(6 pages)

Reg. No. :.....

Code No. : SS 30334 E **Sub. Code : JMMA 22/ JMMC 22/SMMA 22**

B.Sc. (CBCS) DEGREE (Special Supplementary) EXAMINATION, APRIL 2020.

Second Semester

Mathematic/Mathematics with CA — Main

DIFFERENTIAL EQUATIONS

(For those who joined in July 2016 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answers.

1. Solving for p in this equation $x^2p^2+3xyp+2y^2=0$ the value of p is

(a) $\frac{y}{x},\frac{-2y}{x}$ (b) $\frac{-y}{x},\frac{-2y}{x}$

(c) $\frac{y}{x},\frac{2y}{x}$ (d) None

2. The General solution of $\tan^{-1} p = y - xp$ is

(a) $y = cx + \tan^{-1} x$ (b) $y = cx + \tan^{-1} c$

(c) $y = \tan^{-1} c - x$ (d) None

3. The auxillary equation of $x^2 \frac{d^2y}{dx^2} + 4x\frac{dy}{dx} + 2y = e^x$ is

(a) $m^2 + 4m + 2 = 0$ (b) $m^2 + 4x + 2 = e^m$

(c) $m^2 + 3m + 2 = 0$ (d) $m^2 - 3m + 2 = 0$

4. The particular integral of $\left(D^2 + 5D + 6\right)y = e^x$ is

(a) $e^x/6$ (b) $e^x/12$

(c) $e^x/-6$ (d) $-e^x/12$

5. Transform the equation $xy'' + y' + 1 = 0$ into the linear equation with constant coefficient

(a) $D'^2 y = -e^z$

(b) $D'y = -e^z$

(c) $\left(D' - 1\right)^2 y = e^z$

(d) None

6. Transform

$(1+x)^2\frac{d^2y}{dx^2}+(1+x)\frac{dy}{dx}+y=2\sin[\log(1+x)]$ into linear equation with constant coefficient.

(a) $(D'^2+1)y=2\sin z$

(b) $(D'+1)^2y=2\sin z$

(c) $D'^2=2\sin 2z$

(d) None

7. Eliminate the function f from $z=f(x-y)$ then the partial Differential equation is

(a) $p+q=0$ (b) $p-q=0$

(c) $z=p+q$ (d) None

8. The complete integral of $z=px+qy+2\sqrt{pq}$ is $z=$ _____

(a) $ax+by+2\sqrt{pq}$ (b) $px+qy+2\sqrt{ab}$

(c) $ax+by+2\sqrt{ab}$ (d) None

9. Exponential decay constant is

(a) $\frac{dN}{dt}=-\lambda N$ (b) $\frac{dN}{dt}=\lambda N$

(c) $\frac{dN}{dt}=\lambda$ (d) None

10. Newton's law of cooling states the rate of ————

(a) Cool (b) Head

(c) Both of (a) and (b) (d) None

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Solve $2p^2+xy^2=\left(x+2y^2\right)P$.

Or

(b) Solve $e^{3x}\left(p-1\right)+p^3\,e^{2y}=0$.

12. (a) Solve $\left(D^2-4D+13\right)y=e^{2x}\sin 3x.$

Or

(b) Solve $\frac{d^2y}{dx^2}-3\frac{dy}{dx}+2y=xe^{3x}+\sin 2x.$

13. (a) Solve $x^2y''-3xy'-5y=\cos\left(\log x\right)$.

Or

(b) Solve $\left(x+2\right)^2\frac{d^2y}{dx^2}-\left(x+2\right)\frac{dy}{dx}+y=3x+4.$

14. (a) Solve $\frac{\partial z}{\partial x}=6x+3y; \frac{\partial z}{\partial y}=3x-4y.$

Or

(b) Solve $p^2+q^2=x^2+y^2$.

15. (a) Derive the Growth and decay equation for first order.

Or

(b) Drive the principle of conversation of energy.

PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions, choosing either (a) or (b)

16. (a) Solve ; $\left(\frac{dy}{dx}\right)^2-6\left(\frac{dy}{dx}\right)+8y=0.$

Or

(b) $(px-y)(py+x)=2p$ solve.

17. (a) Solve $\left(D^2+4D+3\right)y=e^x\cos 2x-\cos 3x.$

Or

(b) Solve $\left(D^2+9\right)y=\left(x^2+1\right)e^{3x}$.

18. (a) Solve $\left(x^2D^2+xD+9\right)y=x^2\log x.$

Or

(b) Solve $(1+4x)^2\frac{d^2y}{dx^2}+(1+4x)\frac{dy}{dx}+4y=8(1+4x)^2.$

19. (a) Solve $\left(x^2-yz\right)p+\left(y^2-zx\right)q=z^2-xy.$

Or

(b) Solve $x\left(y^2+z\right)p-y\left(x^2-z\right)q=z\left(x^2-y^2\right).$

20. (a) Derive the growth Decay equation for second order.

Or

(b) Write Brochistocrone problem.

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