SC - 810

Total No. of Pages : 2

Seat No.	

F.Y. B.Tech. (All Branches) (Part - I) (Semester - II) Examination, December - 2019

ENGINEERING MATHEMATICS - II

Sub. Code : 72500

Day and Date : Tuesday, 10 - 12 - 2019 **Total Marks : 70**

Time : 2.30 p.m. to 5.00 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

Q1) a) Solve $\frac{dy}{dx} - y\tan x = y^4 \sec x$. **[6]**

b) Solve $y(x^2y + e^x)\,dx - e^x\,dy = 0$ **[6]**

Q2) a) Find the orthogonal trajectories of $x^2 + y^2 = ay$. **[6]**

b) A current is flowing in a circuit of resistance R = 20 Ohms, inductance L = 0.05 henries. If the current of 30 amps flows at the begining, find the current after 0.01 sec there being no external e.m.f. **[5]**

Q3) a) Find the solution of $(x^2 + y)\,dx - dy = 0$ at $x = 0.2$ by modified Euler's method if $y = 1$ when $x = 0$. **[5]**

b) Find $y(1)$ from $dx - (1 + xy)\,dy = 0$ by Runge-Kutta's method of fourth order using $h = 0.5$ if $y(0) = 1$. **[6]**

Q4) Attempt any TWO of the following **[12]**

a) Solve $y(xy + 2x^2y^2)\,dx + x(xy + x^2y^2)\,dy = 0$

b) A body at temperature of 100 °C is placed in a room where temperature is 20 °C and cools to 60 °C in 5 minutes. Find its temperature after a further interval of 3 minutes.

c) Find y at x = 0.2 correct upto 4 decimal places by Taylor's series method from $\frac{dy}{dx} = x - y^2$ and y(0) = 1.

P.T.O.

SECTION - II

Q5) a) Find one root of the equation $x^3 + x^2 = 1$ by Bisection method. **[6]**

b) Find one root of the equation $e^x = 5x - 2$ by Secant method. **[6]**

Q6) a) Evaluate $\int_0^\infty x^4 e^{\left(\frac{-1}{x^3}\right)} dx$ **[6]**

b) Evaluate $\int_0^\pi \left(\sin^3 x\right)\left(\sqrt{1+\cos x}\right)^8 dx$ **[5]**

Q7) a) Evaluate $\int_0^\infty \int_0^\infty e^{-x^2\left(1+y^2\right)} x\, dxdy$ **[5]**

b) Evaluate by changing the order of integration $\int_0^1 \int_{y^2}^{y} \frac{y\, dxdy}{(1-x)\sqrt{x-y^2}}$ **[6]**

Q8) Attempt any TWO of the following

a) Find one root of the equation $x^3 = 5x + 1$ by Newton Raphson method. **[6]**

b) Prove that $erf_c(x) = 1 - erf(x)$ and evaluate $erf_c(-x) + erf_c(x)$. **[6]**

c) Find by double integration the area between the curves $y^2 = 4x$ and $2x - 3y + 4 = 0$. **[6]**

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