Q.P Code: 34775

Duration: $2\frac{1}{2}$ Hours **Marks: 75**

Please check whether you have got the right question paper

Instructions to the candidates:-

1. All the questions are compulsory. Choice is internal.
2. Figures to the right indicate full marks.
3. All questions carry equal marks.
4. Draw flowcharts /diagrams wherever necessary.

Q1 A. Choose the **MOST APPROPRIATE** answer (**any three**): 3

i) _____ is an absolute measure of dispersion.
a) Mean deviation b) Standard deviation c) Skewness

ii) _____ is an area diagram.
a) Histogram b) Line graph c) Pictogram

iii) _____ _ uses only two observations
a) Range b) Standard deviation c) Mode

iv) _____ is also known as norm.
a) Mean b)Mode c) Median

v) _____ percentile is the median of the data.
a) Tenth b) Fiftieth c) Sixtieth

vi) _____ is affected by extreme values.
a) Mode b) Mean c) Median

Q1 B. Define and explain **any one** 2

i) Histogram (ii) Median

Q1 C. Attempt **any one** 4

i) In the accounting department of bank 100 accounts are selected at random and examined for errors. The following results have been obtained. Calculate the mean error.

No. of errors	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	36	40	19	2	0	2	1

ii) Write a note on the application of biostatistics

Q1 D. Answer **any one** of the following: 6

i) Write a note on Standard deviation.

ii) Find SD for the following data on the age of patients suffering from pulmonary disease.

Age in years	**No. of patients**
0 - 10	6
10 - 20	14
20 - 30	10
30 - 40	8

Age in years	**No. of patients**
40 - 50	1
50 - 60	3
60 - 70	8

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Q2 A. Choose the **MOST APPROPRIATE** answer (**any three**): 3

i) In positive skewness of a distribution, _____ is observed.
a) Mean > Median > Mode b) Mean < Median > Mode
b) Mean < Median < Mode

ii) PDB files can be searched by PDB id code using _____ format.
a) FASTA b) BLAST c) Prosite

iii) EMBL is an example of _____ database.
a) Primary b) Secondary c) Tertiary

iv) The range of probability is _____.
a) -1 to +1 b) -1 to 0 c) Exhaustive

v) In normal distribution, Mean $\pm$ 2 σ will correspond to _____.
a) 68.2% b) 95.4% c) 99.7%

vi) The probability of getting an even number in a single throw with a dice is _____.
a) 1/6 b) 1/3 c) 1/2

Q2 B. Define and explain: (**any one**) 2

i) Probability
ii) GenBank

Q2 C. Attempt: (**any one**) 4

i) Two students X and Y work independently on a problem. The probability that X will solve it is 3/4 and the probability that Y will solve it is 2/3. What is the probability that the problem will be solved?
ii) Applications of bioinformatics

Q2 D. Attempt the following: (**any one**) 6

i) a) Discuss microarray analysis and its applications.
b) Enlist the types of databases.
ii) a) Out of 4 boys and 5 girls,a team of 4 students is to be selected for a quiz programme. Find the probability that 2 are girls and 2 are boys.
b)Two dice are tossed. What is the probability that the total score is a prime number?

Q3 A. Choose the **MOST APPROPRIATE** answer (**any three**): 3

i) The _____ hypothesis is regarded to be true in the zone of acceptance of the normal curve
a) Alternative b) Null c) Both 'a' & 'b'
ii) _____ means rejection of hypothesis which should have been accepted.
a) Type I error b) Type II error c) β - error

iii) The alternative hypothesis for a left–tailed test is _____.
a) $\mu \neq \mu_{H0}$ b) $\mu > \mu_{H0}$ c) $\mu < \mu_{H0}$
iv) For the application of Z – test, the sample size must be _____ 30
a) Smaller than b) Larger than c) Equal to

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v) The tests of hypotheses are also known as _____.
   a) Standard tests b)Parametric tests c) Significance tests of hypothesis
vi) _____ is a test of significance in which the direction is specified.
   a) One -tailed test b) Two-tailed test c) Both 'a' & 'b'

Q3 B. Define and explain: (**any one**) 2
   i) Parameter (ii) Hypothesis

Q3 C. Attempt the following: (**any one**) 4
   i) Write a note on Type I and II errors.
   ii) In a study on growth of children, one group of 100 children had a mean height of 60 cm and SD of 2.5 cm. While another group of 150 children had a mean height of 62 cm and SD of 3 cm. Is the difference of mean between the 2 groups statistically significant?

Q3 D. Attempt the following: (**any one**) 6
   i) Intelligence tests of two groups of hamsters and guinea pigs gives the following results

	Mean	SD	Size
Hamsters	84	10	121
Guinea Pigs	81	12	81

Test the hypothesis that guinea pigs have better intelligence average than hamsters.

   ii) Elaborate on Z-test

Q4 A. Choose the **MOST APPROPRIATE** answer (**<u>any three</u>**): 3
   i) The degree of freedom for unpaired t – test can be calculated as _____.
      a) $n_1 + n_2$ b) $n_1 + n_2 - 1$ c) $n_1 + n_2 - 2$
   ii) The values of χ^2- distribution are_____.
      a) Positive b) Negative c) Both 'a'&'b'
   iii) The two attributes under study are not associated when _____
      a) $\chi^2_{cal} < \chi^2_{tab}$ b) $\chi^2_{cal} \leq \chi^2_{tab}$ c) $\chi^2_{cal} > \chi^2_{tab}$
   iv) χ^2 test as a test of independence is _____.
      a) Parametric test b) Non–parametric test c) Both 'a' & 'b'
   v) _____ was given by W. S. Gossett
      a) Z–test b) χ^2 test c)t–test
   vi) _____ is applied for a sample with correlated observations.
      a) Paired t – test b)Unpaired t – test c) χ^2 test

Q4 B. Explain the following: (**any one**) 2
   i) Test of goodness of fit
   ii) Unpaired t-test

Q4 C. Attempt the following: (**any one**) 4
   i) Write a note on Test of independence
   ii) Certain pesticide is packed into bags by a machine. A random sample of 10 bags is drawn and their contents are found to weigh (in kgs) as 50, 49, 52, 44, 45, 48, 46, 45, 49 and 45. Test if the average packing weight can be taken to be 50 kg.

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$(t_{0.05, 9}) = 2.26$; $(t_{0.05, 10}) = 2.21$

Q4 D. Attempt **any one** 6

i) The weights of 10 tuberculosis patients on admission and at the end of 12 months of treatment with PAS plus isoniazid daily are given below. Examine whether the gain in weight is statistically significant.

Patient's No.	1	2	3	4	5	6	7	8	9	10
Before weight	49	41	37	41	42	37	39	38	41	35
After weight	52	43	46	52	46	38	42	41	42	38

$(t_{0.05, 9}) = 2.26$; $(t_{0.05, 8}) = 2.31$; $(t_{0.05, 16}) = 2.12$; $(t_{0.05, 18}) = 2.101$

ii) An oil company has explored three different areas for possible oil reserves. The results of the test were as given below –

	Area			**Total**
	A	**B**	**C**	
Strikes	7	10	8	25
Dry holes	10	18	9	37
Total	17	28	17	62

Do the three areas have the same potential, at the 10% level of significance?

($\Psi 2$ 0.05, 1) = 3.84); ($\Psi 2$ 0.05,2) = 5.991 ; ($\Psi 2$ 0.05, 3) = 7.82)

Q5 A. Attempt the following: (**any one**) 3

i) Find the median of the following data on marks obtained by 100 students in biostatistics.

Marks	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50
No. of students	12	18	34	20	16

ii) Write a note on mode

Q5 B. Attempt the following: (**any one**) 3

i) Elaborate on Normal distribution

ii) A card is drawn from a pack of 52 cards and then a second card is drawn. Find the probability that both cards drawn are queen.

Q5 C. Attempt the following: (**any one**) 3

i) For a given sample of 200 items drawn from a large population, the mean is 65 and the standard deviation is 8. Test the hypothesis that the mean of population is less than 68

ii) Explain - Level of significance and critical value

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Q5 D. Attempt **any one** of the following: 3

i) Two groups of 100 people each were taken for testing the use of a vaccine. 15 persons contracted the disease out of the inoculated person, while 25 contracted the disease in the other group. Test the efficiency of vaccine using χ^2 test.
(Ψ2 0.05, 1) = 3.84); (Ψ2 0.05,2) = 5.991 ; (Ψ2 0.05, 3) = 7.82)

ii) A sample of 20 bottles has mean of 124 ml and a standard deviation of 12 ml. Is the sample representative of a large consignment with a mean of 130 ml?
($t_{0.05, 19}$) = 2.08; ($t_{0.05, 20}$) = 2.067

Q5 E. Write True or False (**any three**) 3

i) If the curve of the distribution has a longer tail towards left, it is said to be negative skewness

ii) In normal distribution, mean, mode and median coincide

iii) RASMOL is a sequence analysis tool

iv) If $z_{cal} > z_{tab}$, alternative hypothesis is rejected

v) Yates' correction reduces the deviation of the observed frequency from the expected by ½

vi) Prosite is an example of genome database

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