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(2064)

14770

B. Pharmacy 2nd Semester Examination

Mathematics-II (O.S.)

HBP-104

Time : 3 Hours

Max. Marks : 80

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Candidates are required to attempt five questions in all selecting one question from each section A, B, C, D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

SECTION - A

1. (i) Evaluate $\int x \tan^{-1} x \, dx$
Solve the following differential equations:
(ii) $(x^3 + 3xy^2) \, dx + (y^3 + 3x^2y) \, dy = 0$.
(iii) $\frac{dy}{dx} = \frac{x + 2y + 1}{2x + 4y + 3}$.
(iv) $(1 + y^2) \, dx = (\tan^{-1} y - x) \, dy$ (4×4=16)
2. (i) Evaluate $\int e^x \left(\frac{1 - \sin x}{1 + \cos x} \right) dx$
Solve the following differential equations:
(ii) $3e^x \tan y \, dx + (1+e^x) \sec^2 y \, dy = 0$ given $y = \frac{\pi}{4}$ when $x = 0$
(iii) $\frac{dy}{dx} = \frac{2x + 3y + 1}{3x + 4y + 1}$.
(iv) $(1 + x) \frac{dy}{dx} = 2y + (1 + x)^4$ (4×4=16)

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[P.T.O.]

SECTION - B

3. Find the Laplace transform of

(i) $t^2 e^t \sin 4t$

(ii) $e^{-4t} \frac{\sin 3t}{t}$

Find the inverse Laplace transform of

(iii) $\frac{s^2 + 3s + 4}{(s - 2)^3}$

(iv) $\frac{2s + 1}{(s + 3)(s^2 + 4s + 13)}$ (4×4=16)

4. (i) State and prove the second shifting theorem of Laplace transform and hence or otherwise find $L[f(t)]$, where

$$f(t) = \begin{cases} 3t, & 0 < t < 2 \\ 6, & 2 < t < 4 \end{cases}$$

(ii) Use Laplace transformation to solve the following differential equation

$$\frac{d^2 y}{dx^2} + 2 \frac{dy}{dx} + 5y = 3e^{-t} \cos 2t; y(0) = 0 \text{ and } y'(0) = 3.$$

(8×2=16)

SECTION - C

5. (i) The following table gives the number of students appeared at the various Examination:

	No. of students		
	B.Pharmacy	200	250
B. Tech.	250	250	300
Biotechnology	150	200	300

Represent the above data by a sub-divided bar diagram.

(ii) Find the mean, median and mode for the following distribution:

Weekly Wages	20-40	40-60	60-80	80-100	100-120	120-140	140-160	160-180	180-200
No. of employees	8	12	20	30	40	35	18	7	5

(8×2=16)

6. (i) Draw a multiple bar diagram from the following data:

Year	Profit in thousands	
	Company-A	Company-B
2008-09	120	90
2009-10	135	95
2010-11	140	108
2011-12	160	120
2012-13	175	130

- (ii) For a group of 200 candidates, the mean and standard deviation of scores were found to be 40 and 15 respectively. Later on it was discovered that the score 43 and 35 were misread as 34 and 53 respectively. Find the corrected mean and standard deviation corresponding to the corrected figures. (8×2=16)

SECTION - D

7. (i) Three urns are given each containing red and white chips as indicated:

Urn I: 6 red and 4 white

Urn II: 2 red and 6 white

Urn III: 1 red and 8 white

One urn is chosen at random and two balls are drawn without replacement from this urn. If both balls are white, find the probability that the balls come from Urns I, II & III.

- (ii) If the probability of defective bolt is 0.1, find (i) the mean (ii) standard deviation for the distribution of defective bolts in a total of 500. Also find the coefficient of skewness and kurtosis. (8×2=16)
8. (i) Suppose the probability that an item produced by a particular machine is defective is 0.2. If 10 items produced by this machine are selected at random, what is the probability that not more than one defective item is found? Use the Binomial and Poisson distributions and compare the answer. (Use $e^{-2} = 0.1353$)

[P.T.O.]

- (ii) Set up the analysis of variance table for the following two-way classified data:

Variety of fertilizer	Variety of seeds		
	A	B	C
W	6	5	5
X	7	5	4
Y	3	3	3
Z	8	7	4

State whether variety difference are significant at 5% level.

(8×2=16)

SECTION - E

9. (i) Write the order and degree of the differential equation

$$\frac{d^3y}{dx^3} = \left\{ y + \left(\frac{dy}{dx} \right)^2 \right\}^{4/3}$$

- (ii) Solution of the linear differential equation $\frac{dy}{dx} + Px = Q$, where P and Q are functions of y.
 (iii) Find the Laplace transformation of $f(t) = t \sin(at)$
 (iv) Find the inverse Laplace transformation of

$$f(t) = \frac{2}{s-3} + \frac{5s}{s^2+25} + \frac{4}{s^3}$$

- (v) The mean salary paid to 1000 employees was found to be Rs.108.40. Later it was found that the salary of two employees was wrongly-entered as Rs. 297 and Rs. 165. Their correct salaries were Rs. 197 and Rs. 185. Find the correct arithmetic mean.
 (vi) Find out the missing figure: Mode= Mean - ? (Mean- Median)
 (vii) What is the probability that a leap year selected at random will contain 53 Sundays?
 (viii) What is the difference between Normal, Binomial and Poisson distributions?
 (2×8=16)