8. (a) Solve :

$$2yzdx + zxdy - xy(1+z)\,dz = 0$$

(b) Solve :

$$z(z-y)\,dx + (z+x)\,z\,dy + x(x+y)dz = 0\,.$$

UNIT – V

9. (a) Solve :

$$\frac{2x}{y^3}dx + \left(\frac{y^2 - 3x^2}{y^4}\right)dy = 0$$

(b) Solve :

$$p^2 - 7p + 12 = 0$$

(c) Solve :

$$\frac{d^4y}{dx^4} + 4y = 0$$

(d) In what condition $y = e^{mx}$ is a solution of

$$\frac{d^2y}{dx^2} + p\frac{dy}{dx} + Qy = 0\,?$$

(e) Solve :

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

(f) Under what condition the differential equation $Pdx + Qdy + Rdz = 0$ is said to be exact.

Roll No. .....

21252

B. Sc. (Hons.) Maths. 2nd Semester Examination – May, 2019

ORDINARY DIFFERENTIAL EQUATIONS

Paper : BHM-122

Time : Three hours] ***[Maximum Marks : 60***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting ***one*** question from each Unit. Question No. **9** (Unit – **V**) is ***compulsory***. All questions carry equal marks.

UNIT – I

1. (a) Solve :

$$(2y\sin x + 3y^4 \sin x \cos x)\,dx - (4y^3\cos^2 x + \cos x)\,dy = 0$$

(b) Solve :

$$p^2 + 2py\cot x = y^2$$

2. (a) Reduce the equation $xp^2 - 2py + x + 2y = 0$ to the Clairaut's form by putting $y - x = v$ and $x^2 = u$. Hence obtain and interpret the primitive and singular solution of the equation.

(b) Find the orthogonal trajectories of the curves :

$$r^n \sin n\theta = a^n$$

UNIT – II

3. (a) Solve :

$$\frac{d^2y}{dx^2} + \frac{dy}{dx} - 2y = x + \sin x$$

(b) Solve :

$$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 3x^2\, e^{2x} \sin 2x$$

4. (a) Solve :

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

(b) Solve :

$$(3x+2)^2\frac{d^2y}{dx^2} + 5\,(3x+2)\frac{dy}{dx} - 3y = x^2 + x + 1$$

UNIT – III

5. (a) Solve :

$$(1-x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = x(1-x^2)^{3/2}$$

(b) Solve :

$$\frac{d^2y}{dx^2} - 4x\frac{dy}{dx} + (4x^2 - 3)\,y = e^{x^2}$$

6. (a) Solve :

$$\frac{d^2y}{dx^2} - (1+4e^x)\frac{dy}{dx} + 3e^{2x}y = e^2(x+e^x)$$

(b) Solve :

$$(1-x)\,y'' + xy' - y = 2(x-1)^2 e^{-x}$$

with given that x and e^x are solutions of homogeneous equation.

UNIT – IV

7. (a) Solve :

$$2\frac{d^2y}{dx^2} - \frac{dz}{dx} - 4y = 2x$$

$$2\frac{dy}{dx} + 4\frac{dz}{dx} - 3z = 0$$

(b) Solve the simultaneous equations :

(i) $$\frac{dx}{\cos(x+y)} = \frac{dy}{\sin(x+y)} = \frac{dz}{z + \frac{1}{z}}$$

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