

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

Day : Tuesday
 Date : 26-07-2022

S-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.
- 4) Assume suitable data **WHEREVER** necessary.
- 5) Draw neat diagram **WHEREVER** necessary.

Q.1 Solve $(x^2y + y^4)dx + (2x^3 + 4xy^3)dy = 0$. **(10)**

OR

Q.1 Form the differential equation whose general solution is $xy = ae^x + be^{-x} + x^2$. **(10)**

Q.2 Find the value of n for which $u = Ae^{-gx} \sin(nt - gx)$ satisfies $u_t = mu_{xx}$. **(10)**

OR

Q.2 If $u = \cos^{-1} \left(\frac{x^3 + y^3}{\sqrt{x^{1/4} + y^{1/4}}} \right)$, find the value of $x^2u_{xx} + 2xyu_{xy} + y^2u_{yy}$. **(10)**

Q.3 Evaluate $\int_0^{\infty} \frac{\cos \lambda x}{x} (e^{-ax} - e^{-bx}) dx$ (a,b >0). **(10)**

OR

Q.3 Examine for minimum and maximum values of $x^3 + 3xy^2 - 3x^2 - 3y^2 + 8$. **(10)**

Q.4 Evaluate $\int_0^1 \int_x^{\sqrt{2x-x^2}} (x^2 + y^2) dx dy$ by transforming to polar form. **(10)**

OR

Q.4 Solve $\int_0^{\infty} \int_x^{\infty} \frac{e^{-y}}{y} dx dy$. **(10)**

Q.5 Find the area of circle $x^2 + y^2 = a^2$ using polar integration. **(10)**

OR

Q.5 Find the volume bounded by $y^2 = x$, $x^2 = y$ and the planes $z = 0$, $x + y + z = 2$. **(10)**

Q.6 Find the fourier sine transform of x^{m-1} . **(10)**

OR

Q.6 Find the Laplace transform of $e^{-t} \left(\frac{\cos at - \cos bt}{t} \right)$ **(10)**
