BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSc **SEMESTER : II**
BRANCH: QEDS **SESSION : SP/2025**

SUBJECT: ED24111 INTERMEDIATE ANALYSIS

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Find the limit and establish the convergency of the sequence of functions: $f_n(x) = \frac{x}{(1+nx^2)}$, $x \in \mathbb{R}$.	[5]	CO1	
Q.1(b)	Explain the difference between pointwise convergence and uniform convergence of a series of functions.	[5]	CO2	
Q.2(a)	Find the radius of convergence and sum of the power series $\sum_{n=0}^{\infty} 3^{2n}x^n$.	[5]	CO2	
Q.2(b)	Find the upper and lower Riemann integral of the function $\boxed{f(x) = x^2,\ x \in (0,1)}$	[5]	CO3	
Q.3(a)	Establish that limit of the function $\boxed{f(x) = \frac{x_1^2 - 2x_2^2}{x_1^2 + 2x_2}}$ does not exit at origin.	[5]	CO4	
Q.3(b)	Find the tangent plane of the function $\boxed{f(x) = x_1^2 + x_2^2 + x_1x_2}$ at the point (1,1).	[5]	CO4	
Q.4(a)	Find the optimum point and optimum value of the function $\boxed{f(x) = x_1^2 - x_2^2}$	[5]	CO4	
Q.4(b)	Solve the following optimization problem: $\min x_1^2 + x_2^2$ Subject to $x_1 + x_2 = 1$	[5]	CO4	
Q.5(a)	Evaluate the following double integral: $\boxed{\iint_R \sin(x_2^2)\,dA,\ \text{where } R = \left\{\begin{pmatrix} x_1 \\ x_2 \end{pmatrix} \mid 0 \le x_1 \le x_2 \le 1\right\}}$	[5]	CO5	
Q.5(b)	Evaluate the following double integral: $\boxed{\iint_R x dA,\ \text{where } R = \left\{\begin{pmatrix} x_1 \\ x_2 \end{pmatrix} \mid x_1 + x_2 \le 3, x_2 \ge 2x_1,\ x_2 \ge \frac{1}{2}x_1\right\}}$	[5]	CO5	

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