Hall Ticket No | | | | | | | | | | |

Course Code: AHSD02

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

B TECH I SEMESTER CIE–II EXAMINATIONS, JANUARY – 2024

Regulation: BT23

MATRICES AND CALCULUS

(COMMON TO ALL BRANCHES)

Time: 2 Hours **Max Marks: 20**

Answer any FOUR questions
All parts of the question must be answered in one place only

1. (a) Identify whether the following functions are functionally dependent or not .If functionally dependent, find the relation between them $u = \frac{x+y}{1-xy}$, $v = tan^{-1}x + tan^{-1}y$.
[BL: Apply| CO: 4|Marks: 2]

   (b) If ux=yz,vy=zx,wz=xy then find the jacobian $\frac{\partial(x,y,z)}{\partial(u,v,w)}$. [BL: Apply | CO: 4|Marks: 3]

2. (a) Determine the Fourier series of periodicity 5 for the function $f(x) = 2x - x^2$, $in\ (0,5)$.
[BL: Apply| CO: 5|Marks: 2]

   (b) Find the Fourier series of the periodic function defined as $f(x)=\begin{cases} -k, & -\pi \le x \le 0 \\ k, & 0 \le x \le \pi \end{cases}$ and hence show that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \ldots\ldots = \frac{\pi}{4}$ [BL: Apply | CO: 5|Marks: 3]

3. (a) Find the Fourier series to represent the function $f(x) = x - x^2$ in $(-\pi, \pi)$
[BL: Apply| CO: 5|Marks: 2]

   (b) Determine the Fourier series representation of the half wave rectifier signal $x(t)=\begin{cases} t, & 0 \le t < \pi \\ 2\pi - t, & \pi \le t < 2\pi \end{cases}$
[BL: Apply | CO: 5|Marks: 3]

4. (a) Find $\iint_R (x+y)dxdy$ over the region bounded by y = 0 , x + y = 2 and $y^2 = x$.
[BL: Apply| CO: 6|Marks: 2]

   (b) Determine the change in the order of integration and hence evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 dydx$.
[BL: Apply | CO: 6|Marks: 3]

5. (a) Evaluate the triple integral $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} \frac{dxdydz}{\sqrt{1-x^2-y^2-z^2}}$.
[BL: Apply| CO: 6|Marks: 2]

   (b) Change the order of integration and evaluate $\int_0^4 \int_{\frac{x^2}{4}}^{2\sqrt{x}} dxdy$. [BL: Apply | CO: 6|Marks: 3]

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