Q.P. Code: 35803

(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 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) The degree of _____ of a distribution is measured relative to the peakedness of a symmetric
bell-shaped curve.
(a) Skewness (b) Moments (c) Kurtosis (d) None of these

(vi) 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

(vii) Two dice are thrown. The probability that the sum of members appearing is more than 10 is;
(a)$\frac{1}{18}$ (b) $\frac{1}{12}$ (c) $\frac{1}{6}$ (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) In a 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

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

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

(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) 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 6^{th} decile (D_6) and 70^{th} percentile (P_{70}) for the following data.

Marks	0 – 9.5	9.5 – 19.5	19.5 – 29.5	29.5 – 39.5	39.5 – 49.5	49.5 – 59.5	59.5 – 69.5	69.5 – 79.5
No.of students	4	2	18	22	21	19	10	3

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

(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

(ii) The mean monthly salary paid to 300 employees of a firm is Rs.14,700. The mean monthly salary of 200 male employees is Rs.15,050. Find the mean monthly salary of remaining female employees.

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

(i) The values of A.M and S.D of 12 observations are 22 & 3 resp. It was later discovered that one observations 32 was wrongly taken as 23. Calculate the correct values of A.M, S.D and C.V.

(ii) Calculate M.D from median and corresponding co-efficient of M.D for the following data:- 100,150,200,250,360,490,500,600,676.

(iii) 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 $n_2=200$, $\bar{x}_2=43$, $\sigma_2=4$

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

(i) The first four moments about the origin are 1,4,10,46. Comment upon the Skewness and Kurtosis of the distribution.

(ii) (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

(ii) Consider the following data:
Find the first, second, third & fourth central moments & hence comment on Skewness of the set of numbers: 1,4,9,12,15

(iii) A certain drug is given to two patients. Probability that the patient A will recover is 2/3 and that of Patient B will recover is 3/4. Find the probability that
(a) Both the patients will recover.
(b) Both the patients will not recover.
(c) Drug is effective.

(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)	$\frac{1}{3}$	$\frac{1}{2}$	k	$\frac{1}{8}$

(ii) A fair dice is rolled. Write down the sample space of the experiment. Find the probability that the number on the uppermost face is
(a) An odd number. (b) A prime number. (c) A perfect square.

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

(i) The probability of a man hitting a target is 1/3.
1. If he fires six times, find the probability of hitting the target at least twice.
2. How many times must he fire so that the probability of hitting the target at least once is at least
0.90.

(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

(iii) Suppose the number of telephone calls that an operator receives during a specified time-interval of the day follows Poisson distribution with mean 3. Find the probability that during this specified time-interval next day, the operator will receive
1. No telephone calls. 2. At the most one telephone call.

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

(i) At a printing press, 3% of the books are found to have defective binding. Find the probability that out of 250 books bound at the printing press, exactly 4 books will have defective binding.

(ii) The height of students in Jay Bharat College follows normal distribution with mean height of 155cms. & S.D of height as 5cms. Find
1. Chance that height of a randomly chosen student from this college exceeds 158cms.
2. Percentage of students with height less than 150cms.
3. Minimum height of tallest 10% students.

Given: { Area between Z=0 and Z=0.6is 0.2257
Area between Z=0 and Z=0.1 is 0.3413
P(Z > 1.28)=0.2123 }

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

(i) Average height of a sample of 6400 persons from one population was found to be 67.85 inches with a standard deviation of 2.56 inches. Another sample 1600 persons showed a mean of 68 inches & standard deviation of 2.52 inches. Is the difference between the mean heights significant? Test the hypothesis at 1% level of significance.

(ii) 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% l.o.s.?

(iii) In a preclinical study, animals were treated with two antihypertensive experimental drugs and a control drug with 12 animals randomly assign to three groups four per group. The results(change in blood pressure from baseline) are shown in following table.[Use 5% l.o.s.]

Drug 1	Drug 2	Control
15	8	-
12	14	16
19	13	20
11	6	22

Use ANOVA technique, given that $F_{0.05}(2,8) = 4.46$.

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

(i) In a sample of 8 observations the sum of squared deviations of items for the mean was 94.5. In another sample of 10 observations, the value was found to be 101.7. Test whether the difference in variances is significant at 5% l.o.s?
(Given that the table value of F distribution at (7,9) d.f with 5% l.o.s. is found to be 3.29)

(ii) 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)

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