Model Question Paper

Differential Equations - Part II

12th Standard

Business Maths

Reg.No. : | | | | | | |

I.Answer all the questions.

II.Use blue pen only.

Time : 01:30:00 Hrs

Total Marks : 85

Part-A

5 x 1 = 5

1) The solution of x dx+y dy=0 is

(a) $x^2+y^2=c$ (b) $\frac{x}{y}=c$ (c) $x^2-y^2=c$ (d) xy=c

2) The solution of $\frac{dy}{dx}=e^{x-y}$ is

(a) $e^y e^x=c$ (b) $y=\log ce^x$ (c) $y=\log c(e^x+c)$ (d) $e^{x+y}=c$

3) The solution of $\frac{dp}{dt}=ke^{-t}$ (k is a constant) is

(a) $c-\frac{k}{e^t}=p$ (b) $p=ke^t+c$ (c) $t=\log\frac{c-p}{k}$ (d) $t=\log_c p$

4) In the differential equation $(x^2-y^2)dy=2xydx$, if we make the subsititution y=vx then the equation is transformed into

(a) $\frac{1+v^2}{v+v^3}\,dv=\frac{dx}{x}$ (b) $\frac{1-v^2}{v(1+v^2)}\,dv=\frac{dx}{x}$ (c) $\frac{dv}{v^2-1}=\frac{dx}{x}$ (d) $\frac{dv}{1+v^2}=\frac{dx}{x}$

5) When $y=vx$the differential equation $x\frac{dy}{dx}=y+\sqrt{x^2+y^2}$ reduces to

(a) $\frac{dv}{\sqrt{v^2-1}}=\frac{dx}{x}$ (b) $\frac{vdv}{\sqrt{v^2+1}}=\frac{dx}{x}$ (c) $\frac{dv}{\sqrt{v^2+1}}=\frac{dx}{x}$ (d) $\frac{vdv}{\sqrt{1-v^2}}=\frac{dx}{x}$

Part-B

5 x 6 = 30

6) Find the order and degree of the following: $\sqrt{1+\frac{d^2y}{dx^2}}=x\frac{dy}{dx}$

7) Find the order and degree of the following: $\left(\frac{d^2y}{dx^2}\right)^{\frac{3}{2}}=\left(\frac{dy}{dx}\right)^2$

8) Find the order and degree of the following: $3\frac{d^2y}{dx^2}+5\left(\frac{dy}{dx}\right)^3-3y=e^x$

9) Find the order and degree of the following: $\frac{d^2y}{dx^2}=0$

10) Find the order and degree of the following: $\left(\frac{d^2y}{dx^2}+1\right)^{\frac{2}{3}}=\left(\frac{dy}{dx}\right)^{\frac{1}{3}}$

Part-C

5 x 10 = 50

11) Solve (x+y)dy+(x-y)dx=0.

12) The net profit p and quantity x satisfy the differential equation $\frac{dp}{dx}=\frac{2p^3-x^3}{3xp^3}$. Find the relationship between the net profit and demand given that p = 20 when x = 10.

13) The rate of increase in the cost C of ordering and holding as the size q of the order increases is given by the differential equation $\frac{dC}{dq}=\frac{C^2+2Cq}{q^2}$. Find the relationship between C and q if C = 1 when q = 1.

14) A bank pays interest by treating the annual interest as the instantaneous rate of change of the principal. A man invests Rs.50,000 in the bank deposit which accrues interest, 6.5% per year compounded continuously. How much will he get after 10 years?(Given : e^{65} = 1.9155)

15) A manufacturing company has found that the cost C of operating and maintaining the equipment is related to the length m of intervals between overhauls by the equation $m^2\frac{dC}{dm}+2mC=2$ and C=4 when m = 2. Find the relationship between C and m.

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