Note: All Questions are compulsory
Use of simple calculator is allowed
Figure at right indicate maximum marks

Q1. (a)    Attempt any 7 [ 2 marks each]:                                                    [14]

(i)    If mode =40.1, median = 38.5, then the approximate value of Mean is:
(a)39.3              (b)837.75           (c) 37.7              (d) 37.76

(ii)    Mean, Median and Mode for the data 16, 15, 14, 16, 18, 20, 16, 18, 20 is
(a)16, 17, 16        (b)16, 16, 17        (c) 15, 17, 16        (d)17, 16,16

(iii)    For a data distribution, 75% of data above 42.5 and 75% of data is below 51.75
then Quartile Deviation is:
(a) 9.25             (b) 47.125           (c) 10.915           (d) 4.625

(iv)    If $n = 8$, $\sum x = 792$ and $\sum x^2 = 78668$, then coefficient of variation is :
(a) 32.49            (b) 5.7              (c) 5.7575%          (d) 99

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

(vi)    For a set of data distribution, mean = 76.5, SD = 4.56 and mode = 72, then, the
Karl Pearson's coefficient of Skewness is
(a)0.9868            (b) 0               (c) -0.9868          (d) None of these

(vii)    The probability of A can solve a problem is 2/9 and that of B is 3/10. If both are
trying to solve the problem independently, probability that the problem is solved
is?
(a) 0.455            (b) 0.544            (c) 0.545            (d) 0.456

(viii)    For a binomial distribution $n = 8$ and $q = 0.4$, then the values of mean and
variance are:
(a) 3.2, 1.92        (b) 3.2, 4.8         (c) 4.8, 1.92        (d) None of these

(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-II' 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

**Q2.** **(a)** Attempt any two ( 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 a 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) For the following distribution, Mode is 960. Find the number of workers of the 600-800 wage class:

Wage in Rs   : 400-600  600-800  800-1000  1000-1200  1200-1400  1400-1600
No of workers:   05        -        30         25          20         10

(iii) The following are the marks of three students A, B, C in 4 subjects P,Q, R and S respectively. The weights of the subjects are given. Decide which of the three students is the best

|            | P | Q | R | S |
|------------|-----|-----|-----|-----|
| Marks of A | 28 | 30 | 40 | 20 |
| Marks of B | 35 | 25 | 20 | 15 |
| Marks of C | 30 | 35 | 30 | 20 |
| Weight     | 4 | 3 | 2 | 1 |

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

(i) The mean of marks scored by 300 students in the subject of statistics is 45. The mean of the top 100 of them was found to be 70 and the mean of the last 100 was known to be 20. What is the mean of the remaining 100 students?

(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.

**Q3.** **(a)** Attempt any two ( 4 marks each)                                                                                     [8]

(i) The first of the two samples had 150 items with mean 16 and SD = 4. If the whole group has 250 items with mean 15.6 and variance 13. 44, find the mean and SD of the second group.

(ii) The daily high blood pressure of a patient on the  last 25 days are given below. Find the  Mean Deviation about Median and its coefficient:

B.P (mmHg)    :    102    106    110    114    118    122
Number of days :    3      3      5      8      4      2

(iii) Find Quartile Deviation and Coefficient of Quartile Deviation for the following data:

Class:     30-34   35-39   40-44   45-49   50-54   55-59   60-64
    F:        3       5      12      18      10       6       2

(b) Attempt any one (3 marks) [3]

(i) Discuss the Characteristics of an ideal/good measure of dispersion.

(ii) Calculate standard deviation and coefficient of variation for the following data:

| Class | : 2-4 | 4-6 | 6-8 | 8-10 | 10-12 |
|-------|-------|-----|-----|------|-------|
| Frequency : | 5 | 15 | 35 | 30 | 15 |

Q4. (a) Attempt any two ( 4 marks each) [8]

(i) The first 4 raw moments about a frequency distribution are 2, 20, 40, 200 respectively. Find the four central moments. Hence comment about the shape of skewness and kurtosis.

(ii) Find mean, variance and standard deviation of the following probability distribution.

| X: | 2 | 4 | 6 | 8 | 10 |
|----|---|---|---|---|-----|
| P: | 0.3 | 0.2 | 0.2 | 0.2 | 0.1 |

(iii) Find Bowley's coefficient of skewness for the following data:

| Class | : 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
|-------|--------|-------|-------|-------|-------|-------|-------|-------|
| Frequency : | 5 | 8 | 9 | 13 | 30 | 20 | 10 | 05 |

(b) Attempt any one (3 marks) [3]

(i) Discuss skewness and kurtosis.

(ii) Two cards are drawn from a well shuffled pack of cards. What is the probability that (i) both are red cards (ii) one is the heart card and the other is a club (iii) only one of them is an Ace card.

Q5. (a) Attempt any two ( 4 marks each) [8]

(i) A company produces hand gloves 3 per cent are found to be defective. If a sample of 10 is taken, what is the probability that (i) 2 of them are defective (ii) none is defective (iii) at lease one of them is defective

(ii) The probability that a man aged 50 years will die within the next year is 0.001. Find the probability that within the next year, out of 1000 such persons : (i) exactly 2 will die (ii) at most one will die. (Given $e^{-0.1}$=0.9050, $e^{-1}$= 0.3679, $e^{-.01}$ = 0.99)

(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, which are measured to the nearest day is normal, find the percentage of pace makers which have life time of (i) more than 370 days (ii) less than 265 days. [ Given that area between z = o and z = 2 is 0. 4772, Given that area between z = o and z = 1 is 0. 3413]

[TURN OVER

**(b)    Attempt any one (3 marks)**                                                    [3]
(i)   Fit a straight line by the method of least squares for the following data:
      Year            :   2010   2011   2012   2013   2014
      Income (in lakhs) :   210     225     245     260     275
      Estimate the Income for the year 2015.

(ii)   Fit an exponential curve $y = ab^x$, from the following data:
      Year           : 2000  2001  2002  2003  2004
      Index          : 435    462    475    492    504
      Estimate the index for the year 2005

**Q6.   (a)    Attempt any two ( 4 marks each)**                                           [8]

(i)    A pharmacy claimed that 95% of the medicines supplied by them   confirmed all
       the quality specifications. An examination of a sample of 200 pieces revealed
       that 18 were guilty. Test the claim at 1% level of significance, against the
       alternative hypothesis that the percentage is less than 95. [ At 1% level of
       significance, table value is 2.58]

(ii)   Two research laboratories have independently produced drugs that provide
       relief to asthma patients. The first drug was tested on a group of 85 patients and
       shown an average relief of 8.5 hours with a sample S.D of 1.8 hours. The second
       drug was tested on 80 patients producing an average of 7.9 hours of relief and a
       sample S.D of 2.1 hours. At 5% l.o.s does the second drug provide a significantly
       shorter period of relief? [given that $Z_\alpha$ value for one tail test for $\mu_1 < \mu_2$ is -1.645]

(iii)   A random sample of 4 batteries each of 4 different samples was tested for any
        difference in their average life with the following results.

| Brands | | | |
|---|---|---|---|
| A | B | C | D |
| 12 | 14 | 12 | 14 |
| 15 | 17 | 19 | 21 |
| 18 | 12 | 20 | 25 |
| 10 | 19 | 23 | 20 |

Use ANOVA table to check whether there is any significant difference in the
average life of the four brands at 5% level  $F_{0.05}(3,12) = 3.49$

**(b)    Attempt any one (3 marks)**                                                    [3]
(i)    A drug was given to 10 patients. Changes in their blood pressure were recorded
       as follows. : 6, 3, -2, 4, -3, 4, 6, 0, 0, 2. Is it reasonable to believe that
       consumption of the drug affected the blood pressure. [ Given that t = 2.262 at
       5% level of significance at 9 df]

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