Second Order Differential Equations

1) $y = e^{x}$ is known solution of C. F. of the differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ if …

a) $1 + Px + Qx^2 = 0$
b) $1 + P - Q = 0$
c) $1 - P + Q = 0$
d) $1 + P + Q = 0$

2) $y = e^{-x}$ is known solution of C. F. of the differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ if …

a) $1 + Px + Qx^2 = 0$
b) $1 + P - Q = 0$
c) $1 - P + Q = 0$
d) $1 + P + Q = 0$

3) $y = e^{mx}$ is known solution of C. F. of the differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ if …

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

4) $y = x^{m}$ is known solution of C. F. of the differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ if …

a) $m(m-1) + mPx + Qx^2 = 0$
b) $m(m-1) - mPx + Qx^2 = 0$
c) $m(m+1) + mPx + Qx^2 = 0$
d) $m(m-1) + Px + Qx^2 = 0$

5) $y = x$ is known solution of C. F. of the differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ if …

a) $1 + P + Q = 0$
b) $1 - P + Q = 0$
c) $P + Qx = 0$
d) $P - Qx = 0$

6) In a differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ if $2 + 2Px + Qx^2 = 0$ then the known solution of C. F. of the given equation is …

a) $y = x$
b) $y = e^{x}$
c) $y = x^2$
d) $y = e^{2x}$

7) By removable of first order derivative, the equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ reduces t the form $\frac{d^2v}{dx^2} + Q_1 v = R_1$ where $Q_1 = ...$

a) $Q - \frac{1}{2}P^2 - \frac{1}{2}\frac{dP}{dx}$
b) $Q - \frac{1}{4}P^2 + \frac{1}{2}\frac{dP}{dx}$
c) $Q - \frac{1}{4}P^2 - \frac{1}{2}\frac{dP}{dx}$
d) $Q - \frac{1}{4}P^2 - \frac{dP}{dx}$

8) In solving $\frac{d^2y}{dx^2}+P\frac{dy}{dx}+Qy=R$ by change of dependent variable method, the complete solution is given by $y=uv$ where $u=...$

a) $e^{\int Pdx}$ b) $e^{\frac{1}{2}\int Pdx}$ c) $e^{-\frac{1}{2}\int Pdx}$ d) $e^{-\int Pdx}$

9) In solving the equation $\frac{d^2y}{dx^2}+P\frac{dy}{dx}+Qy=R$ by changing variable x to z it reduces to the form $\frac{d^2y}{dx^2}+P_1\frac{dy}{dx}+a^2y=R_1$ where a being constant then we select $z=...$

a) $\frac{1}{a}\int\sqrt{Q}\,dx$ b) $\int\sqrt{\frac{Q}{a}}\,dx$ c) $\frac{1}{a}\int Qdx$ d) $a\int\sqrt{Q}\,dx$

10) In solving the equation $\frac{d^2y}{dx^2}+2x\frac{dy}{dx}+(x^2+5)y=xe^{-x^2/2}$ by removal of first order derivative, the complete solution is given by $y=uv$ where $u=...$

a) e^{x^2} b) e^{-x^2} c) $e^{x^2/2}$ d) $e^{-x^2/2}$

11) For solving the equation $\frac{d^2y}{dx^2}+P\frac{dy}{dx}+Qy=R$ by using method of variation of parameter, we assume the solution in the form $y=Au+Bv$ where A and B are …

a) Constants
b) Functions of y
c) functions of x
d) functions of x and y

12) The equation $\frac{d^2y}{dx^2}+P\frac{dy}{dx}+Qy=R$ reduces to $\frac{d^2y}{dx^2}+Q_1y=R_1$ by using method of change of independent variable the value of $\frac{dy}{dx}$ is …

a) $e^{\int Pdx}$ b) $e^{-\int Pdx}$ c) $e^{\frac{1}{2}\int Pdx}$ d) $e^{-\frac{1}{2}\int Pdx}$

13) If $\frac{d^2y}{dx^2}+\frac{2}{x}\frac{dy}{dx}+\frac{a^4}{x^4}y=0$ is solved by change of independent variable x to z then $z=...$

a) $\frac{1}{x}$ b) $\frac{1}{x^2}$ c) $-\frac{1}{x}$ d) x

14) In the differential equation $\frac{d^2y}{dx^2}+P\frac{dy}{dx}+Qy=R$ if $1+\frac{P}{a}+\frac{Q}{a^2}=0$ then we select $u=...$ as known integral of its C. F.

a) e^x b) e^{-ax} c) e^{ax} d) x^a

15) If $\frac{d^2y}{dx^2}-\cot x\frac{dy}{dx}-\sin^2 x\, y=0$ is solved by change of independent variable x to z then $z=...$

a) $\cos x$ b) $-\cos x$ c) $\sin x$ d) $-\sin x$

16) By using the method of removal of derivative the complete solution of the differential equation $\frac{d^2y}{dx^2}+2x\frac{dy}{dx}+(x^2-8)y=x^2e^{-x^2/2}$ is $y=uv$ then the value of $u=$...

a) e^{x^2} b) e^{-x^2} c) $e^{x^2/2}$ d) $e^{-x^2/2}$

17) By using the method of removal of derivative the complete solution of the differential equation $\frac{d^2y}{dx^2}-4x\frac{dy}{dx}+(4x^2-3)y=e^{x^2}$ is $y=uv$ then the value of $u=$...

a) e^{x^2} b) e^{-x^2} c) $e^{x^2/2}$ d) $e^{-x^2/2}$

18) In solving the equation $\frac{d^2y}{dx^2}-\tan x\frac{dy}{dx}+4\sec^2 x\, y=0$ is solved by change of independent variable x to z then $z=$...

a) $\tan x$ b) $\cot x$ c) $\sec^2 x$ d) $\tan^2 x$

19) The complete solution of $\frac{d^2y}{dx^2}-y=2xe^x$ by using method of variation of parameters is given by $y=Au+Bv$ then the values of u and v are …

a) e^x, e^{-x} b) $x, -x$ c) $\sin x, \cos x$ d) $x, \frac{1}{x}$

20) In differential equation $\frac{d^2y}{dx^2}+P\frac{dy}{dx}+Qy=R$ if $2-Px+Qx^2=0$ then the known solution of C. F. of the given equation is …

a) $y=x^2$ b) $y=\frac{1}{x}$ c) $y=\frac{1}{x^2}$ d) $y=e^{2x}$

21) In differential equation $\frac{d^2y}{dx^2}+P\frac{dy}{dx}+Qy=R$ put z $=\int\sqrt{Q}/a\,dx$,then new differential equation is …

a) $\frac{d^2y}{dz^2}+y=R_1$
c) $\frac{d^2y}{dz^2}+P_1\frac{dy}{dz}=R$
b) $\frac{d^2y}{dz^2}+P_1\frac{dy}{dz}+Q_1y=R_1$
d) $\frac{d^2y}{dz^2}+P_1\frac{dy}{dz}+Qy=R_1$

22) The differential equation $x\frac{d^2y}{dx^2}-\frac{dy}{dx}+4x^3y=x^5$ can be solved by changing independent variable x to z by the relation z = …

a) x^2 b) $\frac{x^2}{2}$ c) $2x^2$ d) $2x$

23) 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 …

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

24) In the method of general solution of the differential equation $\frac{d^2y}{dx^2}+P\frac{dy}{dx}+Qy=R$ by known solution. Known solution is the solution of the differential equation …………..

a) $\frac{d^2y}{dx^2}+Qy=R$
c) $\frac{d^2y}{dx^2}+P\frac{dy}{dx}+Qy=0$

b) $\frac{dy}{dx} + Qy = 0$ d) $\frac{d^2y}{dx^2} + P\frac{dy}{dx} = R$

25) If in differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ and 1 – P + Q = 0 then known solution is …

a) $y = e^{-x}$ b) $y = e^{x}$ c) $y = x^2$ d) $y = x$

26) If y = y_1 is solution of $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = 0$ then by putting y = v y, the differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ reduces to form …

a) $\frac{d^2v}{dx^2} + P_1\frac{dv}{dx} + Q_1v = R_1$

b) $\frac{d^2v}{dx^2} + P_1\frac{dv}{dx} = R_1$

c) $\frac{d^2v}{dx^2} + Q_1v = R_1$

d) $\frac{d^2v}{dx^2} + Q_1v = 0$

27) $\frac{d^2y}{dx^2} - \frac{2}{x}\frac{dy}{dx} + (x^2 + 2)y = x$ is solved by removable of the first order derivative, by change of dependent variable by the substitution y = v y_1 then y_1 is …………

a) x b) x^2 c) 1/x d) – x^2

28) If independent variable x is changed to z by using $z = \int e^{-\int Pdx}dx$ then differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ reduces to form …

a) $\frac{d^2y}{dz^2} + P_1\frac{dy}{dz} + Q_1y = R_1$

b) $\frac{d^2y}{dz^2} + P_1\frac{dy}{dz} = R_1$

c) $\frac{d^2y}{dz^2} + Q_1y = R_1$

d) $\frac{d^2y}{dz^2} + Q_1y = 0$

29) While solving a differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ by change of independent variable x to z , z is obtained by z =…

a) $e^{\int Pdx}$ b) $e^{-1/2\int Pdx}$ c) $\int e^{\int Pdx}$ d) $\int e^{-\int Pdx}dx$

30) If by changing the independent variable x to z the differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ reduces to form $\frac{d^2y}{dz^2} + Q_1y = R$ then z is given by …

a) $z = \int Pdx$ c) $z = \int\sqrt{\frac{Q}{a}}dx$

b) $z = \int e^{\int Pdx}dx$ d) $z = \int e^{-\int Pdx}dx$

31) In solving differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ by changing y to v with removing first order derivative we put y = u v where u =…………..

a) $e^{1/2\int Pdx}$ b) $e^{-1/2\int Pdx}$ c)$e^{\int pdx}$ d) $e^{-\int pdx}$

32) In differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ put z =$\int\sqrt{Q}/a\,dx$,then new differential equation is …………….

a) $\frac{d^2y}{dz^2} + y = R_1$ c) $\frac{d^2y}{dz^2} + P_1\frac{dy}{dz} = R$

b) $\frac{d^2y}{dz^2} + P_1\frac{dy}{dz} + Q_1 y = R_1$

d) $\frac{d^2y}{dz^2} + P_1\frac{dy}{dz} + Qy = R_1$

33) If by changing the independent variable x to z the differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ reduces to form $\frac{d^2y}{dz^2} + Q_1 y = R$ then z is given by …………..

a) $z = \int P dx$

c) $z = \int \sqrt{\frac{Q}{a}} dx$

b) $z = \int e^{\int P dx} dx$

d) $z = \int e^{-\int P dx} dx$

Ordinary Simultaneous Differential Equations

1) The differential equation of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ where P, Q, R are functions of x, y, z are called … equations.

a) Total differential

c) Homogeneous linear differential

b) Linear differential

d) Simultaneous differential

2) Geometrically the equation $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ represents a system of curves in which … to the curve are proportional to P, Q, R.

a) d. r. s. of any line

c) d. r. s. of normal

b) d. r. s. of tangent

d) d. c. s. of normal

3) For solving simultaneous equations we make use of … method.

a) known integral

c) multipliers

b) change of dependent variable

d) change of independent variable

4) The values of P, Q, R in the simultaneous equations $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ represents …

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

c) d. c. s. of any line

b) d. r. s. of any line

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

5) One of the solution of simultaneous equations $\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)}$ is …

a) $x - y + z = c_1$

c) $x - y - z = c_1$

b) $x + y + z = c_1$

d) $x + y - z = c_1$

6) One of the solution of simultaneous equations $\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)}$ is …

a) $xyz = c_1$

c) $yz = c_1 x$

b) $xy = c_1 z$

d) $zx = c_1 y$

7) One of the solution of simultaneous equations $\frac{dx}{(y-z)} = \frac{dy}{(z-x)} = \frac{dz}{(x-y)}$ is …

a) $xyz = c_1$

c) $x^2 yz = c_1$

b) $x+y+z=c_1$

d) $x-y+z=c_1$

8) One of the solution of simultaneous equations $\frac{dx}{mz-ny}=\frac{dy}{nx-lz}=\frac{dz}{ly-mx}$ is …

a) $xyz=c_1$

b) $x+y+z=c_1$

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

d) $x^3+y^3+z^3=c_1$

9) One of the solution of simultaneous equations $\frac{dx}{z}=\frac{dy}{-z}=\frac{dz}{z^2(x+y)^2}$ is …

a) $x+y=c_1$

b) $x-y=c_1$

c) $x^2+y^2=c_1$

d) $x^2-y^2=c_1$

10) Which one of the following is solution of the simultaneous equation

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

a) $x+y+z=c_1$

b) $xyz=c_1$

c) $x-y+z=c_1$

d) $x+y-z=c_1$

11) For solving equation $\frac{dx}{bz-cy}=\frac{dy}{cx-az}=\frac{dz}{ay-bx}$ one set of multipliers is a,b,c then other set of multipliers is …

a) $\frac{1}{x},\frac{1}{y},\frac{1}{z}$

b) $\frac{1}{a},\frac{1}{b},\frac{1}{c}$

c) x,y,z

d) $\frac{a}{x},\frac{b}{y},\frac{c}{z}$

12) For solving simultaneous equations $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$ where P,Q,R are functions of x,y,z which one of the following method is not used …

a) Method of grouping

b) Lagrange's method of multipliers

c) variable separate method

d) none of these

13) To solve simultaneous differential equation we make use of … method.

a) known integral method

b) change of dependent variable

c) change of independent variable

d) two groups of equations

14) The complete solution of the differential equation $\frac{dx}{x}=\frac{dy}{y}=\frac{dz}{z}$ is …

a) $y=c_1x, y=c_2z$

b) $xy=c_1, yz=c_2$

c) $y=c_1x, xz=c_2$

d) $xy=c_1, y=c_2z$

15) The complete solution of the equation $\frac{dx}{x(y-z)}=\frac{dy}{y(z-x)}=\frac{dz}{z(x-y)}$ is …

a) $xyz=c_1, x+y+z=c_2$

b) $xyz=c_1, x^2+y^2+z^2=c_2$

c) $xyz=c_1, x-y-z=c_2$

d) $x+y+z=c_1, x^2+y^2+z^2=c_2$

16) One of the following is solution of the simultaneous equation

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

c) $x^2yz=c_1$

c) $xyz^2=c_1$

d) $xy^2z=c_1$

d) $xyz=c_1$

17) Which one of the following is solution of the simultaneous equations

$$\frac{dx}{(y+z)}=\frac{dy}{(z+x)}=\frac{dz}{(x+y)}$$

a) $x-y=c_1z$

c) $\frac{x-y}{y-z}=c_1$

b) $x+y+z=c_1$

d) $xyz=c_1$

18) Which one of the following is solution of the simultaneous equations

$$\frac{adx}{(b-c)yz}=\frac{bdy}{(c-a)zx}=\frac{cdz}{(a-b)xy}$$

a) $ax+by+cz=c_1$

c) $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=c_1$

b) $ax^2+by^2+cz^2=c_1$

d) $xyz=c_1$

19) Method of multipliers is used to solve the differential equations of the type …

a) Simultaneous differential equations

c) Homogeneous linear equations

b) Total differential equations

d) Linear equations

20) In simultaneous equations $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$ the values of P,Q,R are …

a) constants

c) functions of x and y

b) functions of x only

d) functions of x,y,z

Total Differential Equations

1) The differential equation of the form $Pdx+Qdy+Rdz=0$ where P,Q,R are functions of x,y,z are called … equations.

a) Total differential

c) Homogeneous linear differential

b) Linear differential

d) Simultaneous differential

2) The total differential equation $Pdx+Qdy+Rdz=0$ is integrable if …

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

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

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

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

3) In the total differential equation $Pdx + Qdy + Rdz = 0$ the values of P, Q, R are proportional to …

a) d. r. s. of tangent to curve
c) d. r. s. of normal to curve
b) d. c. s. of tangent to curve
d) d. c. s. of normal to curve

4) If the condition of integrability is satisfied then the solution of the equation $(y+z)dx + dy + dz = 0$ is …

a) $e^{x(y+z)} = c_1$
c) $e^{z(x+y)} = c_1$
b) $e^{y(z+x)} = c_1$
d) $x + y + z = c_1$

5) Geometrical interpretation of total differential equation $Pdx + Qdy + Rdz = 0$ is that P, Q, R are proportional to … at point (x, y, z) on the curve.

a) d. r. s. of tangent
c) d. c. s. of tangent
b) d. r. s. of normal
d) d. c. s. of normal

6) The curves represented by equations $Pdx + Qdy + Rdz = 0$ and $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ (where P, Q, R are functions of x, y, z) are …

a) parallel
b) orthogonal
c) equal
d) symmetrical

7) If the condition of integrability is satisfied then the solution of the equation $yzdx + zxdy + xydz = 0$ is …

a) $xyz = c_1$
c) $x + y + z = c_1$
b) $x^2 + y^2 + z^2 = c_1$
d) $x^2 + z = c_1$

8) If the condition of integrability is satisfied then the solution of the equation $(y+z)dx + (z+x)dy + (x+y)dz = 0$ is …

a) $x + y + z = c_1$
c) $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = c_1$
b) $x + z = c_1$
d) $xy + yz + zx = c_1$

9) The solution of the equation $dx + dy + (x+y)dz = 0$, when condition of integrability is satisfied is …

a) $x + y = c_1 e^{-z}$
c) $y + z = c_1 e^{-x}$
b) $x + y + z = c_1$
d) $z + x = c_1 e^{-y}$

10) If the condition of integrability is satisfied then the solution of the equation $(y+z)^2 dx + x^2(dy + dz) = 0$ is …

a) $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=c_1$

b) $\frac{1}{x}+\frac{1}{y+z}=c_1$

c) $\frac{1}{x}-\frac{1}{y+z}=c_1$

d) $\frac{1}{y}+\frac{1}{x+z}=c_1$

11) $\begin{vmatrix} P & Q & R \\ P & Q & R \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \end{vmatrix} = 0$ is condition for integrability of the equation of …

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

b) $\frac{d^2y}{dx^2}+P\frac{dy}{dx}+Qy=R$

c) $Pdx+Qdy+Rdz=0$

d) $P\frac{dy}{dx}+Qy=R$

12) In the total differential equation $Pdx+Qdy+Rdz=0$ the values of P,Q,R are …

a) constants

b) functions of x only

c) functions of y only

d) functions of x,y,z

13) Method of taking one variable as constant is useful in solving … equation.

a) simultaneous

b) total differential

c) homogeneous linear

d) linear equation with constant coefficients

14) Which one of the following method is not used in solving total differential equation.

a) treating one variable as constant

b) method of inspection

c) method of multipliers

d) method of substitution

15) Method of substitution is suitable for solving total differential equation $Pdx+Qdy+Rdz=0$ if P,Q,R are …

a) functions of x,y,z

b) homogeneous functions of x,y,z

c) constants

d) functions of x only

16) The differential equation $Pdx+Qdy+Rdz=0$ integrable if ……

a) $P\left(\frac{\partial Q}{\partial y}-\frac{\partial R}{\partial z}\right)+Q\left(\frac{\partial R}{\partial x}-\frac{\partial P}{\partial y}\right)+R\left(\frac{\partial P}{\partial z}-\frac{\partial Q}{\partial x}\right)=0$

b) $P\left(\frac{\partial R}{\partial z}-\frac{\partial Q}{\partial y}\right)+Q\left(\frac{\partial P}{\partial y}-\frac{\partial R}{\partial x}\right)+R\left(\frac{\partial P}{\partial y}-\frac{\partial R}{\partial x}\right)=0$

c) $P\left(\frac{\partial Q}{\partial z}-\frac{\partial R}{\partial x}\right)+Q\left(\frac{\partial R}{\partial y}-\frac{\partial P}{\partial z}\right)+R\left(\frac{\partial P}{\partial x}-\frac{\partial Q}{\partial y}\right)=0$

d) $P\left(\frac{\partial Q}{\partial z}-\frac{\partial R}{\partial y}\right)+Q\left(\frac{\partial R}{\partial x}-\frac{\partial P}{\partial z}\right)+R\left(\frac{\partial P}{\partial y}-\frac{\partial Q}{\partial x}\right)=0$

17) In solving $Pdx+Qdy+Rdz=0$ by method of reduction we regard …………… variables to be constant.

a) 1 b) 2 c) 0 d) 3

18) If in diff. equation $\frac{dx}{P}+\frac{dy}{Q}+\frac{dz}{R}=\frac{ldx+mdy+ndz}{0}$ then value of $ldx+mdy+ndz$ is …

a) 1 b) 2 c) 4 d) 0

19) The general solution of the differential equation $\frac{xdx}{y^2z} = \frac{dy}{xz} = \frac{dz}{y^2}$ is …

a) $x + y = c_1$, $x^2 - y^2 = c_2$
b) $x^2 + y^2 = c_1$, $x^2 - z^2 = c_2$
c) $x^3 - y^3 = c_1$, $x^2 - z^2 = c_2$
d) $x^3 - y^3 = c_1$, $x^2 + z^2 = c_2$

20) By inspection method the solution of $ayzdx + bzxdy + cxydz = 0$ is ……………

a) $x^a y^b z^c = k$
b) $xyz = abc$
c) $x^a + y^b + z^c = k$
d) $\frac{xyz}{abc} = 1$

21) The differential equation $\frac{dx}{xz} = \frac{dy}{yz} = \frac{zdz}{(x+y)^2}$ is of the kind …………

a) Clairaut's equation
b) Total differential equation
c) Non-linear differential equation
d) Simultaneous differential equation

DSC – 6B (DIFFERENTIAL EQUATIONS - II)

UNIT – 2 Partial Differential Equations.

MULTIPLE CHOICE QUESTIONS

Select the correct alternatives for each of the following:

1. Equation $p\tan y + q\tan x = \sec^2 z$ is of the order

   a) 1 b) 2 c) 0 d) none of these

2. 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

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

   a) Linear b) non-linear c) quasi-linear d) semi-linear

4. $(x + y - z)\frac{\partial z}{\partial x} + (3x + 2y)\frac{\partial z}{\partial y} + 2z = x + y$ is

   a) Linear b) quasi-linear c) semi-linear d) non-linear

5. The bounded solution to the partial differential equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} + e^{-t}$ is

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

6. The equation $Pp + Qq = R$ is known as

a) Charpit's equation
b) Lagrange's equation
c) Bernoulli's equation
d) Clairaut's equation

7. The solution of the partial differential equation $\frac{\partial^2 z}{\partial y^2} = \sin(xy)$ is

a) $z = -x^{-2}\sin(xy) + yf(x) + g(x)$
b) $z = -x^2\sin(xy) - xf(x) + g(x)$
c) $z = -y^2\sin(xy) + yf(x) + g(x)$
d) $z = -x - 2\sin(xy) + xf(x) + g(x)$

8. The Lagrange's auxiliary equations for the partial differential equation $Pp + Qq = R$ are

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

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

a) $\Phi(x+y+z, x^2+y^2+z^2) = 0$
b) $\Phi(xyz, x+y+z) = 0$
c) $\Phi(xyz, x^2+y^2+z^2) = 0$
d) $\Phi(x^2-y^2-z^2, x-y-z) = 0$

10. Subsidiary equations for equation $\frac{y^2 z}{x} p + zxq = y^2$ are

a) $\frac{dx}{y^2 z} = \frac{dy}{zx} = \frac{dz}{y^2}$
b) $\frac{dx}{x^2} = \frac{dy}{y^2} = \frac{dx}{z^2}$
c) $\frac{dx}{x^2} = \frac{dy}{y^2} = \frac{dz}{zx}$
d) $\frac{dx}{\frac{1}{x^2}} = \frac{dy}{\frac{1}{y^2}} = \frac{dz}{\frac{1}{zx}}$

11. The general solution of the linear partial differential equation $Pp + Qq = R$ is

a) $\Phi(u,v) = 1$
b) $\Phi(u,v) = -1$
c) $\Phi(u,v) = 0$
d) none of these

12. A general solution of the partial differential equation $uu_x + yu_y = x$ is of the form

a) $f\left(u^2 - x^2, \frac{y}{x+u}\right) = 0$, where $f : R^2 \to R$ is C^1 and $\nabla f \neq (0,0)$ at every point
b) $u = g\left(\frac{y}{x+u}\right) + x^2, g \in C^1(R)$
c) $f(x^2 + u^2) = 0, f \in C^1(R)$
d) $f(x+y) = 0, f \in C^1(R)$

13. The integral surface to the first order partial differential equation $2y(z-3)p + (2x-z)q = y(2x-3)$ passing through the curve $x^2 + y^2 = 2x, z = 0$ is

a) $x^2 + y^2 - z^2 - 2x + 4z = 0$
c) $x^2 + y^2 + z^2 - 2x + 16z = 0$

b) $x^2 + y^2 - z^2 - 2x + 8z = 0$ d) $x^2 + y^2 + z^2 - 2x - 8z = 0$

14. The partial differential equation from $z = (a + x)^2 + y$ is

a) $z = \frac{1}{4}p^2 + y$ b) $z = \frac{1}{4}q^2 + y$ c) $z = p^2 + y$ d) $z = q^2 + y$

15. The solution of $xp + yq = z$ is

a) $f(x, y) = 0$ b) $f\left(\frac{x}{y}, \frac{y}{z}\right) = 0$ c) $f(xy, yz) = 0$ d) $f(x^2, y^2) = 0$

16. The solution of $p + q = z$ is

a) $f(x + y, y + \log z) = 0$
b) $f(xy, y\log z) = 0$
c) $f(x - y, y - \log z) = 0$
d) none of these

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

a) $f(x + y + z) = xyz$
b) $f(x^2 + y^2 + z^2) = xyz$
c) $f(x^2 + y^2 + z^2, x^2y^2z^2) = 0$
d) $fx + y + z) = x^2 + y^2 + z^2$

18. The equation $z = px + qy + p^2q^2$ is of the type

a) Linear b) non-linear c) Clairaut's d) quasi-linear

19. Singular integral of $z = px + qy + p^2 - q^2$ is

a) $4z^2 = 3(x^2 - y^2)$
b) $4z = 3(x^2 - y^2)$
c) $4z^2 = 3(x^2 + y^2)$
d) $4z = 3(x^2 + y^2)$

20. The complete integral of $f(p, q) = 0$ is

a) $z = ax + by + c$
b) $z = ax + yF(a) + c$
c) $z = ax + yF(a) + \phi'(a)$
d) $z = ax + yF'(a) + \phi(a)$

21. A complete integral of $z = pq$ is

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

22. The complete integral of $x(1 + y)p = y(1 + x)q$ is

a) $z = a(\log x + x + y) + b$
b) $z = a(\log x - x - y) + b$
c) $z = a(\log xy + x + y) + b$
d) $z = a(\log xy - x - y) + b$

23. The complete integral of $q(p - \cos x) = \cos y$ is

a) $z = ax + \sin x + \frac{1}{a}\sin y$
b) $z^2 = ax + \sin x + \frac{1}{a}\sin y$
c) $z = ax - \sin y - \frac{1}{a}\sin x$
d) $z^2 = ax - \sin y - \frac{1}{a}\sin x$

24. The complete integral of $pq = 1$ is

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

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

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

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