Total No. of Questions – [4] Total No. of Printed Pages: 03

G.R. No.	

PAPER CODE	U111–201B(Rf)

MAY 2022 (INSEM+ ENDSEM) EXAM
F.Y. B. TECH. (SEMESTER - II)
COURSE NAME: Calculus
COURSE CODE: ES10201B
(PATTERN 2020)

Time: [2Hr] [Max. Marks: 60]

(*) Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data where ever required**

Q.1 **Solve the following**

i) If $f(x,y)=\frac{\sin(xy^2+y)}{x^2+1}$ then the value of $\frac{\partial f}{\partial y}=$ [2]

A) 0 B) 1 C) -1 D) ∞

ii) If $z^3-zx-y=3$ then the value of $\frac{\partial z}{\partial x}=$ [2]

A) $\frac{z}{3z^2+1}$ B) $\frac{z}{3z^2-1}$ C) $\frac{1}{3z^2+1}$ D) $\frac{1}{3z^2-1}$

iii) If $u=\log(x^2+y^2)$ then ... [2]

A) $u_{xy}=u_{yx}$ B) $u_{xy}=\frac{1}{u_{yx}}$

C) $u_{xy}=-u_{yx}$ D) $u_{xy}=1+u_{yx}$

iv) If $u=\sin^{-1}(x^2+y^2+z^2)$ then $xu_x+yu_y+zu_z=$ [2]

A) $2\cos u$ B) $2\sin u$ C) $2\cot u$ D) $2\tan u$

v) If $x=u\cos v$, $y=u\sin v$ then, $\frac{\partial(x,y)}{\partial(u,v)}=$ [2]

A) u B) $\frac{1}{u}$ C) u^2 D) $\frac{1}{u^2}$

vi) If $x=e^u\cos v$, $y=e^u\sin v$ then, $\frac{\partial(x,y)}{\partial(u,v)}.\frac{\partial(u,v)}{\partial(x,y)}=$ [2]

A) 0 B) 1 C) 2 D) 3

vii) If $u=2xy$, $v=x^2-y^2$ where $x=r\cos\theta$, $y=r\sin\theta$ [2]
then, $\frac{\partial(u,v)}{\partial(r,\theta)}=$

A) $-4r^2$ B) $-\frac{1}{4r^2}$ C) $-4r^3$ D) $-\frac{1}{4r^3}$

viii) If $f(x,y)=x^3y^2(12-x-y)$ then the maximum value occurs at [2]

A) (4,6) B) $(-4,-6)$ C) $(-6,-4)$ D) (6,4)

c) Find the whole length of the loop of the curve: $3y^2 = x(x-1)^2$ [5]

Q.4 **Solve any two out of three**

a) Evaluate: [5]

$$\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2) dxdy$$

b) Evaluate: [5]

$$\int_0^1 \int_0^{1-x} \int_0^{x+y} e^z \, dxdydz$$

c) Find the total area of the curve, $r = a(1 + \cos\theta)$ [5]