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AC-3102

Second Year B. Sc. (Comp. Sci.) (Sem. IV) Examination

April / May – 2015

CCM-401 CS : Differential Equations

Time : **3** Hours] [Total Marks : **70**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ SECOND YEAR B. SC. (COMP. SCI.) (SEM. 4)

Name of the Subject :

☛ CCM-401 CS : DIFFERENTIAL EQUATIONS

☛ Subject Code No. : 3 1 0 2 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) All questions are compulsory.

(3) Figures to the right indicate full marks.

(4) Symbols have their usual meaning.

1 Attempt the following questions as directed : **10**

(1) Find CF of $\left(D^2 - D - 1\right)y = \cos 2x$.

(2) Evaluate $L\left\{e^{-3t} \cdot \sin t\right\}$

(3) Eliminate a and b from $Z = ax + by + ab$ to get partial differential equation.

(4) Find PI of $\left(D^3 - 1\right)y = e^x$

(5) Solve $\frac{\partial^2 z}{\partial x \partial y} = xy + \sin y$.

2 (a) Discuss the method of finding PI of $f(D)y = xV$, where V is a function of x. **5**

OR

(a) Solve : $\left(D^2 - 1\right)y = \left(1 + x^2\right)e^x$.

(b) Solve any **two** : **10**

(1) $\left(D^2 - 1\right)y = x^2 \cos x$

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

(3) $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = 2\log x$

(4) $x^2\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} - 12y = (x+1)^2$

3 (a) Discuss Lagrange Method of solving partial differential equation of first order. **5**

OR

(a) Solve : $x\left(y^n - z^n\right)p + y\left(z^n - x^n\right)q = z\left(x^n - y^n\right)$

(b) Solve any two : **10**

(1) From the partial differential equation from $(x-h)^2 + (y-k)^2 + z^2 = C^2$ by eliminating h and k.

(2) $x^2(y-z) + y^2(z-x)q = z^2(x-y)$

(3) $(D+1)(D+D'-1)z = \sin(x+2y)$

(4) $p + q = \frac{z}{a}$

4 (a) State and prove linearity property of Laplace Transform. **5**

OR

(a) Derive Laplace Transform of t^n.

(b) Solve any two : **10**

(1) Find the Laplace transform of the function $F(t)$, where

$$F(t)=\begin{cases}2t & , \ 0 \le t \le 5 \\ 1 & , \ t > 5\end{cases}$$

(2) Evaluate $L\left\{e^{4t}\sin^4 t\right\}$

(3) Find $L\{F(t)\}$, where $F(t)=\begin{cases}\sin\left(t-\pi/3\right) & , \ t > \pi/3 \\ 0 & , \ t < \pi/3\end{cases}$

(4) Derive Laplace transform of e^{at}.

5 (a) State one dimensional heat equation and solve by the method of separation of variable. **5**

OR

(a) Use method of separation of variable to solve

$$\frac{\partial u}{\partial x}=2\frac{\partial u}{\partial t}+u, \quad u(x,0)=6e^{-3x}.$$

(b) Solve any **two** : **10**

(1) Solve $\frac{\partial^2 z}{\partial x \partial y} = \frac{x}{y} - e^{x+y}$

(2) Solve $\frac{y-z}{yz}p + \frac{z-x}{zx}q = \frac{x-y}{xy}$, where symbols have their usual meaning.

(3) Solve $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6\frac{\partial^2 z}{\partial y^2} = x + y$.

(4) Find $L\{\cos(at)\}$ using definition.