Q. P. Code : 09455

(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, Median = 42.5, then the approximate value of Mean is
(a) 43.15 (b) 43.35 (c) 43.55 (d) 43.75

(ii) Which of the following average is a partition value?
(a) AM (b) Median (c) Mode (d) None

(iii) If 75% of the items lies above 33.64 and 75% of the items lies below 57, then co-efficient of Quartile deviation is:
(a) 23.36 (b) 11.68 (c) 0.2573 (d) 0.2537

(iv) If n=10, Σx=200, SD=10 then Coefficient of Variation is:
(a) 2% (b) 15% (c) 50% (d) 200%

(v) If Median and S.D are 20 and 4 respectively. If each item is increased by 2 then the Median and S.D will be;
(a) 20,4 (b) 18,4 (c) 22,6 (d) 22,4

(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) In a 3 coin trial, the probability of getting at least one Head is
(a) 1/8 (b) 3/8 (c) 5/8 (d) 7/8

(viii) For a binomial distribution mean=4 and variance=2.4 then the values of parameters n and p is
(a) 10 & 0.04 (b) 10 & 0.4 (c) 5 & 0.4 (d) 5 & 0.2

(ix) The table value for a Normal distribution $P[Z \geq 2]$ is 0.0228 then $P[-2 \leq Z \leq 2]$ is
(a) 0.4772 (b) 0.9544 (c) 0.0456 (d) 0.0114

(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

TURN OVER

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

(i) 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

(ii) Calculate Quartile Deviation from the following data:-

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of Students	5	8	9	13	30	20	10	05

(iii) Calculate 7^{th} Decile and 75^{th} Percentile from the following data:-

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of students	2	4	6	8	10	12	14	16

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

(i) 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.

(ii) The average daily income for a group of 50 persons was calculated to be Rs.116. It was later discovered that one figure was misread as Rs.163 instead of the correct value 136. Calculate the correct average income.

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

(i) Obtain the value of median for the following frequency distribution:

Daily Sales(Rs.)	1400-1600	1600-1800	1800-2000	2000-2200	2200-2400	2400-2600
Number of Days	12	30	55	40	35	28

(ii) Calculate M.D. from mean and corresponding coefficient of M.D. for the following data representing daily wages (in Rs.) of workers in a factory:

Daily Wages(in Rs.)	63-67	68-72	73-77	78-82	83-87	88-92	93-97
No. of Workers	2	22	19	14	9	4	3

(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) Means and standard deviation are given below for two groups. Find the combined mean and standard deviation of the two groups taken together.
$n_1=100,\ \bar{x}_1=40,\ \sigma_1=5$ and $n_2=100,\ \bar{x}_2=40,\ \sigma_2=5$

(ii) The prices of shares of two companies A and B in the first six months of 2008 were as follows:

Month	Jan	Feb	Mar	Apr	May	June
Company A	188	178	173	164	172	184
Company B	131	130	130	129	129	120

Which company's shares are more variable in price? Why?

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

(i) From the frequency distribution find the moments about mean:

x :	2	3	4	5	6
f :	1	3	7	3	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 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

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

(i) A random variable 'x' has the following probability distribution.

x	-2	-1	0	1	2	3
P(x)	0.1	K	0.2	2k	0.3	3k

Find k and hence find the expectation and variance.

(ii) A box contains 7 Aspirin, 5 Analgin and 4 paracetemol tablets. Two tablets are drawn at random from the box. Find the probability that
(i) both the tablets are Aspirin.
(ii) one is Analgin and the other is paracetemol.

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

(i) The incidence of occupational disease in an industry is such that the workmen have a 20% chance of suffering from it. What is the probability that out of six workmen, 4 or more will contact the disease?

(ii) It is observed that 2% of tablets made by a factory are defective. Find probability that in sample of 200 tablets
(1) exactly 5 tablets are defective (2) more than 3 tablets are defective

m	1	2	3	4	5	6
e^{-m}	0.3679	0.1353	0.0498	0.0183	0.00673	0.00248

(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:

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:	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) In a sample of 300 tablets manufactured by Pharma company A, 65 tablets were found to be defective and in another sample of 200 tablets manufactured by another Pharma company B, there were 35 defective. Is there any significant difference in the proportion of defective tablets in the sample at 5% l.o.s?
(Given that at 5% significance level table value of $Z_{\alpha/2}$ is 1.96).

(ii) 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. s (Given that the table value of t at 5% l.o.s. with 12 d.f is 2.18)

(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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