Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

I SEMESTER B.TECH.

END SEMESTER MAKEUP EXAMINATIONS, JANUARY 2020

SUBJECT: ENGINEERING MATHEMATICS I [MAT 1151]

REVISED CREDIT SYSTEM

(01/01/2020)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions. Missing data may be suitably assumed.

Q1A. Evaluate $\int_0^{\frac{\pi}{2}} sinx\, dx$ by Simpson's one-third rule dividing the range into six equal parts. (3)

Q1B. Solve $(4xy + 3y^2 - x)dx + x(x + 2y)dy = 0$ (3)

Q1C. Using 4th order Runge Kutta method , solve $y' = 1 + y^2$ with y(0)=0 at x= 0.4 in steps of length h=0.2. (4)

Q2A. Find a real root of the equation $x^3 - 4x - 9 = 0$, using the bisection method given that the root lies between 2 and 3. Carryout 4 iterations. (3)

Q2B. Solve $(2x + 3)^2 \frac{d^2y}{dx^2} - (2x + 3)\frac{dy}{dx} - 12y = 6x$. (3)

Q2C. Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$. (4)

Q3A. Find inverse using Gauss Jordan elimination method if

$$A = \begin{bmatrix} 8 & -4 & 0 \\ -4 & 8 & -4 \\ 0 & -4 & 8 \end{bmatrix}$$ (3)

(PTO)

Q3B. If V is a vector space of dimension n, show that any orthonormal set of n vectors of V forms a basis of V. (3)

Q3C. Solve $5x+2y+z=12, \quad x+4y+2z=15, \quad x+2y+5z=20.$ by Gauss-Seidel iteration method. Carry out four iterations. (4)

Q4A. Apply Taylor's series method to obtain approximate value of y at $x = 0.2$ for the differential equation $y' = 2y + 3e^x, \ y(0) = 0$. (3)

Q4B. Solve by the method of variation of parameters $(D^2+4)y = \tan 2x$. (3)

Q4C. Construct orthonormal Basis using Gram-Schmidt orthogonalisation process from the set of vectors $\{(1,1,1), (1,0,1), (1,1,0)\}$ (4)

Q5A. Estimate the value of $y(3.8)$ for the following data using Newton backward interpolation formula.

x	0	1	2	3	4
y	1	1.5	2.2	3.1	4.6

(3)

Q5B. Solve by Gauss elimination method

$$2x + y + 4z = 12, \ 4x + 11y - z = 33, \ 8x - 3y + 2z = 20.$$ (3)

Q5C. Certain corresponding values of x and y are given below. Find y at 310 using Lagrange's interpolation formula.

x	300	304	305	307
y	2.4771	2.4829	2.4843	2.4871

(4)

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