

QUESTION BANK
B.Sc. (Part- I) (Semester- II)(CBCS) Mathematics

Higher Order Ordinary Differential Equations &

Partial Differential Equations (Paper- IV)

Q) Write the correct alternative (A,B,C or D)into the square on the

Right side .

- 1) If $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = 0$ is an associated equation of second order linear differential equation then $y = x$ is part of solution if -----

- $$\begin{aligned} \text{a) } & x^2 \frac{d^3y}{dx^3} + 2x \frac{d^2y}{dx^2} - \frac{dy}{dx} + \frac{1}{x} y = 1 \quad \text{b) } x^2 \frac{d^3y}{dx^3} + 2 \frac{d^2y}{dx^2} - \frac{dy}{dx} + \frac{1}{x} y = 1 \quad \text{Ans} \\ \text{c) } & x \frac{d^3y}{dx^3} + 2x^2 \frac{d^2y}{dx^2} - \frac{dy}{dx} + \frac{1}{x} y = 4x \quad \text{d) } x^2 \frac{d^3y}{dx^3} + 2x \frac{d^2y}{dx^2} - \frac{dy}{dx} + y = x \end{aligned}$$

3) By suitable substitution the differential equation

$(2x + 5)^2 \frac{d^2y}{dx^2} - 6(2x + 5) \frac{dy}{dx} + 8y = 0$ can be reduced to the homogeneous
from ----- Ans.

- a) $v^2 \frac{d^2y}{dv^2} - 3v \frac{dy}{dv} + 2y = 0$ b) $v^2 \frac{d^2y}{dv^2} - 6v \frac{dy}{dv} + 8y = 0$
 c) $v^2 \frac{d^2y}{dv^2} + 3v - 2y = 0$ d) $\frac{d^2y}{dv^2} - \frac{dy}{dv} + y = 0$

4) for the differential equation $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = R$ the known solution to C.F. will be $y = e^{ax}$ if----- Ans.

- a) $a + Pa^2 + Q = 0$ b) $a^2 + Pa + Q = 0$
 c) $a^2 - Pa + Q = 0$ d) $a - Pa^2 + Q = 0$

5) The general solution of differential equation $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + y = 0$ is ---

- a) $(c_1 + c_2 \log x)$ b) $(c_1 + c_2 x) \log x$ Ans.
 c) $(c_1 + c_2 \log x) x$ d) $(c_1 + c_2 \log x) \log x$

6) Solution of the differential equation $x \frac{d^2y}{dx^2} + \frac{dy}{dx} + \frac{1}{x} y = x^3$ is obtained by substitution ----- Ans.

a) $z = \log x$

c) $-z = e^x$

b) $x = \log z$

d) $z = e^{-x}$

7) The differential equation $\frac{d^2y}{dx^2} + \frac{1}{x^2}y = 1$ is of the type -----

Ans.

a) Homogeneous linear differential equation

b) Non Homogeneous linear differential equation

c) Non- linear Homogeneous linear differential equation

d) Non Homogeneous Non - linear differential equation

8) The differential equation $Pdx + Qdy + Rdz = 0$ is integrable if -----

Ans.

a) $\frac{P}{\partial x} = \frac{Q}{\partial y} = \frac{R}{\partial z} = 0$

b) $\frac{P}{\partial x} = \frac{R}{\partial y} = \frac{Q}{\partial z} = 0$

c) $\frac{P}{\partial x} = \frac{Q}{\partial z} = \frac{R}{\partial y} = 0$

d) $\frac{P}{\partial y} = \frac{Q}{\partial x} = \frac{R}{\partial z} = 0$

9) The type of differential equation $y^2zdx + z^2x dy + x^2ydz = 0$ is -----

a) Lagrange's linear equation b) Simentaneous differential equation

c) Cauchy – Euler equation d) Total differential equation Ans.

10) Ordinary simentaneous differential equation can be solved by -----

a) Changing dependent variable b) Taking one variable constant

c) Changing dependent variable d) Method of multipliers Ans.

11) The general solution of the differential equation $\frac{dx}{x} = \frac{dy}{y} = \frac{dz}{z}$ is -----

a) $\emptyset(xy, yz) = 0$ b) $x = c_1y, y = c_1z$ Ans.

c) $\emptyset\left(\frac{x}{y}, yz\right) = 0$ d) $\emptyset(xyz, yz) = 0$

12) In solving $Pdx+Qdy+Rdz=0$ by method of reduction, we regard-----

variables. Ans.

a) 1 b) 2

c) 0 d) 3

13) A complete solution of differential equation $\frac{dx}{x} = \frac{dy}{y} = \frac{dz}{z}$ is ----- Ans.

a) $x = c_1y, y = c_2z$ b) $x^2 = c_1y, y^2 = c_2z$

c) $xy = c_1, yz = c_2$ d) $x^2y = c_1, y^2z = c_2$

14) Equation $p \tan y + q \tan x = \sec^2 z$ is the order ----- Ans.

a) 1 b) 2

c) 0

d) None of these

15) The equation $(2x+3y)p + 4xq - 8pq = x+y$ is -----

Ans.

a) Linear

b) Non-linear

c) Quasi-linear

d) Semi-linear

16) The bounded solution to the partial differential equation

Ans.

$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} + e^{-t}$ is-----

a) $u(x,t) = e^{-t}$

b) $u(x,t) = e^{-(x+t)}$

c) $u(x,t) = e^{-x} + e^{-t}$

d) $u(x,t) = x + e^{-t}$



17) The equation $Pp + Qq = R$ is known as ----- Ans.



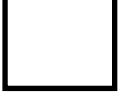
a) Charpit's equation

b) Lagrange's equation

c) Bernoulli's equation

d) Clairaut's equation

18) The general solution of $(y-z)p + (z-x)q = x-y$ is ----- Ans.



a) $\emptyset(x+y+z, x^2+y^2+z^2) = 0$

b) $\emptyset(xyz, x+y+z) = 0$

c) $\emptyset(xyz, x^2+y^2+z^2) = 0$

d) $\emptyset(x^2+y^2+z^2, x-y-z) = 0$

19) The Lagrange's auxillary equation for the partial differential equation

$Pp + Qq = R$ are -----

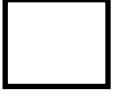
Ans.

a) $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$

b) $\frac{dx}{P} = \frac{dy}{Q}$

c) $\frac{dx}{P} = \frac{dz}{R}$

d) None of these



20) The solution of $xp + yq = z$ is-----

Ans.

a) $f(x,y) = 0$

b) $f\left(\frac{x}{y}, \frac{y}{z}\right) = 0$



c) $f(xy, yz) = 0$

d) $f(x^2, y^2) = 0$

21) The equation $z = px + qy + p^2q^2$ is of the type -----

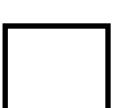
Ans.

a) Linear

b) Non-linear

c) Clairaut's

d) Quasi-linear



22) Singular integral of $z = px + qy + p^2 - q^2$ is -----

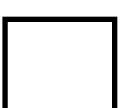
Ans.

a) $4z^2 = 3(x^2 - y^2)$

b) $4z = 3(x^2 - y^2)$

c) $4z^2 = 3(x^2 + y^2)$

d) $4z = 3(x^2 + y^2)$



23) A complete integral of $z = pq$ is -----

Ans.

a) $4az = (x + ay + b)^2$

b) $4az = (x + ay + b)$

c) $4z = (x + ay + b)^2$

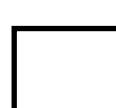
d) $4z = (x + ay + b)$



24) The complete integral of $pq = 1$ is -----

Ans.

a) $z = ax - \frac{1}{a}y + cbz^2 = ax - \frac{1}{a}y - c$



c) $z = ax + \frac{1}{a}y + c$

25) The equation $\frac{\partial^2 z}{\partial x^2} - 2 \frac{\partial^2 z}{\partial x \partial y} + \left(\frac{\partial z}{\partial y}\right)^2 = 0$ is of order-----

a) 1

b) 2

c) 3

d) None of these

Ans.