Seat No.

MAR_APR 2025 SUMMER EXAMINATION

11731 Bachelor of Technology (NEP-2.0)

Sub. Name: Engineering Mathematics-II

Sub. Code: 109816

Day and Date: SEPTEMBER,09-09-2025 **Total Marks: 60**

Time: 10:30 AM To 01:00 PM

Instructions: **1. All questions are compulsory**
2. Figures to the right indicate full marks
3. Use of Scientific calculator is allowed

Q1) **[15]**

Attempt any Three of the following. (5 Marks Each)

a) Solve: $(x^2 + y^2)dx + 2xydy = 0$

b) A constant e.m.f. E volts is applied to a circuit containing a constant resistance R ohms in series and a constant inductance L henries. The current i at any time, t *is* given by $L\frac{di}{dt} + Ri = E$. If the initial current is zero, show that the current builds up to half its theoretical maximum value in $\frac{L}{R}\log 2$ seconds.

c) Using Euler's method, find the approximate value of y at $x = 1$ when $\frac{dy}{dx} = x^2 + y^2$,with $y(0) = 1$ taking h = 0.2.

d) Apply Runge-Kutta's method of fourth order to find an approximate value of y at $x = 0.1$ given that $\frac{dy}{dx} = x + y^2$, with $y(0) = 1$ taking $h = 0.1$.

Q2) **[15]**

Attempt any Three of the following. (5 Marks Each)

a) Perform four iterations of the Bisection method to obtain the smallest positive root of the equation $x^3 - 5x + 2 = 0$.

b) Find the real root of the equation $x^3 - 2x - 5 = 0$, correct to three decimal places using Newton-Raphson method.

c) Find the root of the equation $xe^x = cosx$ using secant method correct to three decimal places.

d) By Newton-Raphson method, find the value of cube root of 48 correct to four decimal places.

Q3) **[15]**

Attempt any Three of the following. (5 Marks Each)

a) Evaluate: $\int_0^{\infty} \frac{x^6}{6^x}\, dx$.

b) Evaluate: $\int_0^{\infty} \left(\frac{x}{1+x^2}\right)^6 dx$.

c) Evaluate: $\int_3^7 \sqrt[4]{(x-3).(7-x)}\, dx$.

d) Express erf(x) as an infinite series and find erf (0.7).

Q4) **[15]**

Attempt any Three of the following. (5 Marks Each)

a) Evaluate: $\int_0^1 \int_0^x (x^2+y^2)\, x \;\; dy\, dx$.

b) Change the order of integration and evaluate $\int_0^1 \int_{x^2}^x xy\, dydx$.

c) Find the area common to the parabolas $y^2 = 4ax$ *and* $x^2 = 4ay$.

d) Find the Mass of an elliptical plate $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ if the density at any point P (x, y) on it is λxy.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -
This Question Paper may be distributed for following Subjects as common code.
सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

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