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DMM-3097

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

March/April – 2016

MTH-402 : Mathematics

(Partial Differential Equations)

(New Course)

Time : 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 :
☛ **MTH-402 : MATHEMATICS (NEW COURSE)**

☛ Subject Code No. : **3 0 9 7** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) All questions are compulsory.
(3) Figures to the right indicate marks of the question.
(4) Follow the usual notations.

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

(1) Write Lagrange's auxiliary equation of
$$z(2^2 - xy)(px - qy) = x^4.$$

(2) Eliminate the arbitrary constants a and b from
$z = (x^2 + a)(y^2 + b)$.

(3) Obtain complete integral of $p + q = p.q$.

(4) Eliminate the arbitrary function F from $z = F(x^2 + y^2)$.

(5) Find complementary function of $(D^2 - 7DD' + 6D'^2)z = 0$.

(6) Find $\dfrac{1}{(D - D')} e^{x+y}$.

(7) Solve : $(D + 3D' - 2)z = 0$.

(8) Find particular integral of $\dfrac{\partial^2 z}{\partial x^2} - \dfrac{\partial^2 z}{\partial y^2} = \cos x \cdot \cos xy$.

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

(1) Obtain the partial differential equation by eliminating arbitary constants a, b and c from

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=10$$

(2) Solve :

$$\frac{dx}{x(y^2+z)}=\frac{dy}{y(x^2+z)}=\frac{dz}{z(x^2-yz)}$$

(3) Solve :

$$x(y^n-z^n)\,p+y\,(z^n-x^n)\,q=z\,(x^n-y^n).$$

(4) Obtain the partial differential equation by eliminating arbitrary function ϕ from :

$$lx+my+nz=\phi\,(x^2+y^2+z^2).$$

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

(1) Explain the method to solve $F(p,q)=0.$

(2) Solve :

$$z^2(p^2+q^2+1)=c^2$$

(3) Solve :

$$p^2+q^2=x+y$$

(4) Solve :

$$9(p^2z+q^2)=4$$

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

(1) In usual notations, prove that :

$$\frac{1}{f(D,D')}e^{ax+by}=\frac{1}{f(a,b)}e^{ax+by};\,f(a,b)\neq 0$$

where $f(D,D')=D^2+K_1DD'+K_2D'^2$

If $f(a,b)=0$ then what can you say about particular integral ?

(2) Solve :

$$r - 45 + 4t = e^{2x+y}$$

(3) Solve :

$$\frac{\partial^2 z}{\partial x^2} + 2\frac{\partial^2 z}{\partial x \partial y} + \frac{\partial^2 z}{\partial y^2} = x^2 y$$

(4) Solve :

$$\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6\frac{\partial^2 z}{\partial y^2} = y \cdot \cos x$$

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

(1) Obtain Monge's equations for

$$y^2 r - 2ys + t = p + 6y$$

(2) Solve :

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

(3) Solve :

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

(4) Solve :

$$(D^2 - DD' + D' - 1)z = \cos(x + 2y)$$
