BOARD QUESTION PAPER : MARCH 2017

Notes:

i. All questions are compulsory.
ii. Figures to the right indicate full marks.
iii. Answer to every question must be written on a new page.
iv. L.P.P. problem should be solved on graph paper.
v. Log table will be provided on request.
vi. Write answers of Section – I and Section – II in one answer book.

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: **[12]**

i. The ratio of number of boys and girls in a school is 3 : 2. If 20% of the boys and 30% of the girls are scholarship holders, find the percentage of students who are not scholarship holders. (2)

ii. Calculate crude death rates (CDR) for district A:

District A

Age groups (in years)	Number of persons (in thousands)	Number of death
0 – 15	1	20
15 – 60	3	30
60 and above	2	40

(2)

iii. What is the sum due of ₹ 5,000, due 4 months, hence at 12.5% p.a. simple interest? (2)

iv. The following data gives the marks of 20 students in Mathematics (X) and Statistics (Y) each out of 10, expressed as (x, y). Construct ungrouped frequency distribution considering single number as a class:
(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) (2)

v. A wholesaler allows 25% trade discount and 5% cash discount, what will be the net price of an article marked at ₹ 1,600? (2)

vi. Verify the following function, which can be regarded as p.m.f. for the given values of X:

$X = x$	–1	0	1
$P(x)$	–0.2	1	0.2

(2)

vii. Solve the following minimal assignment problem:

Machines	Jobs		
	I	II	III
M_1	1	4	5
M_2	4	2	7
M_3	7	8	3

(2)

viii. If X has Poisson distribution with parameter m = 1, find P[X≤ 1] [USE $e^{-1} = 0.367879$]. (2)

Q.5. (A) Attempt any TWO of the following: (6)[14]

i. Find the present value of annuity immediate of ₹ 18,000 p.a. for 3 years at 9% p.a. compounded annually. [Given: $(1.09)^{-3} = 0.7722$] (3)

ii. Complete the following life table:

x	l_x	d_x	q_x	p_x	L_x
4	9100	60	?	?	?
5	?	45	?	?	

(3)

iii. Given that r = 0.4. $\Sigma(x - \bar{x})(y - \bar{y}) = 108$, $\sigma_y = 3$ and $\Sigma(x - \bar{x})^2 = 900$. Find the number of pairs of observations. (3)

(B) Attempt any TWO of the following: (8)

i. Find mean and standard deviation of the continuous random variable X whose p.d.f. is given by

$f(x) = 6x(1 - x) \quad 0 < x < 1$

$= 0 \quad$ otherwise (4)

ii. Solve the following L.P.P. graphically

Minimize $Z = 3x + 5y$

Subject to $2x + 3y \geq 12$

$-x + y \leq 3$

$x \leq 4$

$y \geq 3$ (4)

iii. We have seven jobs each of which has to go through two machines M_1 and M_2 in the order $M_1 - M_2$. Processing times (in hours) are given as:

Jobs	A	B	C	D	E	F	G
Machine M_1	3	12	15	6	10	11	9
Machine M_2	8	10	10	6	12	1	3

Determine a sequence of these jobs that will minimize the total elasped time 'T', and idle time for each machine. (4)

Q.6. (A) Attempt any TWO of the following: (6)[14]

i. Compute the age specific death rate for the following data:

Age groups (years)	Population (in thousands)	Number of deaths
Below 5	15	360
5 – 30	20	400
Above 30	10	280

(3)

ii. If the rank correlation coefficient is 0.6 and the sum of squares of differences of ranks is 66, then find the number of pairs of observations. (3)

iii. The equations of the two regression lines are $2x + 3y - 6 = 0$ and $5x + 7y - 12 = 0$.
Find: a. Correlation coefficient.

b. $\frac{\sigma_x}{\sigma_y}$ (3)

(B) Attempt any TWO of the following: (8)

i. John and Mathew started a business with their capitals in the ratio 8 : 5. After 8 months, John added 25% of his earlier capital as further investment. At the same time, Mathew withdrew 20% of his earlier capital. At the end of the year, they earned ₹ 52,000 as profit. How should they divide the profit between them? (4)

ii. A departmental store gives training to the salesmen in service followed by a test. It is experienced that the performance regarding sales of any salesman is linearly related to the scores secured by him. The following data gives the test scores and sales made by nine (9) salesmen during a fixed period.

Test scores (X)	16	22	28	24	29	25	16	23	24
Sales (Y) (₹ in hundreds)	35	42	57	40	54	51	34	47	45

a. Obtain the line of regression of Y on X.
b. Estimate Y when X = 17. (4)

iii. Three different aeroplanes are to be assigned to carry three cargo consignments with a view to maximize profit. The profit matrix (in lakhs of ₹) is as follows:

Aeroplanes	**Cargo consignments**		
	C_1	**C_2**	**C_3**
A_1	1	4	5
A_2	2	3	3
A_3	3	1	2

How should the cargo consignments be assigned to the aeroplanes to maximise the profit? (4)