



DMM-3333

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

March / April - 2016

Mathematics for Computer Science : CCM-401CS
(Differential Equations) (Old Course)

Time : 3 Hours]

[Total Marks : 70

Instructions :

(1)

नीचे दृशायेक निशानीवाणी विगतो उत्तरवही पर अवश्य कपवी.
Fillup strictly the details of signs on your answer book.

Name of the Examination :
SECOND YEAR B. SC. (SEM. IV)

Name of the Subject :
Mathematics for Computer Science : CCM - 401CS (Old)

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

Seat No. :

Student's Signature

(2) All the question are compulsory.

(3) Digits shown in the right hand side indicate full marks of the question.

(4) Symbols have their usual meaning.

1 Attempt the following questions as directed :

10

(i) Find PI of differential equation $(D^3 - 1)y = e^x$

(ii) Evaluate $\mathcal{L} \{e^{-t} \cos t\}$

(iii) Solve $\frac{\partial^2 z}{\partial x^2} = \sin(2x - y)$

(iv) Form a partial differential equation by eliminating a and b from $z = (x + a)(y + b)$

(v) Explain wave equation.

- 2 (a) Discuss the method of solving $F(D)y = e^{ax}V$, where V is a function of x . 5

OR

- (a) Discuss the method of finding PI of $F(D)y = \cos(ax)$.

- 2 (b) Solve any two : 10

(i) $(D^2 - 4D + 3)y = e^{-x} \cos x$

(ii) $(D^3 + 2D^2 + D)y = e^{-2x} + x^2$

(iii) $(x^2D^2 - 3xD + 4)y = x^2 \log x$

(iv) $(x^2D^2 - 2xD - 20)y = x^2$

- 3 (a) Discuss the method of solving $Pp + Qq = R$ 5

OR

- (a) Form a partial differential equation by eliminating f and ϕ from $z = f(x + ay) + \phi(x - ay)$.

- 3 (b) Solve any two : 10

(i) $x(y - z)p + y(z - x)q = z(x - y)$

(ii) $(x + 2z)p + (4zx - y)q = 2x^2 + y$

(iii) $(D + D')z = \sin x$

(iv) $\frac{\partial^3 z}{\partial x^2 \partial y} = \sin(x - 2y) + x^2 y$, by direct integration method.

- 4 (a) State and prove first shifting theorem for Laplace Transform. 5

OR

- (a) Find $\mathcal{L}(\cos at)$ using definition.
- 4 (b) Attempt any two : 10
- (i) Evaluate $\mathcal{L}(\cos \sqrt{t})$
- (ii) Evaluate $\mathcal{L}\{f(t)\}$, where $f(t) = \begin{cases} e^t, & 0 < t \leq 5 \\ 5, & t > 5 \end{cases}$
- (iii) Evaluate $\mathcal{L}\{e^{-4t} \cos h2t\}$
- (iv) Evaluate $\mathcal{L}\{e^{-3t} \cos^3 t\}$.

- 5 (a) State two dimensional heat equation and solve it. 5

OR

- (a) Solve $2x \frac{\partial u}{\partial x} - 3y \frac{\partial u}{\partial y} = 0$, by variation of parameter.
- 5 (b) Attempt any two : 10
- (i) Solve $\frac{\partial^3 z}{\partial x^3} - \frac{\partial^3 z}{\partial y^3} = x^3 y^3$
- (ii) Solve $(y^2 - x^2 + z^2)p - 2xyq + 2xz = 0$
- (iii) State and prove linearity property for Laplace Transform.
- (iv) Solve $\frac{\partial^2 z}{\partial x^2} = a^2 z$ given that when $x = 0, \frac{\partial z}{\partial x} = a \sin y$
and $\frac{\partial z}{\partial y} = 0$