

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 Mean=27.78, Mode=28, then the approximate value of Median is
(a)27.85 (b)27.46 (c)27.50 (d)27.95
- (ii) Which of the following measure of central tendency is based on all the observations?
(a) Mean (b) Median (c) Mode (d)None of these
- (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 Mean=30.0806, S.D=13.4049, Mode=33.4920, then Karl Pearson's co-efficient of skewness is:
(a)0.2544 (b)0.0348 (c) -0.2544 (d) -0.0348
- (v) If $\bar{x}=1$, $\mu_2=3$, $\mu_3=0$, then the third raw moment about origin is;
(a)8 (b)7 (c) -6 (d) 10
- (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) For a binomial distribution, mean=4 and variance=2.4, then the value of parameters n and p are
(a) 8 and 0.5 (b) 10 and 0.6 (c) 10 and 0.4 (d) None of these
- (ix) The table value for a Normal distribution, $P[Z \geq 2.1]=0.0179$ then $P[Z \leq 2.1]=$
(a) 0.4821 (b) 0.9821 (c) 0.0179 (d) None of these

(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 the Null hypothesis is accepted if :

- (a) Test value is more than Critical value (b) Test value is less than Critical value
(c) Test value is equal to Critical value (d) None of these

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

[8]

(i) Find the missing frequency in the following data if it is known that the A.M for the data is 244.

Life in hours	0 - 100	100 - 200	200 - 300	300 -400	400 - 500	500 - 600
No. of tubes	8	25	45	-	7	3

TURN OVER

- (ii) Calculate the Q.D and its co-efficient for the following data giving the life of 500 tubes.

Life in hours	600 - 800	800 - 1000	1000 - 1200	1200 - 1400	1400 - 1600
No. of tubes	20	60	80	30	10

- (iii) Calculate the 6th decile(D_6) and 35th percentile(P_{35}) for the following data.

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90
No. of students	4	2	18	22	21	19	10	3	1

(b) Attempt any 1 [3 marks]

[3]

- (i) The following data gives the no. of defectives articles by workers in a factory in a month. Find the arithmetic mean.

No. of defective articles	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
No. of workers	5	8	10	12	5

- (ii) The A.M of 50 observations was found to be 104. It was later noticed that the observation 98 was misread as 89. Find the correct value of the A.M.

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

[8]

- (i) Find M.D from (1) Mean, (2) Median for the following data and verify that M.D is minimum when taken from median: 17, 19, 18, 22, 19, 18, 19, 21, 19, 20, 24, 20, 23, 25, 21.
- (ii) Means and standard deviation are given below for two groups. Find the combined mean and standard deviation of the two groups taken together. They are $n_1=100$, $\bar{x}_1=40$, $\sigma_1=5$ and $n_2=200$, $\bar{x}_2=43$, $\sigma_2=4$
- (iii) The no. of runs scored by two cricketers A and B in 10 innings of 5 test matches are shown below: Find which cricketer is more consistent.

A	5	20	90	76	102	90	6	108	20	16
B	40	35	60	62	58	76	42	30	30	20

(b) Attempt any 1 [3 marks]

[3]

- (i) The first four moments of a frequency distribution are 0, 16, -64, 312 resp. Comment on the nature of Skewness and Kurtosis.
- (ii) Find the value of Mode for the following data:-

I.Q Group	10 - 30	30 - 50	50 - 70	70 - 90	90 - 110	110 - 130	130 - 150
No. of Students	5	10	25	30	15	10	5

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

[8]

- (i) Find the Karl Pearson's co-efficient of Skewness for the following data:

Class	0 - 2	2 - 4	4 - 6	6 - 8	8 - 10
Frequency	5	8	10	5	2

TURN OVER

- (ii) From the frequency distribution find the moments about mean:

X	2	3	4	5	6
f	1	3	7	3	1

- (iii) Hundred students appeared for two examinations. 60 passed the first, 50 passed the second and 30 passed in both. Find the probability that student selected at random
- (a) Passed in at least one examinations.
(b) Failed in both the examinations.

(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	0	1	2	3
P(x)	1/3	1/2	k	1/8

- (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) Let X be a binomial random variable with mean 4 and variance 2.4. Find the probability that the variate takes values less than or equal to 2.
- (ii) It is stated that optical lenses supplied by a manufacturer are found to be defective follows Poisson distribution, with mean 4. What is the probability that form a random sample of lenses
- (1) 3 or more are defective. (2) at the most 2 lenses are defective?
- (iii) The particle size analysis of powder shows normal distribution. Particle size analysis data of 10000 particles show the mean size of 750 μm and standard deviation of 50. Find
- (1) the number of particles with size less than 700 μm .
(2) the probability of particles with size between 700 μm and 800 μm
(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:

Year:	2009	2010	2011	2012	2013
Index:	210	225	245	260	275

Estimate the index for the year 2014.

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

Year	:	2010	2011	2012	2013	2014
Income (in lakhs):		6	9	14	15	18

TURN OVER

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

- (i) Following table shows number of animals Alive and Dead after three months.

	Alive	Dead	Total
Placebo	61	14	75
Drug	69	6	75
Total	130	20	150

Diseased animals were tested with either placebo or drug. Using above data, is the drug more effective than the control in preventing death at 5% I.o.s.?

- (ii) In a cross-breeding experiment with plants at certain species 240 offspring were classified in 4 classes w.r.t the structure of their leaves as follows:

Class	I	II	III	IV	Total
Frequency	21	127	40	52	240

According to theory of heredity, the probabilities of the four classes should be in the ratio 1:9:3:3. Are these data consistent with theory? (Given that the table value of χ^2 with 3 d.f at 5% I.o.s. is 7.815)

- (iii) The following table gives the yields of 15 sample plots under three varieties of seed.

A	B	C
5	8	7
6	10	3
8	11	5
9	12	4
7	4	1

You are required to find if the average yields of land under different varieties of seed show significant differences. Use ANOVA technique, given that $F_{0.05}(2,12) = 3.89$.

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

- (i) A random sample of size 20 from a normal population gives a sample mean of 42 and a sample standard deviation is 6. Test the hypothesis that the population standard deviation is 9. (Given that: table value of
- χ^2
- with 19 d.f at 5% I.o.s. is 15.507)

- (ii) The following data present the yield in quintals of corn on ten subdivisions of equal area of two agriculture plot:

Plot 1:	6.2	5.7	6.5	6.0	6.3	5.8	5.7	6.0	6.0	5.8
Plot 2:	5.6	5.9	5.6	5.7	5.8	5.7	6.0	5.5	5.7	5.5

Test whether two samples taken from two random population have the same variance at 5% I.o.s. (Given that: the table value F distribution $F_{0.05}(9,9) = 3.1789$.)