

4E4176

Roll No. _____

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B. Tech. IV-Sem. (Back) Exam., Oct.-Nov. - 2020
Electrical Engineering
4EE6A Advanced Engineering Mathematics – II
EE, EX

Time: 2 Hours

Maximum Marks: 48
Min. Passing Marks: 16

Instructions to Candidates:

*Attempt **three** questions, selecting **one** question each from any three 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. NIL2. NIL

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UNIT-I

Q.1 (a) Given the following pairs of values of x and y - [8]

x :	5	6	9	11
y :	12	13	14	16

Interpolate the value of y at x = 10.

(b) The values of a function $y = f(x)$ at some points are given in the following table - [8]

x :	0	1	2	3	4	5	6
y = f(x) :	176	183	197	205	215	223	231

Find the value of the function $y = f(x)$ at x = 0.2.

OR

Q.1 (a) Using Stirling formula, compute $f(1.22)$ from the following data - [8]

$x :$	1	1.1	1.2	1.3	1.4
$f(x) :$	0.841	0.891	0.932	0.963	0.985

(b) Fit a parabola of second degree, taking x as independent variable to the following data - [8]

$x :$	1	1.5	2.0	2.5	3.0	3.5	4.0
$y :$	1.1	1.3	1.6	2.6	2.7	3.4	4.1

UNIT- II

Q.2 (a) Apply Picard's method to find the solution of the differential equation - [8]

$$\frac{dy}{dx} = \frac{y - x}{y + x} \text{ with } x = 0.1, y = 0.2$$

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using - [8]

(i) Trapezoidal rule

(ii) Simpson's $\frac{1}{3}$ rule

OR

Q.2 (a) Use Runge-Kutta method of fourth order to find the numerical solution at $x = 0.8$

for $\frac{dy}{dx} = \sqrt{(x+y)}$, $y(0.4) = 0.41$. Take $h = 0.2$. [8]

(b) Use Euler's modified method to solve $\frac{dy}{dx} = x^2 + y$; $y(0) = 0.94$ for $x = 0.1$ [8]

UNIT- III

Q.3 (a) Show that -

$$\frac{d}{dx} [x J_n(x) J_{n+1}(x)] = x [J_n^2(x) - J_{n+1}^2(x)]$$

[8]

(b) Prove that -

$$P'_{n+1} + P'_n = P_0 + 3P_1 + 5P_2 + \dots + (2n+1)P_n$$

[8]

OR

Q.3 (a) Express $J_{3/2}(x)$ and $J_{-(3/2)}(x)$ in terms of sine and cosine functions.

[8]

(b) Show that -

[8]

$$J_{-1/2}(x) = \sqrt{\left(\frac{2}{\pi x}\right)} \sin x$$

UNIT- IV

Q.4 (a) In a bolt factory machines A, B and C manufacture respectively 25%, 35% and 40% of the total bolts of their output 5, 4 and 2 percent are respectively defective bolts. A bolt is drawn at random from the product and is found to be defective, what is the probability that it was manufactured by machine A, B and C? [8]

(b) If 10% of the pens manufactured by the company are defective, find the probability that a box of 12 pens contain - [8]

(i) Exactly two defective pens

(ii) Atleast two defective pens

OR

Q.4 (a) Find the probability that at the most 5 defective fuses will be found in a box of 200 fuses if experience shows that 2% of such fuses are defective. [8]

(b) Find mean and variance of Normal Distribution. [8]

UNIT- V

Q.5 (a) Obtain the rank correlation coefficient for the following data - [8]

x :	85	74	85	50	65	78	74	60	74	90
y :	78	91	78	58	60	72	80	55	68	70

(b) Calculate the Karl Pearson's coefficient of correlation of the following data - [8]

x :	25	27	30	35	33	28	36
y :	19	22	27	28	30	23	28

OR

Q.5 (a) Calculate the coefficient of correlation and obtain the line of regression for 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 inverse z – transform of - [8]

$$f(z) = \frac{1}{(z-3)(z-2)}$$

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If (i) $|z| < 2$ (ii) $|z| > 3$
