Paper Id: | 180102 | **Roll No:** | | | | | | | | | | | |

B.TECH
(SEM I) THEORY EXAMINATION 2019-20
ENGINEERING MATHEMATICS-I

Time: 3 Hours   *Total Marks: 70*

Note: **1.** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 7 = 14**

    a.   Find the median of the following data:3000,2180,2785,2500,1560,1782,2200,1385,2123,1222.

    b.   Write the normal equations: $y = ax^2 + bx + c$.

    c.   Define the differentiability of function at $x = x_0$.

    d.   Find$\frac{dy}{dx}$ for $y = x^2 secx$.

    e.   Find$\frac{\partial^2 u}{\partial x \partial y}$ for $u = x^3 \log(x^2 + y^2)$.

    f.   Evaluate $\int \sin^2 x \, dx$

    g.   Define the order and degree of differential equation.

SECTION B

2.   **Attempt any *three* of the following:**   **7 x 3 = 21**

    a.   Find the measures of skewness for the following distribution:

x	1	3	5	7	9
f	1	4	6	4	1

    b.   Find $\frac{dy}{dx}$ for $y = \frac{sinx}{logx}$.

    c.   Examine $f(x, y) = x^3 + y^3 - 3axy$ for maximum and minimum values.

    d.   Evaluate $\int \frac{x+2}{(x+1)(x+3)} dx$

    e.   Solve the differential equation $3\frac{dy}{dx} + xy = \frac{x}{y^2}$.

SECTION C

3.   **Attempt any *one* part of the following:**   **7 x 1 = 7**

    (a)   By the method of least squares, find the curve $y = ax + bx^2$ that best fits the following data:

x	1	2	3	4	5
y	1.8	5.1	8.9	14.1	19.8

(b)   Obtain the median for the following frequency distribution:

x	1	2	3	4	5	6	7	8	9
f	8	10	11	16	20	25	15	9	6

4.   **Attempt any *one* part of the following:**   **7 x 1 = 7**

(a)   Find $\frac{dy}{dx}$ for $y = logloglog(tanx^{2})$.

(b)   Show that f (x) given by

$$f(x) = \begin{cases} 5x - 4 & if\ 0 < x \le 1 \\ 4x^3 - 3x & if\ 1 < x < 2 \end{cases} \text{is continuous at x = 1.}$$

5.   **Attempt any *one* part of the following:**   **7 x 1 = 7**

(a)   If $u = f(r), where\ r^2 = x^2 + y^2$, prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = f''(r) + \frac{1}{r}f'(r)$.

(b)   If u,v w are the roots of the equation $(\lambda - x)^3 + (\lambda - y)^3 + (\lambda - z)^3 = 0\ in\ \lambda$, find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.

6.   **Attempt any *one* part of the following:**   **7 x 1 = 7**

(a)   Evaluate $\int x^2 sinx\ dx$.

(b)   Evaluate $\int \frac{cos^2(logx)}{x} dx$.

7.   **Attempt any *one* part of the following:**   **7 x 1 = 7**

(a)   Solve the differential equation $(D^2 + 4)y = sin3x + cos2x$.

(b)   Solve $(D^2 + 9)y = tanx$ differential equation by the method of variation of parameters.