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Total No. of Questions : 10]

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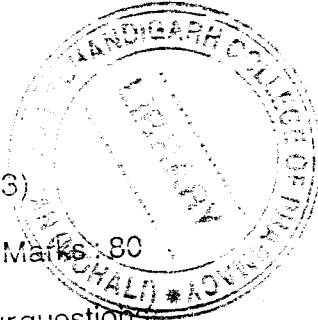
1.2.2

Advanced Mathematics

(B. Pharmacy, 2nd Semester, 2063)

Time : 3 Hours]

[Maximum Marks : 80



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

Section—A

Marks : 30

1. (a) Prove that

$$y = cx + \frac{a}{c}$$

is a solution of the differential equation,

$$y = x \frac{dy}{dx} + a \frac{dx}{dt}$$

Turn Over

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(b) Solve :

$$\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$$

(c) Solve :

$$\frac{d^3y}{dx^3} + \frac{4d^2y}{dx^2} + \frac{dy}{dx} = 0.$$

(d) Find the Laplace transform of $\sin 2t \sin 3t$.

(e) Find the inverse Laplace transforms of

$$\frac{3(s^2 - 2)^2}{2s^5}$$

(f) The following data gives the number of children in 20 families :

5, 2, 3, 3, 1, 2, 2, 4, 2, 5, 4, 1, 1, 2, 3, 4, 1, 1, 2, 3.

Make an array of the above data and construct a frequency table.

(g) The weight of 15 students are given below :

Weight (in kgs) : 50 52 54 55 57

No. of Students : 4 5 2 3 1

Find the mean weight.

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(h) Define measure of dispersion.

(i) The runs scored by 11 members of a cricket team are :

34, 27, 15, 29, 31, 50, 13, 43, 56, 0, 20.

Find the median score.

(j) Examine the validity of the following statement :

"The mean of binomial distribution is 10 and variance is 16."

(k) A random variate x follows a Poisson distribution with parameter 4. Find the probability that x assumes the values less than 2.

(l) Find the area under the normal curve when the standard normal variate lies between $z = -0.75$ and $z = 0$.

- (m) The coefficient of correlation between two variables X and Y is 0.64, their covariance is 6.72. If the standard deviation of Y is 3.5, find the variance of X.
- (n) Find the value of the correlation coefficient if $b_{yx} = -0.6$ and $b_{xy} = -1.35$.
- (o) In a frequency distribution, the median is 38, Bowley's coefficient is 0.6 and $Q_1 + Q_3 = 100$. Find Q_1 and Q_3 .

Section-B Marks 5 Each

2. Solve :

$$\frac{dy}{dx} = \frac{2y}{x+1} + (x+1)^3.$$

3. Find the inverse Laplace transforms of

$$\frac{s^2 - 10s + 13}{(s-7)(s^2 - 5s + 6)}$$

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(5)

(56)

(55)

(14)

4. Use Laplace transforms to solve :

$$\frac{d^2y}{dt^2} + \frac{dy}{dt} - 2y = t, \quad y(0) = 1,$$
$$y'(0) = 0.$$

5. Urn A contains 1 white, 2 black and 3 red balls, urn B contains 2 white, 1 black and 1 red balls and urn C contains 4 white, 5 black and 3 red balls. One urn is selected at random and two balls are drawn. These happen to be one white and one red. What is the probability that they come from urn A ?
6. Find the binomial distribution when the sum of its mean and variance for 5 trials is 4.8.

Section-C **Marks : 10 Each**

7. Solve :

$$\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 3y = x + e^{-x} \sin x.$$

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Turn Over

8. Use Laplace transforms method to solve :

$$\frac{dx}{dt} + 5x - 2y = t,$$

$$\frac{dy}{dt} + 2x + y = 0, x(0) = 0, y(0) = 0.$$

9. Given below marks obtained by ten students in two subjects :

Maths	Statistics
58	56
59	87
60	89
65	46
66	93
52	65
75	44
31	54
46	78
48	68

Calculate the correlation coefficient.

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10. The increase in weights due to two kinds of food are given below. Can it be said that food B is better than food A ?

Food A	Food B
49	52
53	55
51	52
52	53
47	50
50	54
52	54
53	53

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