

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

May-June 2025	
Program: B. Tech Scheme III / II / I	
Regular/Supplementary Examination: FY Semester: II	
Course Code: BSC201 and Course Name: Engineering Mathematics - II	
Date of Exam: 2-June-2025	Duration: 02.5 Hours Max. Marks: 60

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.
- (4) Write numerical values in decimals not in fractions.
- (5) Write numerical values till four decimal places

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any two questions out of three: (05 marks each)	10		
a)	Evaluate $\int_0^a \int_0^{a-x} \int_0^{a-x-y} x^2 dz dy dx$	5	5	3
b)	Solve $(4xy + 3y^2 - x)dx + x(x + 2y) dy = 0$	5	1	3
c)	Solve $(D^3 + 3D^2 + 3D + 1)y = e^{-x}$	5	2	3
Q 2	Solve any two questions out of three: (05 marks each)	10		
a)	Using rule of DUIS prove that $\int_0^1 \frac{x^\alpha - 1}{\log x} dx = \log(1 + \alpha)$.	5	3	3
b)	Evaluate $\iint y dx dy$ over the region bounded by $x = 0, y = x^2, x + y = 2$ in the first quadrant.	5	4	3
c)	Find the value of $\int_0^1 \frac{1}{1+x^2} dx$ using Trapezoidal rule with $h=0.2$. Can we use Simpson's $1/3^{\text{rd}}$ rule? why?	5	6	3
Q.3	Solve any two questions out of three. (10 marks each)	20		
a)	Find the area outside the circle $r = a$ and inside the cardioid $r = a(1 + \cos \theta)$.	10	5	3

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b)	Solve $(x^3 y^3 + xy) dy = dx$	1	3
c)	Apply the method of variation of parameters to solve $(D^3 - 6D^2 + 12D - 8)y = \frac{e^{2x}}{x}$	2	3
Q.4	Solve any two questions out of three. (10 marks each)	20	
a)	(i) Evaluate $\int_0^1 (\log x)^5 dx$	5	3
	(ii) Evaluate $\int_0^1 \sqrt{\sqrt{x} - x} dx$	5	
b)	Draw the sketch the region of integration for the following integral then Change the order of integration and evaluate. $\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x}{\sqrt{x^2 + y^2}} dx dy$	10	3
c)	Solve $\frac{dy}{dx} = x + 3y$ with $x_0 = 0, y_0 = 1$ by Euler's modified method for $x = 0.1$ with $h = 0.05$. Correct up to three places of decimals.	10	3
