4E4176

Roll No. _____ Total No of Pages: 4

4E4176

B. Tech. IV Sem. (Main/Back) Exam., June/July-2014

Electrical Engg.

4EE6A Advance Engg. Mathematics-II

Common to (EE and EX)

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 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)

UNIT-I

Q.1. (a) Evaluate:- $E = 1 + \frac{1}{2}\delta^2 + \delta\sqrt{1 + \frac{\delta^2}{4}}$ [4]

(b) Using Lagrange's formula find the value of y (10) from the following data [4]

x	5	6	9	11
y	12	13	14	16

(c) The ordinates of the normal curve are given by the following table: [8]

x	0.10	0.15	0.20	0.25	0.30
y	0.1003	0.1511	0.2026	0.2554	0.3093

Calculate y for

(i) $x = 0.14$

(ii) $x = 0.21$

(iii) $x = 0.28$

OR

Q.1. (a) Use Regular Falsi method to find a real root of the equation $x \log_{10} x - 1.2 = 0$ correct to four decimal places. [5]

(b) Solve the following equations by Gauss- Seidel method upto third iterations. [5]

$$27x + 6y - z = 85$$
$$6x + 15y + 2z = 72$$
$$x + y + 54z = 110$$

(c) Fit a straight line to the following data [6]

x	1	2	3	4	6	8
y	2.4	3	3.6	4	5	6

UNIT-II

Q.2. (a) Evaluate $\int_1^2 \sqrt{x - \frac{1}{x}}\, dx$ by [8]

(i) Trapezoidal rule

(ii) Simpson's 1/3 rule by taking 5 ordinates.

(b) Solve the difference equation: [8]

$$y_n - y_{n-1} + 2y_{n-2} = n + 2^n$$

OR

Q.2. (a) Using Picard's method, find the fourth order approximate solution at x = 0.2 of the problem [8]

$$\frac{dy}{dx} = 1 + xy \ , \ y\ (0) = 0$$

(b) Given $\frac{dy}{dx} = y\text{-}x^2$; y(0) = 1; y(0.2) = 1.12186; y(0.4) = 1.4682; y(0.6) = 1.7379. Evaluate y(0.8) using Milne's predictor – corrector method. [8]

UNIT-III

Q.3. (a) Prove that $\int x\ J_0^2(x)\ dx = \frac{x^2}{2}\left[J_0^2(x) + J_1^2(x)\right] + C$ [6]

(b) Find $J_{-5/2}(x)$ [5]

(c) Prove $\frac{d}{dx}\left[x^{-n} J_n(x)\right] = -x^{-n} J_{n+1}(x)$ the recurrence relation for $J_n(x)$ [5]

OR

Q.3. (a) Show that [8]

(i) $\int_{-1}^{1} P_n(x)\ dx = 0\ ;\ n \neq 0$

(ii) $\int_{-1}^{1} P_0(x)\ dx = 2$

(b) Prove that [8]

(i) $n P_n(x) = x P_n'(x) - P_{n-1}'(x)$

(ii) $(2n+1) P_n(x) = P_{n+1}'(x) - P_{n-1}'(x)$

UNIT-IV

Q.4. (a) In a bolt factory machines A, B and C manufactory 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 is was manufactured by machine A, B and C? [8]

Q.2. (a) Using Picard's method, find the fourth order approximate solution at x = 0.2 of the problem [8]

$$\frac{dy}{dx} = 1 + xy \ , \ y\ (0) = 0$$

(b) Given $\frac{dy}{dx} = y\text{-}x^2$; y(0) = 1; y(0.2) = 1.12186; y(0.4) = 1.4682; y(0.6) = 1.7379. Evaluate y(0.8) using Milne's predictor – corrector method. [8]

UNIT-III

Q.3. (a) Prove that $\int x\ J_0^2(x)\ dx = \frac{x^2}{2}\left[J_0^2(x) + J_1^2(x)\right] + C$ [6]

(b) Find $J_{-5/2}(x)$ [5]

(c) Prove $\frac{d}{dx}\left[x^{-n} J_n(x)\right] = -x^{-n} J_{n+1}(x)$ the recurrence relation for $J_n(x)$ [5]

OR

Q.3. (a) Show that [8]

(i) $\int_{-1}^{1} P_n(x)\ dx = 0\ ;\ n \neq 0$

(ii) $\int_{-1}^{1} P_o(x)\ dx = 2$

(b) Prove that [8]

(i) $n\,P_n(x) = x\,P_x'(x) - P_{n-1}'(x)$

(ii) $(2n+1)\,P_n(x) = P_{n+1}'(x) - P_{n-1}'(x)$

UNIT-IV

Q.4. (a) In a bolt factory machines A, B and C manufactory 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 is was manufactured by machine A, B and C? [8]

(b) A and B throws alternatively with a pair of dice. The one who throws a first wins. Show that their chances of wining are 9:8 [8]

OR

Q.4. (a) A car-hire firm has two cars, which it hires out day by day. The demand for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days on which some demand is refused. [8]

(b) In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the parameters of the distribution. [8]

UNIT-V

Q.5. (a) Calculate the karl Pearson's coefficient of correlation of the following data [8]

x	25	27	30	[illegible]	28	36
y	19	22	27	[illegible]	23	28

(b) Find the inverse Z transform of $\frac{1}{(z-a)^2}$ [8]

(a) $|z| < a$

(b) $|z| > a$

OR

Q.5. (a) Calculate the coefficient of correlation from the following data: [8]

x	1	3	5	7	8	10
y	8	12	15	17	18	20

(b) Solve the difference equation by Z transform

$u_{n+2} - 6u_{n+1} + 8u_n = 2^n + 6_n$ [8]

-------x-------x-------