

Name :

Roll No. :

Invigilator's Signature :

CS/B.OPTM/SEM-6/BO-603/2012

2012

BIO-STATISTICS

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

i) The mode of the observations 4, 6, 8, 6, 5, 6, 7, 4, 5, 6, 7, 7 is

- a) 7
- b) 6
- c) 5
- d) none of these.

ii) The HM of 2, 4, 6, 8, 10 is

- a) 4.4
- b) 6.8
- c) 7.11
- d) 10.5.



- iii) The normal curve is perfectly symmetrical about the
- a) mean
 - b) median
 - c) mode
 - d) none of these.
- iv) In which of the following distributions the mean and variance are same ?
- a) Binomial
 - b) Poisson
 - c) Uniform
 - d) Normal.
- v) The graphical representation of a cumulative frequency distribution is known as
- a) Mean curve
 - b) Histogram
 - c) Ogive
 - d) Bar chart.
- vi) If A and B are mutually exclusive events, then
- a) $P (AB) = P (A) P (B | A)$
 - b) $P (A) + P (B) = 1$
 - c) $P (AB) = P (B) P (A | B)$
 - d) all of these.
- vii) If X, Y are jointly distributed random variables, then
- a) $\text{Var} (X, Y) = \text{Var} (X) + \text{Var} (Y) + 2 \text{Cov} (X, Y)$
 - b) $\text{Var} (X, Y) = \text{Var} (X) + \text{Var} (Y) - \text{Cov} (X, Y)$
 - c) $\text{Var} (X, Y) = \text{Var} (X) + \text{Var} (Y) + \text{Cov} (X, Y)$
 - d) $\text{Var} (X, Y) = \text{Var} (X) + \text{Var} (Y) - 2 \text{Cov} (X, Y)$.



viii) If the variables X, Y are independent, then

- a) $\text{cov} (X, Y) = 0$ b) $\text{cov} (X, Y) = 1$
 c) $\text{cov} (X, Y) = - 1$ d) all of these.

ix) Standard error of sample means (\bar{x}) is

- a) σ/\sqrt{n} b) \sqrt{n}/σ
 c) σ/n d) none of these.

x) If the regression coefficients are 4 and 16, then the correlation coefficient is

- a) 8 b) 12
 c) 24 d) 10.

xi) The standard deviation is independent of the change of

- a) origin b) scale
 c) both (a) and (b) d) none of these.

xii) A pair of dice is thrown, the chance of obtaining a sum of 12 is

- a) $\frac{1}{12}$ b) $\frac{5}{12}$
 c) $\frac{3}{12}$ d) $\frac{7}{12}$.



xiii) If Q_1 , Q_2 , Q_3 are 1st, 2nd and 3rd quartiles respectively, then which of the following is true ?

- a) $Q_1 < Q_2 < Q_3$ b) $Q_1 = Q_2 < Q_3$
 c) $Q_1 < Q_2 = Q_3$ d) $Q_1 > Q_2 > Q_3$.

xiv) Poisson distribution is

- a) Discrete b) Continuous
 c) Uniform d) none of these.

xv) The median of 2, 7, 9, 4, 12, 5, 13, 8, 23 is

- a) 7 b) 8
 c) 7.5 d) 8.5.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

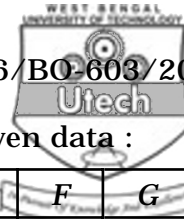
2. The mean of optometry students is 28.8. Find the missing frequency :

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Frequency	4	6	20	?	7	3

3. A sample of size 60 has mean 52 and standard deviation 9. Another sample of size 90 has mean 48 and standard deviation 12. If two samples are pooled together, find the mean and the standard deviation of combined samples.

4. Find the mode of the following :

Year under	10	20	30	40	50	60
Number of persons	15	32	51	78	97	109



5. Find the rank correlation coefficient of the given data :

Students	A	B	C	D	E	F	G
Marks in Mathematics	96	85	64	32	48	49	56
Marks in Physics	32	45	55	59	67	68	91

6. Four coins are tossed simultaneously. What is the probability of getting at least 2 heads ?

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Two persons X and Y appear in an interview for two vacancies in the post of Faculty of optometry. The probability of X 's selection is $1/5$ and that of Y 's selection is $1/3$, what is the probability that

- i) only one of them selected,
- ii) none of them selected ?

b) Find composite standard deviation σ from the following table :

Characteristics	Groups I	Groups II	Composite Group
No. of observations	$N_1 = 55$	$N_2 = 45$	$N = 100$
mean	$\bar{X}_1 = 6.6$	$\bar{X}_2 = 6.38$	$\bar{X} = 6.5$
Standard Deviation	$\sigma_1 = 1.5$	$\sigma_2 = 1.97$	$\sigma = ?$

8 + 7

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8. a) Draw the histogram, frequency polygon and ogives (both less than and more than types) :

Wages	50 - 59	60 - 69	70 - 79	80 - 89	90 - 99	100 - 109	110 - 119
No. of Employees	8	10	16	14	10	5	2

b) Find median from the following :

Income :	260 - 269	270 - 279	280 - 289	290 - 299	300 - 309
Workers :	6	14	29	23	16

310 - 319	320 - 329
10	2

10 + 5

9. a) A population consists of the number 1, 5, 3, 7, 9. Consider all possible samples of size two which can be drawn with replacement from this population. Find

- i) Population mean
- ii) Population s.d.
- iii) Mean of sampling distribution of means
- iv) s.d. of the sampling distribution of means
- v) Standard error of means.

b) If $P(A) = 1/2$, $P(B) = 3/5$, $P(A \cap B) = 1/3$, find $P(A \cup B)$ & $P(A/B)$. 10 + 5



10. Find the three quartiles Q_1 , Q_2 , Q_3 from given data :

Class Interval	10 - 15	15 - 20	20 - 25	25 - 30	30 - 40	40 - 50
Frequencny	4	12	16	22	10	8

50 - 60	60 - 70	Total
6	4	82

Find also the quartile deviation.

11. a) Arithmetic mean and standard deviation of a binomial distribution are 4 and $2\sqrt{2}/3$ respectively. Find the values of p and q .
- b) Given $\Sigma x = 56$, $\Sigma y = 40$, $\Sigma xy = 364$, $\Sigma x^2 = 524$, $\Sigma y^2 = 256$, and $n = 8$. Find the regression equation of x on y .
- c) If the Geometric mean of 4, 6, x , 3, 6, 12, is 5.7, then find the value of x . 5 + 7 + 3

