SV - 617

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Seat No.	

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

ENGINEERING MATHEMATICS - II (CBCS)

Sub. Code : 72500

Day and Date : Thursday, 25 - 04 - 2019 **Total Marks : 70**

Time : 10.00 a.m. to 12.30 p.m.

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

SECTION - I

Q1) a) Solve $\sin y \frac{dy}{dx} - \cos y = x \cos^2 y$ [6]

b) Solve $(ye^{xy} - \tan x)\,dx + (xe^{xy} - \sec y)\,dy = 0$ [6]

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

b) The current in a circuit containing inductance L, resistance R and voltage $E\sin\omega t$ is given by $L\frac{di}{dt} + Ri = E\sin\omega t$. If there is no current initially in the circuit then show that the current at any time t is given by

$$\frac{E}{\sqrt{R^2 + \omega^2 L^2}}\sin(\omega t - \phi) + \sin\phi e^{-Rt/L} \text{ where } \phi = \tan^{-1}\frac{L\omega}{R}$$ [5]

Q3) a) Find the solution of $(y^2 - x - 1)dx + dy = 0$ at $x = 0.4$ by modified Euler's method using $h = 0.2$ if $y(0) = 1$ [6]

b) Find y at $x = 0.2$ if $\frac{dy}{dx} = \frac{(2x-1)y}{x^2} + 1$ and $y(1) = 2$ by Runge Kutta's fourth order method. [5]

P.T.O.

Q4) Attempt any two of the following: [12]

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

b) Temperature of water initially is 100° C and that of surrounding is 20°C. If water cools down to 60°C in first 20 minutes, during what time will it come to 30°C.

c) Solve $\frac{dy}{dx} = x^2 + y^2$ with $y(1) = 0$ for $x = 1.3$ by Taylor's series method correct upto 4 places of decimals.

SECTION - II

Q5) a) Find one root of the equation $3x - \cos x - 1 = 0$ by Bisection method [6]

b) Find one root of the equation $e^{-x} = 5x - 1$ by Newton Raphson method [6]

Q6) a) Evaluate $\int_0^1 \left[\log\left[\frac{1}{x}\right]^5\right] x^{\frac{5}{2}} dx$ [5]

b) Evaluate $\int_0^{\pi} x\cos^6 x dx$ [6]

Q7) a) Evaluate by changing the order of integration [6]

$$\int_0^a \int_{\frac{y^2}{a}}^{y} \frac{ydxdy}{(a-x)\sqrt{ax-y^2}}$$

b) Find by double integration the area enclosed between the curves $y^2 = x^3$ and $y = x$. [5]

Q8) Attempt any two of the following

a) Find one root of the equation by Secant method $e^x = x^4$ [6]

b) Express erf(x) in series and evaluate erf (0.3) [6]

c) Change into polar coordinates and evaluate [6]

$$\int_0^{4a} \int_{\frac{y^2}{4a}}^{y} dxdy$$

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