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

July/Aug ~~May-June~~ 2025
Program: B. Tech Scheme III
~~Regular~~/Supplementary Examination: FY Semester: II
Course Code: BSC201 and Course Name: Engineering Mathematics - II
Date of Exam: ~~2 June 2025~~ 29/07/25 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.

Q. No.	Question	Max. Marks	CO	BT level
Q 1	Solve any **two** questions out of three: (05 marks each)	10		
a)	Evaluate $\int_0^a \int_0^{\sqrt{a^2-y^2}} y^2\sqrt{x^2+y^2}\,dydx$ by changing to polar coordinates.	5	5	3
b)	Solve $y(x^2y^2+2)dx + x(2-2x^2y^2)dy = 0$	5	1	3
c)	Solve $(D^3-3D^2+9D-27)y = \cos 3x$	5	2	3
Q 2	Solve any **two** questions out of three: (05 marks each)	10		
a)	Evaluate $\int_0^1 \sqrt[3]{\log(1/x)}\,dx$	5	3	3
b)	Evaluate $\int_0^1 \int_0^{\sqrt{(1-y^2)/2}} \frac{dxdy}{\sqrt{1-x^2-y^2}}$	5	4	3
c)	Solve $\frac{dy}{dx} = x^3+y$, $x=0$, $y=2$ by Runge-Kutta method of fourth order for $x=0.2$	5	6	3
Q.3	Solve any **two** questions out of three. (10 marks each)	20		
a)	(i) Find by double integration the area between the circles $r = 2asin\theta$, $r = 2bsin\theta$ $(b>a)$ (ii)Evaluate $\int_0^{log2} \int_0^x \int_0^{x+y} e^{x+y+z}\,dzdydx$	6 4	5	3

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b)	(i) Solve $y^4dx = (x^{-3/4} - y^3x)dy$ (ii) Solve $\frac{dy}{dx} + (2xtan^{-1}y - x^3)(1+y^2)$	6 4	1	3
c)	Solve $(D^4 + 2D^2 + 1)y = x^2 \cos x$	10	2	3
Q.4	Solve any **two** questions out of three. (10 marks each)	20		
a)	(i) Show that $\int_0^{\pi} \frac{\log(1+acosx)}{cosx} dx = \pi \sin^{-1} a$, $0 \le a \le 1$. Hence , evaluate $\int_0^{\pi} \frac{\log(1+\cos x)}{\cos x} dx$ (ii) Evaluate $\int_0^2 y^4(8-y^3)^{-1/3}dy$	6 4	3	3
b)	(i) Evaluate $\iint(x+2y)dA$ over the region bounded by the parabolas $y = 2x^2$ *and* $y = 1 + x^2$ (ii) Change the order of integration and evaluate the integral $\int_0^2 \int_0^{4-x^2} \frac{xe^{2y}}{4-y} dydx$	6 4	4	3
c)	Compute the values of $\int_{0.2}^{1.4}(sinx - log_e x + e^x)dx$ by using (i) Simpson's (1/3)rd rule ,and (ii) Simpson's (3/8)th rule	10	6	3

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