

BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)
B. Tech. Sem - II CHEMICAL : WINTER- 2022
SUBJECT : DIFFERENTIAL & INTEGRAL CALCULUS

Day : Thursday
 Date : 24-11-2022

W-24051-2022

Time : 10:00 AM-01:00 PM
 Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable calculator is allowed.

Q.1 Form the differential equation whose general solution is $(x-A)^2 + (y-B)^2 = r^2$ (10)

OR

Q.1 Solve $\frac{dy}{dx} = \frac{x+y+1}{2x+2y+3}$ (10)

Q.2 If $\theta = r^n e^{-r^2/4r}$ then find the value of n so that $\frac{1}{r^2} \frac{\partial}{\partial r} \left(r^2 \frac{\partial \theta}{\partial r} \right) = \frac{\partial \theta}{\partial r}$ (10)

OR

Q.2 If $u = \tan^{-1} \left[\frac{x^4 + y^4}{x-y} \right]$ then find the value of $x^2 u_{xx} + 2xy u_{xy} + y^2 u_{yy}$ (10)

Q.3 Solve $\int_0^{\infty} \frac{\tan^{-1}(ax)}{x(1+x^2)} dx$ (10)

OR

Q.3 Solve $\int_0^1 \frac{x^u - 1}{\log x} dx$ (10)

Q.4 Evaluate $\iint_R \sqrt{\frac{a^2 b^2 - b^2 x^2 - a^2 y^2}{a^2 b^2 + b^2 x^2 + a^2 y^2}} dx dy$ over the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (10)

OR

Q.4 Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \frac{dx dy}{(1+e^x) \sqrt{1-x^2-y^2}}$ (10)

Q.5 Evaluate $\int_{\frac{1-\sqrt{x+4}}{3}}^{4+2\sqrt{x}} dx dy$ (10)

OR

Q.5 Solve $\int_{\theta=0}^{\pi/2} \int_{r=1-\cos\theta}^{\sin\theta} r dr d\theta$ (10)

Q.6 Find the Fourier cosine transform of x^{n-1} . (10)

OR

Q.6 Find Laplace transform of $\frac{e^{-3t} - e^{-4t}}{t}$ (10)

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