## BOARD QUESTION PAPER : MARCH 2019 MATHEMATICS AND STATISTICS - II

## Notes:

i. All questions are compulsory.
ii. Figures to the right indicate full marks.
iii. Graph paper is compulsory for L.P.P
iv. Logarithm table will be provided on request.
v. Answers to the question in Section - I and Section - II should be written in two separate answer books.
vi. Question from Section - I attempted in the answer book of Section - II and vice-versa will not be assessed / not be given any credit.
vii. Answer to every question must be written on a new page.

## Section - I

Question 1 to 3 (based on section I) are given in our book STD XII (COMMERCE) MATHEMATICS AND STATISTICS - I

## Section - II

## Q.4. Attempt any SIX of the following:

i. Two fair coins are tossed simultaneously.

If X denotes the number of heads, find the probability distribution of X . Also find $\mathrm{E}(\mathrm{X})$.
ii. If the correlation coefficient between X and Y is 0.8 , what is the correlation coefficient between
a. $\quad \mathrm{X}$ and 3 Y
b. $\quad X-5$ and $Y-3$
iii. Find the premium on property worth $₹ 12,50,000$ at $3 \%$ if the property is insured to the extent of $80 \%$ of its value.
iv. If the sum of squares of differences of ranks for 10 pairs of observations is 66 , find the rank correlation coefficient.
v. If the present worth of a bill due 6 months hence is $₹ 2,500$ at $10 \%$ per annum, what is the true discount?
vi. From the following table find $\mathrm{q}_{\mathrm{o}}$ :

| $x$ | 0 | 1 | 2 | 3 | 4 | 5 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| $l_{x}$ | 1000 | 940 | 780 | 590 | 25 | 0 |

vii. Compute CDR using the information given below:

| Age group (years) | $0-15$ | $15-35$ | $35-65$ | 65 and above |
| :---: | :---: | :---: | :---: | :---: |
| Population | 9000 | 25000 | 32000 | 9000 |

Total number of deaths in a year is given to be 900.
viii. What must be subtracted from each of the numbers 5,7 and 10 , so that the resulting numbers are in continued proportion?
Q.5. (A) Attempt any TWO of the following:
i. An article is marked at ₹ 1,500 . A trader allows a discount at $3 \%$ and still gains $20 \%$ on the cost. Find the cost price of the article.
ii. For a binomial distribution $n=6$ and $p=0.3$, find the probability of getting exactly 3 successes.
iii. Diet for a sick person must contain at least 4000 units of vitamins, 50 units of minerals and 1500 calories. Two foods $F_{1}$ and $F_{2}$ cost ₹ 50 and ₹ 75 per unit respectively. Each unit of food $F_{1}$ contains 200 units of vitamins, 1 unit of minerals and 40 calories, whereas each unit of food $F_{2}$ contains 100 units of vitamins, 2 units of minerals and 30 calories. Formulate the above problem as L.P.P to satisfy the sick person's requirements at minimum cost.
(B) Attempt any TWO of the following:
i. Two samples from bivariate populations have 15 observations each. The sample means of X and Y are 25 and 18 respectively. The corresponding sum of squares of deviations from means are 136 and 148. The sum of product of deviations from respective means is 122. Obtain the equation of line of regression of X on Y .
ii. Suggest optimum solution to the following assignment problem, also find the total minimum service time.
Service Time (in hrs.)

| Counters | Salesmen |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | A | B | C | D |
| W | 41 | 72 | 39 | 52 |
| X | 22 | 29 | 49 | 65 |
| Y | 27 | 39 | 60 | 51 |
| Z | 45 | 50 | 48 | 52 |

iii. From the following table which relates to the number of animals of a certain species at age $x$, complete the life table:

| $x$ | 0 | 1 | 2 | 3 | 4 | 5 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| $l_{x}$ | 1000 | 850 | 760 | 360 | 25 | 0 |

## Q.6. (A) Attempt any TWO of the following:

i. For 50 students of a class, the regression equation of marks in statistics ( X ) on the marks in accountancy (Y) is $3 y-5 x+180=0$. The mean marks in accountancy are 44 and the variance of marks in statistics is $\left(\frac{9}{16}\right)^{\text {th }}$ of the variance of marks in accountancy. Find the mean marks is statistics and the correlation coefficient between marks in the two subjects.
ii. The p . d. f. of a random variable X is given by:
$f(x)=2 x, 0 \leq x \leq 1$
$=0$, otherwise $\quad \begin{array}{r}\text { Find } \mathrm{P}\left(\frac{1}{3}<x<\frac{1}{2}\right)\end{array}$

$$
\begin{equation*}
=0 \text {, otherwise } \tag{3}
\end{equation*}
$$

iii. Find the sequence that minimizes the total elapsed time required to complete the following task. The table below gives the processing time in hours. Also, find the minimum elapsed time and idle times for both machines.

| Jobs | 1 | 2 | 3 | 4 | 5 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| $\mathrm{M}_{1}$ | 3 | 7 | 4 | 5 | 7 |
| $\mathrm{M}_{2}$ | 6 | 2 | 7 | 3 | 4 |

(B) Attempt any TWO of the following :
i. A bill of ₹ 7,500 was discounted for ₹ 7,290 at a bank on $28^{\text {th }}$ October 2006. If the rate of interest was $14 \%$ p.a., what is the legal due date?
ii. The following data gives the marks of 20 students in mathematics $(\mathrm{X})$ and statistics (Y) each out of 10 , expressed as $(x, y)$. Construct ungrouped frequency distribution considering single number as a class. Also prepare marginal distributions:
$(2,7)(3,8)(4,9)(2,8)(2,8)(5,6)(5,7)(4,9)$
$(3,8)(4,8)(2,9)(3,8)(4,8)(5,6)(4,7)(4,7)$
$(4,6)(5,6)(5,7)(4,6)$.
iii. Find the feasible solution for the following system of linear inequations :
$0 \leq x \leq 3,0 \leq y \leq 3, x+y \leq 5,2 x+y \geq 4$

