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DMM-3342

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

March/April – 2016

Mathematics : MTH-402

(Partial Differential Equations)

(Old Course)

Time : **2** Hours] [Total Marks : **50**

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. (SEM. - IV)**

Name of the Subject :
☛ **MATHEMATICS : MTH-402 (OLD COURSE)**

☛ Subject Code No. : **3 3 4 2** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) All questions are compulsory.

(3) Digits to the right indicate full marks of the questions.

(4) Follow usual notations.

1 Answer the following : (any **five**) **10**

(1) Write Auxiliary equation of $p+q=\frac{z}{a}$.

(2) Find the complete solution of $z=px+qy+f(p,q)$.

(3) Show that the solution of $p.q=z$ is $z=(x+a)(y-b)$.

(4) Obtain Charpit's Auxiliary equation for $F(z,p,q)=0$.

(5) Find complementary function of $\frac{\partial^2 z}{\partial x^2}-9\frac{\partial^2 z}{\partial y^2}=\cos(2x-3y)$.

(6) Find particular integral of $\frac{\partial^2 z}{\partial x^2}-16\frac{\partial^2 z}{\partial y^2}=\sin(2x+3y)$.

(7) Write Charpit's Auxiliary equation for $F(x, y, z, p, q) = 0$.

(8) Eliminate arbitrary constants a and b from $z = ax + by + a \cdot b$.

2 Answer the following : (any **two**) **10**

(1) Obtain the partial differential equation by eliminating arbitrary constants a, b and c from $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$.

(2) Solve : $x(y - z)p + y(z - x)q = z(x - y)$.

(3) Solve : $xzp + yzq = x \cdot y$.

(4) Obtain the partial differential equation by eliminating an arbitrary function $\phi(x + y + z,\ x^2 + y^2 + z^2) = 0$.

3 Answer the following : (any **two**) **10**

(1) Describe the method to solve $f_1(x, p) = f_2(y, q)$

(2) Solve : $z = p \cdot q$

(3) Solve : $z - px - qy = p \cdot q$

(4) Describe the method to solve $F(p, q,) = 0$.

4 Answer the following : (any **two**) **10**

(1) Show that the particular integral of

$(D^2 + k_1 DD' + k_2 D'^2)\ z = \sin(mx + ny)$ is given by

$$PI = \frac{1}{f(-m^2, -mn, -n^2)} \sin(mx + ny)$$

where $f(D, D') = D^2 + k_1 DD' + k_2 D'^2$.

(2) Find the complete solution of $(D^2 + k_1 DD' + k_2 D'^2) Z = 0$, where $D \equiv \frac{\partial}{\partial x}, D' \equiv \frac{\partial}{\partial y}$ where k_1, k_2 are constants and the roots of auxiliary equation of it are real and equal.

(3) Solve : $(2D^2 + 5DD' + D'^2) z = 0.$

(4) Solve : $\frac{\partial^2 z}{\partial x^2} - 2\frac{\partial^2 z}{\partial y^2} = 2e^{2x}.$

5 Solve the following : (any **two**) **10**

(1) $(D^2 + DD' + D' - 1) z = e^x.$

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

(3) $(D + D' - 1)(D + 2D^2 - 3) z = 4 + 3x + 6y.$

(4) $(D^2 + 2DD' + D'^2 - 2D - 2D')\ Z = \sin(x + 2y).$