Mid-West University

Examinations Management Office

Surkhet, Nepal

End Semester Examination-2082

Level: B.Ed. / VI Semester | FM: 60

Time: 3.00 hrs. | PM: 30

Sub: Differential Equations (MATH 464)

Candidates are required to give their answers in their own words as far as practicable.

Attempt All the Questions.

Group 'B' **6×5 = 30**

1. Define exact differential equation and solve:
$(x^2 - 2xy - y^2)dx - (x + y)^2 dy = 0$

2. Find the complementary function and particular integral of
$\frac{3d^2y}{dx^2} + \frac{2dy}{dx} - y = e^{\frac{x}{2}} + 2e^{3x}$

3. Solve the following equation by homogeneous method:
$(x^2y - y^3 - y^2z)dx + (xy^2 - x^2z - x^3)dy + (xy^2 + x^2y)dz = 0$

Or

Find the laplace transforms: $L(sin^3 2t)$

4. Define partial differential equation with an example and solve:
$(x-a)^2+(y-b)^2+(z-c)^2=R^2$

5. State the linear differential equation and solve:
$(1+x^2)\frac{dy}{dx} + 2xy = 4x^2$

6. Define Bessel's equation and solve:
$$\frac{x^2d^2y}{dx^2} + \frac{xdy}{dx} + \left(x^2 - \frac{1}{9}\right)y = 0$$

Or

Find the singular and ordinary points of the following equation:
$(1 - x^2)y'' - 6xy' - 4y = 0$

Group 'C' **2×10=20**

7. Define non-homogeneous linear differential equation and solve:
$(3x+2)^2\frac{d^2y}{dx^2} + 3(3x + 2)\frac{dy}{dx} - 36y - 3x^2 + 4x + 1$

8. Solve by regarding one variable as constant method:
$xz^3dx - zdy + 2ydz = 0$

Or

Solve the following partial fractions differential equation:
$\frac{s}{(s^2+1)(s^2+4)}$

THE END

Mid-West University

Examinations Management Office

Surkhet, Nepal

End Semester Examination-2082

Level: B.Ed. /VI Semester

Sub: Differential Equations (MATH 464)

Roll No: .....

Group 'A' **10 × 1 =10**

Tick (✓) the best answers:

1. What is the degree of the differential equation

   $\left(\frac{1+d^3y}{dx^3}\right)^2 = \left(\frac{d^2y}{dx^2}\right)^3$?

   a. 1 b. 2 c. 3 d. 4

2. An equation of the form $\frac{dy}{dx} + Py = Q$, where P and Q are function of x alone or constant is.....

   a. Linear equation b. Bernoulis equation

   c. Exact equation d. Separable equation

3. The particular integral of $(D^2 - 3D + 2)y = e^{5x}$ is.....

   a. $2y^x$ b. $3e^{-x}$ c. $\frac{1}{2}e^{-x}$ d. $\frac{1}{4}e^{-x}$

4. Which of the following auxiliary equations is not true?

   a. $(c_1 + c_2 x)e^{mx}$ b. $(c_1 e^{m1x} + c_2 e^{m2x})$

   c. $e^{\alpha x}(c_1 sin\beta x + c_2 cos\beta x)$ d. $e^{ax}(c_1 cos\beta x + c_2 sin\beta x)$

5. Which of the followings is true?

   a. $P\left(\frac{\partial P}{\partial X} - \frac{\partial Q}{\partial Y}\right) + Q\left(\frac{\partial Q}{\partial Z} - \frac{\partial R}{\partial X}\right) + R\left(\frac{\partial R}{\partial Y} - \frac{\partial P}{\partial Z}\right) = 0$

   b. $P\left(\frac{\partial P}{\partial X} + \frac{\partial Q}{\partial Y}\right) + Q\left(\frac{\partial Q}{\partial Z} + \frac{\partial R}{\partial X}\right) + R\left(\frac{\partial R}{\partial Y} + \frac{\partial P}{\partial Z}\right) = 0$

   c. $P\left(\frac{\partial Q}{\partial Z} - \frac{\partial R}{\partial Y}\right) + Q\left(\frac{\partial R}{\partial X} - \frac{\partial P}{\partial Z}\right) + R\left(\frac{\partial P}{\partial Y} - \frac{\partial Q}{\partial X}\right) = 0$

   d. $P\left(\frac{\partial Q}{\partial Z} + \frac{\partial R}{\partial Y}\right) + Q\left(\frac{\partial R}{\partial X} + \frac{\partial P}{\partial Z}\right) + R\left(\frac{\partial P}{\partial Y} + \frac{\partial Q}{\partial X}\right) = 0$

6. Legendre's equation is.....

   a. $\frac{dy}{dx} + py = q$

   b. $(1 - x^2)\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + n(n-1)y = 0$

   c. $(x^2 - 1)\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + n(n+1)y = 0$

   d. $(1 - x^2)\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} + n(n-1)y = 0$

7. L$(coshat)$ equal to:

   a. $\frac{s}{s^2+a^2}$ b. $\frac{a}{s^2-a^2}$ c. $\frac{a}{s^2+a^2}$ d. $\frac{s}{s^2-a^2}$

8. Which of the followings is the shifting property?

   a. $L^{-1}\{\overline{f}(s-a)\} = e^{at}f(t)$ b. $L^{-1}\{\int_s^\infty \overline{f}(s)ds\} = \frac{1}{t}f(t)$

   c. $L^{-1}\left\{\overline{f}\frac{(s)}{s}\right\} = \int_0^t f(t)dt$ d. $L^{-1}\left\{\frac{d}{ds}\overline{f}(s)\right\} = -tf(t)$

9. The homogeneous differential equation of the form $\frac{dy}{dx} = f(\frac{y}{x})$ can be solved by substituting.....

   a. $y = t + x$ b. $y = \frac{x}{t}$ c. y= tx d. $y = \frac{t}{x}$

10. The Lagrange's linear equation is standard form.....

    a. Pdx + Qdy + Rdz = 0 b. Pp′ + Qq′=R

    c. Mdx+Ndy=0 d. $\frac{dy}{dx} + P(x).y = Q(x)y^n$