Seat No.	

SZ-05

Total No. of Pages : 02

F.Y.B.Tech.(All Branches) (Part-I) (Semester-II) (CBCS) Examination, Oct.-2025
ENGINEERING MATHEMATICS-II
Sub. Code: 72500

Day and Date : Friday, 16-01-2026 **Total Marks : 70**
Time : 10.30 a.m. to 1.00 p.m.

Instructions :
1) Attempt any three questions from each section.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.

SECTION-I

Q. 1) a) Solve $(secx\ tanx\ tany + 4x^3)dx + (secx\ sec^2y + cos\ y)dy = 0$. [6]

b) Solve $(x^4e^x - 2mxy^2)dx + 2mx^2ydy = 0$. [6]

Q. 2) a) Find the orthogonal trajectory of $\frac{x^2}{a^2} + \frac{y^2}{b^2+\lambda} = 1$ where λ is parameter. [5]

b) In a circuit containing resistance R, inductance L and a constant e. m. f. E, [6]
the current i is given by $L\frac{di}{dt} + Ri = E$. If L = 640 h, R= 250 Ω , E = 500 V
and i= 0 when t = 0, show that the current will approach 2 amp, when $t \to \infty$.

Q. 3) a) Use Taylor's series method to solve $\frac{dy}{dx} = 1 + xy$, with $y(1) = 2$ at $x = 1.2$. [6]

b) Use Euler's modified method to solve $\frac{dy}{dx} = x^2 + y$, with $y(0) = 1$ at $x = 0.1$ [5]
taking h=0.05.

Q. 4) Attempt any TWO of the following.

a) Solve $3y^2\frac{dy}{dx} + 2xy^3 = 4x^3e^{x^2}$. [6]

b) A body at temperature 80^0C is placed in a room temperature at 50^0C at time $t = 0$. [6]
At the end of 5 minutes the body has cooled to temperature 70^0C.
Find the temperature of the body after 10 minutes.

c) Apply Runge-Kutta's method of fourth order to solve [6]
$\frac{dy}{dx} = x + y^2, with\ y(0) = 1\ \ at\ x = 0.1$.

SECTION-II

Q.5) a) Perform five iterations of the bisection method to obtain the positive root of the equation $sinx = \frac{1}{x}$ that lies between $x = 1$ and $x = 1.5$. [6]

b) Find the positive root of the equation $x^4 - x - 10 = 0$ correct to three decimal places using Secant method. [6]

Q.6) a) Evaluate $\int_0^{\infty} 5^{-4x^2}\, dx$. [5]

b) Evaluate $\int_0^2 x^4 (8 - x^3)^{-\frac{1}{3}} dx$. [6]

Q.7) a) Evaluate $\int_0^a \int_0^{\sqrt{a^2-x^2}} \sqrt{a^2 - x^2 - y^2}\; dydx$. [5]

b) Evaluate by Changing to polar coordinates $\int_0^{4a} \int_{\frac{y^2}{4a}}^{y} dx\, dy$. [6]

Q.8) Attempt any TWO of the following.

a) Using Newton-Raphson method, find the real root of $x \log_{10} x = 1.2$ correct to five decimal places. [6]

b) Express erf(x) as an infinite series and find $erf(0.5)$. [6]

c) Find the area between $y^2 = 4x$ and the chord AB joining the points A (1,2) and B (1, -2). [6]

❐❐❐