INSTRUCTION TO QUESTION SETTER FOR MJ-2

Semester Internal Examination (SIE) 20+5 = 25 marks:

The Semester Internal Examination shall have two components.

a) One Semester Internal Assessment Test (SIA) of 20 marks.

b) Class Attendance Score (CAS) including the behaviour of the students towards teachers and students activity in the institution of 5 marks.

End Semester Examination (ESE) 75 marks:

There will be two groups of questions.

Group A is compulsory which will contain three questions.

a) **Question No.1** very short answer types consisting of five questions of ***one*** mark each.

b) **Questions No.2 and 3** will be short answer type questions of ***five*** marks each.

Group B will contain descriptive type seven questions of ***fifteen*** marks each, out of which any four are to be answered.

Note: There may be subdivisions in the questions of group B.

Semester	Subject name	Subject Code	Credit	**Teaching hours**
II	**Calculus**	**MJ-2**	6	90

Course Learning Outcomes: This course will enable the students to:

a) Assimilate the notions of limit of a sequence and convergence of a series of real numbers.
b) Calculate the limit and examine the continuity of a function at a point.
c) Understand the consequences of various mean value theorems for differentiable functions.
d) Sketch curves in Cartesian and polar coordinate systems.
e) Apply derivative tests in optimization problems appearing in social sciences, physical sciences, life sciences and a host of other disciplines.
f) Various integration techniques appearing in engineering and research.

Unit-I: Differential calculus

Differentiability of a real valued function, Geometrical interpretation of differentiability, Relation between differentiability and continuity, Differentiability and monotonicity, Chain rule of differentiation; Darboux's theorem, Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Geometrical interpretation of mean value theorems, Successive differentiation, Leibnitz's theorem.

[2 Questions]

Unit-II: Expansions of Functions

Maclaurin's and Taylor's theorems for expansion of a function in an infinite series, Taylor's theorem in finite form with Lagrange, Cauchy and Roche–Schlomilch forms of remainder, Maxima and minima.

[1 Questions]

Unit-III: Curvature and Asymptotes

Curvature; Asymptotes of general algebraic curves, Parallel asymptotes, Asymptotes parallel to axes; Symmetry, Concavity and convexity, Points of inflection, Tangents at origin, Multiple points, Position and nature of double points.

[1 Questions]

Unit-IV: Integral Calculus: Reduction formulae, derivations and illustrations of reduction formulae of the type $\int sin^n x\, dx, \int cos^n x\, dx, \int tan^m x\, dx, \int sin^n x cos^m x\, dx$ and $\int sin^m x cos\, nx\, dx$, parametric equations, parameterizing a curve, curve tracing, arc length, Area of bounded curve, volume and area of surface of revolution.

[3 Questions]

References:

1. R. K. Dwivedi, Calculus, 1st Edition, Pragati Prakashan, Meerut, India, 2019.
2. Howard Anton, I. Bivens & Stephan Davis (2016). *Calculus* (10th edition). Wiley India.
3. Gabriel Klambauer (1986). *Aspects of Calculus*. Springer-Verlag.
4. Wieslaw Krawcewicz & Bindhyachal Rai (2003). *Calculus with Maple Labs*. Narosa.
5. George B. Thomas Jr., Joel Hass, Christopher Heil & Maurice D. Weir (2018). *Thomas' Calculus* (14th edition). Pearson Education.