DMM-3101
Second Year B. Sc. (Sem. - IV) Examination
March/April – 2016
MCS-403 : Differential Equations-II
(Mathematics for Comp. Sc.)
(New Course)

Time : Hours\ [Total Marks :

Instructions :

(1) Fill up strictly the details of signs on your answer book.

Seat No. :

Second Year B. Sc. (Sem. - IV)
Name of the Subject :
MCS-403 : Differential Equations-II (New)
Subject Code No. : 3101 Section No. (1, 2,...,): Nil

Student's Signature

(2) All questions are compulsory.

(3) Figures to the right indicate full marks.

1 Attempt any five :

(1) Find the general solution of \( \frac{d^2 y}{dx^2} + 4y = e^x \).

(2) Obtain C.F. of \( \frac{d^2 y}{dx^2} + 2 \frac{dy}{dx} + 3y = 0 \).

(3) Convert \( x^2 \frac{d^2 y}{dx^2} - 5x \frac{dy}{dx} + 9y = x^5 \) into linear different equation with constant coefficient.

(4) Eliminate the arbitrary function from \( z = e^{xy} \phi(x-y) \).

(5) Solve \( 25r - 40s + 16t = 0 \).

(6) Solve \( \frac{\partial^4 z}{\partial x^4} - \frac{\partial^4 z}{\partial y^4} = 0 \).

(7) Find C.F. of \( (D^3 - 2D^2 D' + DD'^2) z = 0 \).

(8) Solve \( z = px + qy + pq \).
2 (a) Describe the method of finding the P.I. of
\[ f(D)y = \sin ax, \quad \text{where} \quad D = \frac{d}{dx} \text{ and} \]
\[ f(D) = D^n + P_1 D^{n-1} + \ldots + P_n(P_1, P_2, \ldots, P_n \in R)\phi(-a^2) \neq 0. \]

OR

(a) Describe the method of finding general solution of
\[ n! m^n y = \frac{d^n y}{dx^n} + P_1 x \frac{d^{n-1} y}{dx^{n-1}} + \ldots + P_n x^n y = X(x). \]

(b) Solve any two:

1. \[ \frac{d^2 y}{dx^2} + 2 \frac{dy}{dx} + 3y = x^2 + 4x \]
2. \[ \frac{d^4 x}{dx^4} + 2 \frac{d^2 y}{dx^2} + y = x^2 \cos x \]
3. \[ x^2 \frac{d^2 y}{dx^2} + 5x \frac{dy}{dx} + 4y = x^4 \]
4. \[ (x + a)^2 \frac{d^2 y}{dx^2} - 4 (x + a) \frac{dy}{dx} + 6y = x. \]

3 (a) Describe Lagrange’s method to solve liner partial
Different equation of the first order.

OR

(a) Form the P.D.E. by eliminating an arbitrary function \( \phi \)
from the relation \( \phi(u, v) - 0 \); where \( u \) and \( v \) are functions
of \( x, y \) and \( z \).

(b) Attempt any two:

1. Solve \( (x + 2z)p + (4zx - y)q = 2x^2 + y \)
2. Solve : \( xzp + yzq = xy \)
3. From the partial Different using the relation
\[ z = (x + a)(y + b). \]
4. Eliminate the arbitrary function \( f \) and \( \phi \) from
\[ z = f(ax + by) + \phi(ax - by). \]
4 (a) Discuss the method of solving partial Different from the following: (any one)

(1) \( f(z, p, q) = 0 \),
(2) \( f_1(x, p) = f_2(y, a) \).

(b) Solve any two:

(1) \( p^2 + q^2 = n^2 \)
(2) \( z = px + qy + \log pq \)
(3) \( z = pq \)
(4) \( q = p + x - y = 0 \)

5 (a) Discuss the rules for evaluating \( \frac{1}{F(D, D')} \phi(ax + by) \)

where \( F(a, b) = 0 \).

OR

(a) Discuss the general method of finding the particular integral of the equation \( (D - mD')z = f(x, y) \).

(b) Solve any two:

(1) \( \frac{\partial^2 z}{\partial x^2} + 3 \frac{\partial^2 z}{\partial x \partial y} + 2 \frac{\partial^2 z}{\partial y^2} = x + y \)
(2) \( (D^2 - 2DD' + D'^2)z = e^{x+2y} \)
(3) \( r - 2s + l = \sin(2x + 3y) \)
(4) \( (D^2 - 6DD' + 9D'^2)z = 12x^2 36xy \).