c Discuss large scale manufacturing of suppositories. 4

OR

Outline the problems encountered during formulation of suppositories. 4

6 a Elaborate on the process of sterilization of catgut. 3
b Elaborate on Preservation of emulsions. 4

OR

Explain the following, Creaming, Flocculation and Coalescence. 4
c Elaborate on Penetration enhancers and mechanism of penetration enhancement. 4

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Q.P. CODE: 38012

N. B. (1) All questions are compulsory **Marks: 70**
(2) Figures to the right indicate full marks

Q 1a. Answer the following 12
- (i) Discuss following terms i.e. 'inverse agonist' and 'bioequivalence'
- (ii) Explain terms
  1) Carcinogenicity
  2) Mutagenicity
- (iii) Enlist the therapeutic uses of adrenergic drugs
- (iv) Explain the term 'receptor' and classify with examples
- (v) Classify adrenergic receptors and give example of selective antagonist for each subtype
- (vi) Enlist factors affecting volume of drug distribution

Q 1b. (i) Give mechanism of action of loop diuretics 3
(ii) Classify skeletal muscle relaxants
(iii) Enlist side effects of atropine

Q 2 (a) Answer any two of the following 8
- (i) Describe synthesis, storage, release, and metabolism of acetylcholine
- (ii) What are ganglion blocking agents? Compare and contrast between depolarizing and non-depolarizing agents.
- (iii) Discuss in-detail pharmacological actions of adrenaline

Q 2 (b) Answer any one of the following 3
- (i) Discuss hepatotoxicity and related causes
- (ii) Classify routes of administration and discuss advantages and disadvantages of oral route over parenteral route

Q 3 (a) Answer any two of the following 8
- (i) Classify anti-anginal agents and add a note on nitrates
- (ii) Classify antiarrhythmic agents and discuss the role of calcium channel blockers in-detail
- (iii) Classify antihyperlipidemic drugs. Write a note on bile acid sequestrants

Q 3 (b) Answer any one of the following 3
- (i) Describe mechanism of action of digitalis and state related toxicity
- (ii) Write a note on sodium channel blockers with examples

Q 4 (a) Answer any two of the following 8
- (i) Classify cholinergic receptors and discuss therapeutic uses of selective agonist and antagonist for each subtype of receptor
- (ii) Describe synthesis, storage, release, and metabolism of catecholamines
- (iii) Explain in-detail the therapeutic effects of sympatholytics

Q 4 (b) Answer any one of the following 3
- (i) Classify anticholinesterases and discuss related therapeutic use
- (ii) Discuss the therapeutic role of adrenaline

Q 5 (a) Answer any two of the following 8
- (i) Describe enzyme-linked receptors in-detail
- (ii) Explain the adenylylcyclase c-AMP pathway of GPC receptors.
- (iii) What are nuclear receptors? Explain related mechanism of action with example

Q 5 (b) Answer any one of the following 3

(i) Discuss renal route of excretion with examples of a drug

(ii) Classify phase II reaction with example and write a note on any one reaction

Q 6 (a) Answer any two of the following 8

(i) Write a note on thiazide diuretics

(ii) Discuss therapeutic uses and complication of diuretics

(iii) Describe role of carbonic anhydrase inhibitors and loop diuretic in the treatment of hypertension

Q 6 (b) Answer any one of the following 3

(i) Write a short note on tolerance?

(ii) Explain how body weight affects drug action
