

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2025)

CLASS: IMSc
BRANCH: QEDS

SEMESTER : II
SESSION : SP/2025

SUBJECT: ED24111 INTERMEDIATE ANALYSIS

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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- Q.1(a) Find the limit of the sequence of functions: [2] CO BL
CO1
- $$f_n(x) = \frac{x}{1 + nx^2}$$
- Q.1(b) Establish the convergence of the sequence of function given in Q.1 (a) [3] CO1
- Q.2(a) State Weiersrauss M-test for convergency test for series of functions [2] CO2
Q.2(b) Establish the convergency of the following series of functions: [3] CO2
- $$\sum_{n=1}^{\infty} \frac{\sin(n^2x + x^2)}{n(n+1)}$$
- Q.3(a) Find the radius of convergence and region or interval of convergence of the following [2] CO2
power series:
- $$\sum_{n=0}^{\infty} 3^{2n}x^n$$
- Q.3(b) Find the sum of the power series given in Q.3(a). [3] CO2
- Q.4(a) Find the period of periods of the following periodic functions: [2] CO2
- $$(i.) \sin(ax), (ii.) \sin\left(\frac{n\pi}{L}x\right)$$
- Q.4(b) Find a Fourier series of a period function defined as follows: [3] CO2
 $f(x) = x, x \in (-\pi, \pi), f(x + \pi) = f(x).$
- Q.5(a) Explain partition of a closed and bounded interval $[a, b]$. [2] CO3
Q.5(b) Define Riemann sums of a bounded function defined over $[a, b]$ as $f: [a, b] \rightarrow \mathbb{R}$. [3] CO3

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