

## Question Bank

Course Name :- B.Sc-I (CBCS)

Subject Name :- Mathematics

Sem :- II

Paper No :-P-IV

**Q.Choose correct alternative for each of the following.**

1) In solving the equation:  $d^2 y / dx^2 + p dy / dx + Q y = R$  by change of dependent variable method, the complete solution is given by  $y = uv$ , where  $u = \dots\dots\dots$

A)  $e^{\int p dx}$

C)  $e^{1/2 \int p dx}$

B)  $e^{-1/2 \int p dx}$

D)  $e^{-1 \int p dx}$

2) The equation:  $d^2 y / dx^2 + p dy / dx + Q y = R$  reduces to  $d^2 y / dx^2 + Q_1 y = R_1$  by using method of change of independent variable the value of  $dz / dx$  is  $\dots\dots\dots$

A)  $e^{\int p dx}$

B)  $e^{-\int p dx}$

C)  $e^{1/2 \int p dx}$

D)  $e^{-1/2 \int p dx}$

3) In the D.E.  $d^2 y / dx^2 + p dy / dx + Q y = R$  if  $1 + p / a + Q / a^2 = 0$  then we select  $u = \dots\dots\dots$  as known integral of its C.F.

A)  $e^x$

B)  $e^{-ax}$

C)  $e^{ax}$

D)  $xa$

4) In the total D.E.  $P dx + Q dy + R dz = 0$ , the values of P, Q, R are proportional to  $\dots\dots\dots$

A) d.r.s.of tangent to curve

C) d.c.s.of tangent to curve

B) d.r.s.of normal to curve

D) d.c.s.of normal to curve

5) The curves represented by equation

$P dx + Q dy + R dz = 0$  &  $dx / P = dy / Q = dz / R$  are  $\dots\dots\dots$

A) Parallel

B) Orthogonal

C) Equal

D) Symmetrical

6) The solution of the Equation  $dx + dy + (x + y) dz = 0$  when condition of integrability is satisfied is  $\dots\dots\dots$

A)  $x + y = c_1 e^{-z}$

C)  $x + y + z = c_1$

B)  $y + z = c_1 e^{-x}$

D)  $z + x = c_1 e^{-y}$

7) Geometrically the equation  $dx / P = dy / Q = dz / R$  represent a system of curve in which  $\dots\dots\dots$  To the curve are proportional to P, Q, R

A) d.r.s.of any line

C) d.r.s.of tangent

B) d.r.s.of normal

D) d.c.s.of normal

8) One of the solution of simultaneously equations

$$\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)} \text{ is } \dots\dots\dots$$

A)  $x - y + z = c_1$

C)  $x + y + z = c_1$

C)  $x - y - z = c_1$

D)  $x + y - z = c_1$

9) In the simultaneous equations are  $dx / P = dy / Q = dz / R$

The values of P, Q, R are .....

A) Constants

C) Function of x only

B) Function of x & y

D) Function of x, y, z

10) The partial differential equation obtained by eliminating the constants

From  $z = a(x + y) + b$  is .....

A)  $z = px + qy$

C)  $z = p + q$

B)  $P = q$

D)  $p + q = 0$

11) The particular integral of  $1 - P + Q = 0$  is .....

A)  $y = e^x$

B)  $y = e^{-x}$

C)  $y = 2e^x$

D)  $y = x$

12) For solving the equation  $d^2 y / dx^2 + p dy / dx + Q y = R$  by using method

Of variation of parameters, we assume the solution in the form  $y = Au + B v$

Where A & B are .....

A) Constants

C) Function of x only

B) Function of x & y

D) Function of x, z

13)  $y = e^{mx}$  is known solution of C.F. of the differential equation

$d^2 y / dx^2 + p dy / dx + Q y = R$  if .....

A)  $m^2 + mp + Q = 0$

C)  $m^2 + mp - Q = 0$

B)  $m^2 - mp + Q = 0$

D)  $m^2 - mp - Q = 0$

14) Method of multipliers is used to solve the D.E. of the type .....

A) Simultaneous D.E.

C) Total D.E.

B) Homogeneous linear equation

D) Linear equation

15) The values of P, Q, R in the simultaneous equation

$dx / P = dy / Q = dz / R$  represents .....

A) d.r.s. of any line

C) d.r.s. of tangent to the curve

B) d.c.s. of normal

D) d.c.s. of normal to the curve

16) One of the solution of simultaneously equations

$$\frac{dx}{(y-z)} = \frac{dy}{(z-x)} = \frac{dz}{(x-y)} = \text{is } \dots\dots\dots$$

A)  $x - y + z = c_1$

C)  $x + y + z = c_1$

C)  $xyz = c_1$

D)  $x + y - z = c_1$

17) One of the solution of simultaneously equations

$$\frac{dx}{mz-ny} = \frac{dy}{nx-lz} = \frac{dz}{ly-mx} = \text{is } \dots\dots\dots$$

A)  $x - y + z = c_1$

C)  $x^2 + y^2 + z^2 = c_1$

C)  $xyz = c_1$

D)  $x + y - z = c_1$

18) Method of taking one variable as a constant is useful in solving -----equations.

A) Simultaneous D.E.

C) Total D.E.

B) Homogeneous linear equation

D) Linear equation

19) If the condition of integrability is satisfied then the solution of the equation  $yz dx + zx dy + xy dz = 0$  is -----

A)  $xyz = c_1$

C)  $x^2 + y^2 + z^2 = c_1$

C)  $x - y + z = c_1$

D)  $x + y - z = c_1$

20) The partial D.E.  $P p + Q q = R$  is called Lagranges linear equation if P, Q, R are -----

A) Constants

C) Function of x only

B) Function of x & y

D) Function of x, y, z

21) The complete integral of the equation  $z = px + qy + pq$  is -----

A)  $z = ax + by$

C)  $z = ax + by + a + b$

B)  $z = ax + by + ab$

D)  $z = ax + by - a - b$

22) The partial D.E. formed by eliminating the constants from

$$z = (x^2 + a) (y^2 + b) \text{ is -----}$$

A)  $pq = 4xyz$  B)  $pq = 2xyz$  C)  $pq = xyz$  D)  $z = pq$

23) The general method of solving non-linear equation

$$f(x, y, z, p, q) = 0 \text{ is -----}$$

A) Eulers

B) Lagranges

C) Charpits

D) Clairauts

24) Lagranges auxiliary equation are given by -----

A)  $dx / P = dy / Q = dz / R$  C)  $dx / P = dy / Q = dz / R = 0$

B)  $dx / P = dy / Q$

D)  $dx / P + dy / Q + dz / R$

25) If one solution of  $f(D) y = R$  is known then I.F. is -----

A)  $e^{\int (p + \frac{2}{u} \frac{du}{dx}) dx}$

C)  $e^{-\int (p + \frac{2}{u} \frac{du}{dx}) dx}$

$$B) e^{\int (p - \frac{2}{u} \frac{du}{dx}) dx}$$

D) None of this

26) The partial D.E.  $P p + Q q = R$  is called Lagranges linear equation

if P, Q, R are -----

A) Constants

C) Function of x only

B) Function of x & y

D) Function of x, y, z

27) The complete integral of the equation  $z = px + qy + pq$  is -----

A)  $z = ax + by$

C)  $z = ax + by + a + b$

B)  $z = ax + by + ab$

D)  $z = ax + by - a - b$

28) The partial D.E. formed by eliminating the constants from

$$z = (x^2 + a)(y^2 + b) \text{ is -----}$$

A)  $pq = 4xyz$     B)  $pq = 2xyz$     C)  $pq = xyz$     D)  $z = pq$

29) The general method of solving non-linear equation

$$f(x, y, z, p, q) = 0 \text{ is -----}$$

A) Eulers

B) Lagranges

C) Charpits

D) Clairauts

30) Langranges auxiliary equation are given by -----

A)  $dx / P = dy / Q = dz / R$     C)  $dx / P = dy / Q = dz / R = 0$

B)  $dx / P = dy / Q$

D)  $dx / P + dy / Q + dz / R$

31) If one solution of  $f(D) y = R$  is known then I.F. is -----

$$A) e^{\int (p + \frac{2}{u} \frac{du}{dx}) dx}$$

$$C) e^{-\int (p + \frac{2}{u} \frac{du}{dx}) dx}$$

$$B) e^{\int (p - \frac{2}{u} \frac{du}{dx}) dx}$$

D) None of this

32) In solving the equation:  $d^2 y / dx^2 + p dy / dx + Q y = R$  by change of dependent variable method, the complete solution is given by  $y = uv$ , where  $u = \dots\dots\dots$

$$A) e^{\int p dx}$$

$$C) e^{1/2 \int p dx}$$

$$B) e^{-1/2 \int p dx}$$

$$D) e^{-1 \int p dx}$$

33) The equation:  $d^2 y / dx^2 + p dy / dx + Q y = R$  reduces to  $d^2 y / dx^2 + Q_1 y = R_1$  by using method of change of independent variable the value of  $dz / dx$  is -----

$$A) e^{\int p dx}$$

$$B) e^{-\int p dx}$$

$$C) e^{1/2 \int p dx}$$

$$D) e^{-1/2 \int p dx}$$

34) In the D.E.  $d^2 y / dx^2 + p dy / dx + Q y = R$  if  $1 + p / a + Q / a^2 = 0$  then we select  $u = \dots\dots\dots$  as known integral of its C.F.

$$A) e^x$$

$$B) e^{-ax}$$

$$C) e^{ax}$$

$$D) xa$$

35) In the total D.E.  $P dx + Q dy + R dz = 0$ , the values of P, Q, R are proportional to-----

- A) d.r.s.of tangent to curve
- B) d.r.s.of normal to curve
- C) d.c.s.of tangent to curve
- D) d.c.s.of normal to curve

36) The curves represented by equation

$P dx + Q dy + R dz = 0$  &  $dx / P = dy / Q = dz / R$  are.....

- A) Parallel
- B) Orthogonal
- C) Equal
- D) Symmetrical

37) The solution of the Equation  $dx + dy + (x + y) dz = 0$  when condition of integrability is satisfied is .....

- A)  $x + y = c_1 e^{-z}$
- B)  $y + z = c_1 e^{-x}$
- C)  $x + y + z = c_1$
- D)  $z + x = c_1 e^{-y}$

38)  $y = e^{mx}$  is known solution of C.F .of the differential equation

$d^2 y / dx^2 + p dy / dx + Q y = R$  if -----

- A)  $m^2 + mp + Q = 0$
- B)  $m^2 - mp + Q = 0$
- C)  $m^2 + mp - Q = 0$
- D)  $m^2 - mp - Q = 0$

39) Method of multipliers is used to solve the D.E. of the type -----

- A) Simultaneous D.E.
- B) Homogeneous linear equation
- C) Total D.E.
- D) Linear equation

40) The values of P ,Q, R in the simultaneous equation

$dx / P = dy / Q = dz / R$  represents -----

- A) d.r.s.of any line
- B) d.c.s.of normal
- C) d.r.s.of tangent to the curve
- D) d.c.s.of normal to the curve

41) One of the solution of simultaneously equations

$\frac{dx}{(y-z)} = \frac{dy}{(z-x)} = \frac{dz}{(x-y)}$  = is .....

- A)  $x - y + z = c_1$
- C)  $xyz = c_1$
- C)  $x + y + z = c_1$
- D)  $x + y - z = c_1$

42) One of the solution of simultaneously equations

$\frac{dx}{mz-n} = \frac{dy}{nx-lz} = \frac{dz}{ly-mx}$  = is .....

- A)  $x - y + z = c_1$
- C)  $x^2 + y^2 + z^2 = c_1$
- C)  $xyz = c_1$
- D)  $x + y - z = c_1$

43) Method of taking one variable as a constant is useful in solving -----equations.

- A) Simultaneous D.E.
- B) Homogeneous linear equation
- C) Total D.E.
- D) Linear equation

44) If the condition of integrability is satisfied then the solution of the equation  $yz dx + zx dy + xy dz = 0$  is -----

A)  $xyz = c_1$

C)  $x^2 + y^2 + z^2 = c_1$

C)  $x - y + z = c_1$

D)  $x + y - z = c_1$

45) Geometrically the equation  $dx / P = dy / Q = dz / R$  represent a system of curve in which ..... To the curve are proportional to P ,Q , R

A) d.r.s.of any line

C) d.r.s.of tangent

B) d.r.s.of normal

D) d.c.s.of normal

46) One of the solution of simultaneously equations

$$\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)} \text{ is } \dots\dots\dots$$

A)  $x - y + z = c_1$

C)  $x + y + z = c_1$

C)  $x - y - z = c_1$

D)  $x + y - z = c_1$

47) In the simultaneous equations are  $dx / P = dy / Q = dz / R$

The values of P, Q, R are .....

A) Constants

C) Function of x only

B) Function of x & y

D) Function of x, y, z

48) The partial differential equation obtained by eliminating the constants

From  $z = a(x + y) + b$  is .....

A)  $z = px + qy$

C)  $z = p + q$

B)  $P = q$

D)  $p + q = 0$

49) The particular integral of  $1 - P + Q = 0$  is -----

A)  $y = e^x$

B)  $y = e^{-x}$

C)  $y = 2e^x$

D)  $y = x$

50) For solving the equation  $d^2 y / dx^2 + p dy / dx + Q y = R$  by using method

Of variation of parameters, we assume the solution in the form  $y = Au + B v$

Where A & B are -----

A) Constants

C) Function of x only

B) Function of x & y

D) Function of x, z

**Q.Long answer question (10 marks each)**

Q1) Explain charpits method of solving partial differential equation

$f(x, y, z, p, q) = 0$  where  $p$  and  $q$  are independent variable and  $p = \frac{\partial z}{\partial x}$ ,

$$q = \frac{\partial z}{\partial y}$$

Q2) Explain the Lagrange's method of solving  $P_p + Q_q = R$  when  $P, Q$

and  $R$  are function of  $X, Y, Z$  and hence solve

$$p + 3q = z + \cot(y - 3x)$$

Q3) Explain the method of solving the equation of the form  $f(x, p) = g(y, q)$  and

Hence solve  $q - p + x - y = 0$

Q4) Explain the method of solving the equation of the form

$$f(p, q, z) = 0 \text{ and solve } p^3 + q^3 = 3pqz$$

Q5) Explain the method of solving the equation of the form

$$f(p, q) = 0 \text{ and solve } 3p^2 - 2q^2 = 4pq$$

Q6) Eliminate the arbitrary function  $F$  from  $F(x^2 + y^2 + z^2, z^2 - 2xy) = 0$

Q7) Find the complete integral of  $z = px + qy + p^2 + q^2$  by using Charpit's method.

Q8) Solve  $\frac{dx}{yz} = \frac{dy}{zx} = \frac{dz}{xy}$

Q9) Solve  $\frac{(b-a)}{a} yzp + \frac{(c-a)}{b} zxq = \frac{(a-b)}{c} xy$

Q10) Eliminate the arbitrary function  $F$  from  $F(x + y + z, x^2 + y^2 - z^2) = 0$

**Q. Short answer question (05 marks each)**

Q1) Solve  $\frac{dx}{mz-ny} = \frac{dy}{nx-l} = \frac{dz}{ly-mx}$

Q2) Solve  $\frac{dx}{z} = \frac{dy}{-z} = \frac{dz}{z^2+(x+y)^2}$

Q3) Solve  $\frac{dx}{x} = \frac{dy}{y} = \frac{dz}{z}$

Q4) Solve  $\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)}$

Q5) Solve  $\frac{dx}{x(y^2-z^2)} = \frac{dy}{y(z^2-x^2)} = \frac{dz}{z(x^2-y^2)}$

Q6) Solve  $\frac{dx}{\tan x} = \frac{dy}{\tan y} = \frac{dz}{\tan z}$

Q7) Eliminate the arbitrary constant a, b, c from  $z = ax + by + cxy$

Q8) Eliminate a and b from  $(x - a)^2 + (y - b)^2 + z^2 = 4$

Q9) Solve  $\frac{y^2z}{x}p + xzq = y^2$

Q10) Solve  $yzp + 2xq = xy$

Q11) Solve  $\left(\frac{b-c}{a}\right)yzp + \left(\frac{c-a}{b}\right)zxq = \left(\frac{a-b}{c}\right)xy$

Q12) Find the complete integral of  $pq=1$  by using charpits method

Q13) Find complete integral  $q = 3p^2$

Q14) Solve  $p + q + pq = 0$

Q15) Solve  $p^2 = qz$

Q16) Solve  $p^3 + q^3 = 3pqz$

Q17) Eliminate the arbitrary a, b from  $z = (x - a)^2 + ((y - b)^2$

Q18) Solve  $zp = -x$

Q19) Solve  $yzp + 2xq = xy$

Q20) Solve  $p + q = \sin x$