

16/7/2016

4E4176

Roll No. _____

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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]