

B.Tech. IV Semester (Main) Examination, June/July - 2015

Electrical Engineering

4EE6A Advance Engg. Mathematics-II

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

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.

Unit - I

1. a) The observed values of a function are respectively 168, 120, 72 and 63 at the four positions 3, 7, 9 and 10 of the independent variable. What is the value of $f(6)$? (8)

- b) Solve the system

$$27x + 6y - z = 85$$

$$6x + 15y + 2z = 72$$

$$x + y + 54z = 110$$

Using Gauss-seidel method

(8)

OR

1. a) Use Stirling's formula to find u_{11} , given that

$$u_0 = 3010,$$

$$u_5 = 2710,$$

$$u_{10} = 2285,$$

$$u_{15} = 1860,$$

$$u_{20} = 1560,$$

$$u_{25} = 1510,$$

$$u_{30} = 1835$$

(8)

- b) Fit a second degree parabola to the following data taking X as independent variable

| | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|
| X : | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | |
|-----|---|---|---|---|----|----|----|----|---|
| Y : | 2 | 6 | 7 | 8 | 10 | 11 | 11 | 10 | 9 |
|-----|---|---|---|---|----|----|----|----|---|

(8)

Unit - II

2. a) Find the first derivative of $f(x)$ at $x=0.4$ from the following table

| | | | | |
|--------|---------|---------|---------|---------|
| x | 0.1 | 0.2 | 0.3 | 0.4 |
| $f(x)$ | 1.10517 | 1.22140 | 1.34986 | 1.49182 |

(8)

- b) Using Euler's modified method, obtain a solution of the equation

$$\frac{dy}{dx} = x + \sqrt{y} = f(x, y) \text{ with initial condition } y=1 \text{ at } x=0 \text{ for the range } 0 \leq x \leq 0.4$$

in steps of 0.2 (8)

OR

2. a) using Simpson's "1/3" rule, show that $\int_0^1 \frac{dx}{1+x} = \log_e 2 = 0.69315$ (8)

- b) Solve the equation $\frac{dy}{dx} = x + y$ with initial condition $y(0) = 1$ by Runge-kutta fourth order method, from $x=0$ to $x=0.2$ with $h=0.1$ (8)

Unit - III

3. a) State and prove orthogonal property of Bessel's function (8)

- b) For Legendre's function prove:

$$nP_n(x) = (2n-1)xP_{n-1}(x) - (n-1)P_{n-2}(x) \quad (8)$$

OR

3. a) State and prove orthogonal property of legendre's function (8)

- b) For Bessel's function, prove

$$\frac{d}{dx} [x^n J_n(x)] = x^n J_{n-1}(x); n \geq 0 \quad (8)$$

Unit - IV

4. a) A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six (8)

- b) Thirteen cards are drawn simultaneously from a pack of 52 cards. If ace count 1, face cards, 10 and others according to their denomination. find the expectation of the total score in 13 cards (8)

OR

4. a) Suppose 300 misprints are distributed randomly throughout a book of 500 pages. find the probability that a given page contains

i) exactly 2 misprints

ii) 2 or more misprints

(8)

b) In a normal distribution, 31% of the items are under 45 and 8% are over 64 find mean and standard deviation of the distribution. given that if

$$f(z) = \frac{1}{\sqrt{2\pi}} \int_0^z e^{-\frac{x^2}{2}} dx, \text{ then } f(0.5) = 0.19, f(1.41) = 0.42 \quad (8)$$

Unit - V

5. a) Calculate correlation coefficient using rank correlation method for following data (8)

| | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|
| x: | 68 | 64 | 75 | 50 | 64 | 80 | 75 | 40 | 55 | 64 |
| y: | 62 | 58 | 68 | 45 | 81 | 60 | 68 | 48 | 50 | 70 |

b) Find the Z-transform of $\{a^n \sinh n\theta\}; n \geq 0$ (8)

OR

5. a) Find the two lines of regression for data given below rtuonline.com

$$n = 18, \quad \sum x = 12, \quad \sum y = 18,$$

$$\sum x^2 = 60, \quad \sum xy = 48 \quad (8)$$

b) Find $Z^{-1} \left[\frac{z}{(2-z)(2z-1)} \right]$ by partial fraction method (8)