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Total No. of Questions : 10]

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**P.H.M.-1.2.2**

**ADVANCED MATHEMATICS**

**(B.Pharmacy., 2nd Semester, 2124)**

Time : 3 Hours

Maximum Marks : 80

**Note** :- Section A is compulsory. Attempt any *Four* questions from Section B and any *Three* questions from Section C. Statistical tables are available on demand.

**Section-A** Marks : 2 Each

1. (a) A bookseller has 150 books of Statistics and Mathematics. The average price of these books is Rs. 40 per book. Average price of books on Statistics is Rs. 43 and that of Mathematics is Rs. 35. Find the number of books on Statistics with the seller.

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- (b) Coefficient of variation of two series are 58% and 69%. Their standard deviations are 21.2 and 15.6 respectively. What are their arithmetic means ?
- (c) What is the probability that a leap year selected at random will contain 53 Sundays ?
- (d) A and B are mutually exclusive events for which  $P(A) = .3$ ,  $P(B) = p$  and  $P(A + B) = .5$ . Find the value of  $p$ .
- (e) The mean of a Binomial distribution is 6 and variance 4. Calculate  $n$ ,  $p$  and  $q$ .
- (f) For two series X and Y,  $\text{cov}(X, Y) = 15$ ,  $\text{Var}(X) = 36$ ,  $\text{Var}(Y) = 25$ , calculate the coefficient of correlation.
- (g) If  $\bar{X} = 25$ ,  $\bar{Y} = 120$ ,  $b_{XY} = 2$ , estimate the value of X when  $Y = 130$ .

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(o) Solve :

$$\frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} + 10y = 0.$$

**Section-B**

Marks : 5 Each

2. Solve :

$$(xy - y^2) dx - x^2 dy = 0,$$

given that  $y = 1$  where  $x = 1$ .

3. Solve :

$$\frac{d^2 y}{dx^2} + \frac{2dy}{dx} + 3y = \sin x.$$

4. Find the inverse Laplace transforms of

$$\frac{2s + 5}{s^2 + s - 6}$$

5. Solve using Laplace transforms :

$$d^2 y/dt^2 + y = 0, y(0) = 1, y'(0) = 0.$$

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6. It is known that 1000 litres of water have been polluted with  $10^6$  bacteria. If 1 c.c. of water is drawn off, what is the probability that the sample is not polluted ?

**Section-C**      Marks : 10 Each

7. A pot of boiling water  $100^\circ\text{C}$  is removed from the fire and allowed to cool at  $30^\circ\text{C}$  room temperature. Two minutes later, the temperature of the water in the pot is  $90^\circ\text{C}$ . What will be the temperature of the water after 5 minutes ?      10
8. (a) For the data given below, find the equation to the best fitting exponential curve of the form  $y = ae^{bx}$ .

x	:	1	3	5	7	9
y	:	100	81	73	54	43

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- (b) A certain medicine given to each of the 9 patients resulted in the following increase in blood pressure :

7, 3, -1, 4, -3, 5, 6, -4, -1

Can it be concluded that the medicine will, in general, be accompanied by an increase in blood pressure ? Test at 5% level of significance. 6,4

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