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B.Pharmacy (Sem. - 2nd)
ADVANCED MATHEMATICS
SUBJECT CODE : PHM - 1.2.2
Paper ID : [D0108]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours   Maximum Marks : 80

Instruction to Candidates:

   1)   Section - A is **Compulsory**.

   2)   Attempt any **Four** questions from Section - B.

   3)   Attempt any **Three** questions from Section - C.

Section - A

Q1)   *(15 x 2 = 30)*

   a)   Form a differential equation whose solution is

   $$y = c_1 e^x + c_2 e^{-x} + x^2$$

   b)   Solve the following differential equations:

   $$\sec^2 x \tan y\, dx + \sec^2 y \tan x\, dy = 0$$

   c)   Solve the following differential equations:

   $$xy' = x + y$$

   d)   Solve the following equations:

   $$\left(x^2 - 1\right)y' + 2xy = 1$$

   e)   Define homogeneous differential equation.

   f)   Prove that $L(\cos at) = \dfrac{s}{s^2 - a^2}$.

   g)   If $L\{f(t)\} = \bar{f}(s)$, then.

   $$L\{e^{at} f(t)\} = \bar{f}(s - a)$$

   h)   If $f'(t)$ be continuous and $L\{f(t)\} = f(s)$, then $L\{f'(t)\} = s\bar{f}(s) - f(0)$.

R-278   *P.T.O.*

i) Prove that $L^{-1}\left[\dfrac{1}{(s-a)^n}\right] = \dfrac{e^{at}t^{n-1}}{(n-1)!}$.

j) Find the Laplace transform of $\sin 2t$, $\cos 3t$.

k) What is statistical inference?

l) Write the definition of Binomial distribution.

m) Define the Angle between two lines of regression.

n) Write the definition student t-test and F-test

o) Find the mean and the variance of the first n natural numbers.

Section - B

(4 x 5 = 20)

Q2) Solve the following differential equations:

(a) $\left(e^x + e^{-x}\right)\dfrac{dy}{dx} = e^x + e^{-x}$.

(b) $dy + \sqrt{\dfrac{1-y^2}{1-x^2}}\, dx = 0$.

Q3) Find the Laplace transform of $\left(\sqrt{t} - \dfrac{1}{\sqrt{t}}\right)^3$.

Q4) Find the inverse Laplace transform of $\dfrac{s+2}{\left(s^2 + 4s + 5\right)^2}$.

Q5) Three machines A, B and C produces identical items. Of their respective output 5%, 4% and 3% of items are faulty. On a certain day, A has produced 25% of the total output; B has produced 30% and C the remainder. An item selected at random is found to be faulty. What are the chances that it was produced by the machine with the highest output?

Q6) Calculate the coefficient of correlation between the age of husband (X) and of wife (Y) for the data given below:

X	23	27	28	28	29	30	31	33	35	36
Y	18	20	22	27	21	29	27	29	28	29

Section - C

(3 x 10 = 30)

Q7) Solve the following different equations:

(a) $x^2 + 2xy\dfrac{dy}{dx} - y^2 = 0.$

(b) $(3x - 7y - 3)\dfrac{dy}{dx} = 3y - 7x + 7.$

Q8) Solve $\dfrac{d^2x}{dt^2} + 9x = \cos 2t$, if $x(0) = 1$, $x\left(\frac{\pi}{2}\right) = -1.$

Q9) The following data are the number of seeds germinating out of 10 on damp filter paper for 80 sets of seeds. Fit a binomial distribution to these data:

X	0	1	2	3	4	5	6	7	8	9	10
Y	6	20	28	12	8	6	0	0	0	0	0

Q10) Fit a Poisson distribution to the following data and test for its goodness of fit at level of significance 0.05.

X	0	1	2	3	4
Y	419	352	154	56	19