

4E4176

Roll No. _____

Total No of Pages: **4****4E4176****B.Tech. IV-Sem (Main & Back) Exam; June-July 2016****Electrical & Electronics Engineering****4EX6A Advanced Engg. Mathematics-II****Common with EE,EX****Time: 3 Hours****Maximum Marks: 80****Min. Passing Marks (Main & Back): 26****Min. Passing Marks (Old Back): 24****Instructions to Candidates:-**

Attempt any **five** questions, selecting **one** question from each unit. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No.205)

1. _____

2. _____

UNIT-I

Q.1 (a) Use Newton – Raphson method to find a real root of $f(x) = x^3 - 3x - 5 = 0$. [8]

(b) Given the following data:

x:	0.0	0.2	0.4	0.6	0.8
y:	0.3989	0.3910	0.3683	0.3332	0.2897

Evaluate the value of $y(0.25)$, $y(0.62)$ and $y(0.43)$. [8]

OR

Q.1 (a) Fit a straight line for the following data: [8]

x:	1	2	3	4	5
y:	35	65	100	138	170

- (b) Using Lagrange's interpolation formula, find the value of $y(5)$ from the following table: [8]

x:	1	2	3	4	7
y:	2	4	8	16	128

UNIT-II

- Q.2 (a) Evaluate the value of $\frac{dy}{dx}$ for $x = 0.1$ and 0.5 from the following table: [8]

x:	0	0.1	0.2	0.3	0.4	0.5	0.6
y:	30.28	31.43	32.98	33.54	33.97	33.48	32.13

- (b) Use Runge – Kutta method to find $y(1.1)$, given that:

$$\frac{dy}{dx} = x^2 + y^2; y(1) = 0 \quad [8]$$

OR

- Q.2 (a) Use Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rules to evaluate the integral $\int_0^1 \frac{x^2}{1+x^3} dx$. Hence obtain

the approximate value of $\log_e 2$. [8]

- (b) Use Milne's Predictor – Corrector method to find $y(0.8)$, given that:

$$\frac{dy}{dx} = x - y^2; y(0) = 0, y(0.2) = 0.02, y(0.4) = 0.0795, y(0.6) = 0.1762. \quad [8]$$

UNIT-III

- Q.3 (a) Show that $xJ_{n+1} + xJ_{n-1} = 2nJ_n$. [8]

- (b) Prove that $\int_{-1}^1 P_m(x) P_n(x) dx = \begin{cases} 0 & ; m \neq n \\ \frac{2}{2n+1} & ; m = n \end{cases}$ [8]

OR

- Q.3 (a) Show that $J_{-n}(x) = (-1)^n J_n(x)$, $n \in \mathbb{Z}$ [8]

- (b) Show that $P_n(x) = \frac{1}{(n!) 2^n} \frac{d^n}{dx^n} (x^2 - 1)^n$ [8]

UNIT-IV

Q.4 (a) A newly constructed house may fall down either due to wrong designing or by inferior material used in the construction. Chance that the designing is faulty is 10% and the probability of its collapse, if design is faulty is 95% and that due to bad material is 45%. If the house collapses, find the chance that it was due to wrong designing. [8]

(b) If the height of 300 students are normally distributed with mean 64.5 inches and standard deviation 3.3 inches, how many students have heights

- (i) Less than 5 feet,
- (ii) Between 5 feet and 5 feet 9 inches. Also find the height between which 99% of the student lie.

[(Given $P(0 < Z < 1.36) = 0.4131$, $P(0 < Z < 2.57) = 0.495$)] [8]

OR

Q.4 (a) Razor blades are supplied by a manufacturing company in packets of 10. There is a probability of 1 in 100 blades to be defective. Using Poisson distribution, calculate the number of packets containing one defective blade, no defective blade and all defective blades in a consignment of 10,000 packets. [8]

(b) The distribution of weekly wages for 500 workers in factory is approximately normal with the mean and standard deviation of ₹ 75 and ₹ 15 respectively. Find the number of workers who receive weekly wages

- (i) More than ₹ 90,
- (ii) Less than ₹ 45.

[(Given $P(0 \leq Z < 1) = 0.3413$, $P(0 < Z < 2) = 0.4772$)] [8]

UNIT-V

Q.5 (a) In a partially destroyed laboratory on record of an analysis of correlation data, the following results only are legible:

$\text{Var}(x) = 9$, Regression equations: $8x - 10y + 66 = 0$, $40x - 18y = 214$. Find

- (i) The mean values of x and y ,
- (ii) The standard deviation of y ,
- (iii) The correlation coefficient of x and y .

[8]

(b) Find the inverse Z – transform of following function:

$$F(z) = \frac{1}{(z-1)(z-2)}, \text{ if ROC is}$$

- (i) $|z| < 1$,
- (ii) $1 < |z| < 2$,
- (iii) $|z| > 2$.

[8]

OR

Q.5 ✓ (a) Calculate the coefficient of correlation between x and y using the following data: [8]

x:	1	2	3	4	5	6	7	8	9
y:	9	8	10	12	11	13	14	16	15

(b) Find the Z – transform of $u_n = c^n \cosh an$, $n \geq 0$.

[8]