Mid-West University

Examinations Management Office

Surkhet, Nepal

End Semester Examination 2080

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

Time: 3 hrs PM: 30

Sub: Differential Equation (Math 464)

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

Attempt All the Questions.

Group 'B' **6 × 5 = 30**

1. Define the order of differential equation. Also solve the following separable differential equations.
   $(e^y + 1)cosxdx + e^y sinxdy = 0.$

2. Solve: $\frac{d^2x}{dt^2} - 3\frac{dx}{dt} + 2x = 0$ given that when, x=1 when t=0, and $\frac{dx}{dt} = 0$ *when* $t = 0.$

3. Solution by inspection method.
   $yz^2(x^2 - yz)dx + zx^2(y^2 - xz)dy + xy^2(z^2 - xy)dz = 0.$

   Or

   Find the laplace transforms. $e^{4t}sin2tcost.$

4. Define linear partial differential equation with an example.
   Solve: $2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}.$

5. Find the inverse Laplace transforms $L^{-1}\left[\frac{3s+7}{s^2-2s-3}\right].$

6. State the linear differential equation and solve: $(x + 2y^3)\frac{dy}{dx} = y.$

   Or

   Define homogeneous linear differential equation and solve.
   $\frac{x^3d^2y}{dx^2} - 2\frac{x^2dy}{dx} + 2xy = 1.$

Group 'C' **2 × 10=20**

7. Solve the lagrange's linear partial differential equation
   $y^2p - xyq = x(z - 2y).$

8. Solution by regarding one variable as constant method.
   $z^2dx + (z^2 - 2yz)dy + (2y^2 - yz - zx)dz = 0.$

   Or

   Define Bernoulli's equation and solve. $\frac{cosdy}{dx}y(sinx - y).$

THE END

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Roll No. .....

Group 'A' **10×1=10**

Tick (✓) the Best Answer.

1. Which one of the followings is the first order differential equation of $y = ce^x$?
   a. $\frac{dy}{dx} = x$ b. $\frac{dy}{dx} = y$
   c. $\frac{dy}{dx} = \frac{1}{x}$ d. $\frac{dy}{dx} = \frac{1}{y}$

2. Which one of the followings is the integrating factor of the differential equation $\frac{dy}{dx} + 2y = 9x$?
   a. e^{2y} b. e^{2x}
   c. e^{2x^2} d. e^{y^2}

3. The particular integral of $(D^2 - 3D + 2)y = e^{5x}$ is
   a. $13y^x$ b. $10e^{5x}$
   c. $\frac{1}{12}e^{5x}$ d. $\frac{1}{5}e^{5x}$

4. Which one of the followings auxiliary equation is true?
   a. $(c_1 - c_2 x)e^{mx}$ b. $(c_1 e^{m1x} \times c_2 e^{m2x})$
   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 one of the followings is equal to $\frac{ydx - xdy}{y^2}$?
   a. $d\left(log\frac{y}{x}\right)$ b. $d\left(log\frac{x}{y}\right)$
   c. $d\left(\frac{x}{y}\right)$ d. $d\left(\frac{y}{x}\right)$

6. The homogeneous differential equation of the form $\frac{dy}{dx} = f(\frac{y}{x})$ can be solved by substituting.
   a. $y = t + x$ b. $y = tx$
   c. $y = \frac{x}{t}$ d. $y = \frac{t}{x}$

7. L$(coshat)$ equals 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. $L^{-1}\left(\frac{1}{s^n}\right)$ equal to:
   a. $\frac{t^{n-1}}{(n-1)!}$ b. $\frac{e^{at}.t^{n-1}}{(n-1)!}$
   c. $\frac{1}{a}sinat$ d. $\frac{1}{a}sinhat$

9. The inverse of linear transforms $L^{-1}\{\bar{f}(s-a)\} = e^{at}f(t)$ *is* ...
   a. derivative property b. division property
   c. integral d. shifting property

10. The Lagrange's linear equation is standard form.
    a. Pp + Qq = R b. Pdx + Qdy + Rdz = 0
    c. Mdx+Ndy=0 d. $\frac{dy}{dx} + P(x).y = Q(x)y^n$