(10)

Roll No. ....

Total No. of Questions : 10] [Total No. of Pages : 03

J-729[5374] **[2126]**

B.Pharmacy (Semester - 2nd)

ADVANCED MATHEMATICS (PHM - 1.2.2)

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 the differential equation of simple harmonic motion given by $x = A\cos(nt+\alpha)$.

b) Solve $\frac{dy}{dx} = e^{3x-2y} + x^2 e^{-2y}$.

c) Find the degree and order of the D.E. $\left(\frac{d^2y}{dx^2}\right)^4 + \left(\frac{d^3y}{dx^2}\right)^{7/2} x - 7y = \cos x$.

d) What are the applications of D.E.?

e) Find C.F of the D.E. $(D^2 - 1)y = x\sin 3x + \cos x$.

f) Find the orthogonal trajectories of parabola $y = ax^2$.

g) State and prove change of scale property.

h) Define the Laplace transform.

i) Find the Laplace transform of the function $F(t) = 1$.

j) Find the Laplace transform of the function $F(t)$. Where

$$F(t) = \begin{cases} \sin t & 0 < t < \pi \\ 0 & t > \pi \end{cases}$$

P.T.O.

k) Find the probability of getting a 9 exactly, once in 3 throws with a pair of dice.

l) Find the probability of guessing correctly at least 6 of the 10 answers on a true or false examination.

m) Find the movement of generating function of a Random variable X which is binomially distributed.

n) How that if a binomial distribution with n=100, is symmetric, it's coefficient of Kurtosis is 2.9?

o) Find the probability of getting more than 25 "sevens" in 100 tosses of a pair dice.

Section - B

(4 x 5 = 20)

Q2) Solve $\frac{dx}{dt}+2x-3y=5t$.

$$\frac{dy}{dt}-3x+2y=2e^{2t}.$$

Q3) Solve $x^2\frac{d^2y}{dx^2}-x\frac{dy}{dx}+y=\log x$.

Q4) State and prove convolution theorem.

Q5) Prove that $L\left\{\frac{\sin t}{t}\right\}=\tan^{-1}\frac{1}{p}$ and hence Find $L\left\{\frac{\sin at}{t}\right\}$. Does the Laplace transform of $\frac{\cos at}{t}$ exist?

Q6) Find the movement generating function for the general normal distribution.

Section - C

(3 x 10 = 30)

Q7) Solve $(1+x)^2 \dfrac{d^2y}{dx^2}+(1+x)\dfrac{dy}{dx}+y=4\cos\log(1+x)$.

Q8) Use the convolution theorem to find $L^{-1}\left\{\dfrac{1}{(p-2)(p^2+1)}\right\}$.

Q9) Prove that if X_1 and X_2 are independent poisson variables with respective parameters λ_1 and λ_2 then X_1+X_2 has a poisson distribution with parameter $\lambda_1+\lambda_2$. (Hint : Use the movement generating function).
Generalize the result to n variables.

Q10) Solve $(D^2-1)y = x\sin x + (1+x^2)e^x$.

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