4E 4135

4E 4135

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

Electronics and Communication Engg.

4EC6A Advance Engg. Mathematics

Common for AI,BM,EI,CRE,EC,PE,PC

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) Prove with the usual notations that

i) $E = e^{hD}$

ii) $\Delta = \frac{1}{2}\delta^2 + \delta\sqrt{1 + \delta^2/4}$ **(8)**

b) Use Stirling's formula to evaluate f(1.22), given **(8)**

x :	1.0	1.1	1.2	1.3	1.4
f(x) :	0.841	0.891	0.932	0.963	0.985

OR

1. a) Find the cubic polynomial which takes the following values **(8)**

x :	0	1	2	3
f(x) :	1	2	1	10

b) Using Lagrange's formula express the function

$\frac{x^2 + 6x - 1}{(x^2 - 1)(x - 4)(x - 6)}$ as a sum of partial fractions **(8)**

Unit - II

2. a) Given that

x :	1.0	1.1	1.2	1.3	1.4	1.5	1.6
$f(x)$:	7.989	8.403	8.781	9.129	9.451	9.750	10.031

find the first derivative of $f(x)$ at $x=1.1$ **(8)**

b) Using modified Euler's method. Find an approximate value of y when x=0.3 given that $\frac{dy}{dx}=x+y$ and y=1 when x=0 **(8)**

OR

2. a) Evaluate $\int_0^1 \frac{dx}{1+x}$ taking 7 ordinates by applying Simpson's 3/8th rule **(8)**

b) Using Runge-Kutta method of fourth order, solve $\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}$ with y(0)=1 at x=0.2, 0.4 **(8)**

Unit - III

3. a) Express $J_5(x)$ in terms of $J_0(x)$ *and* $J_1(x)$ **(4)**

b) Prove that $J_{5/2}(x)=\sqrt{\frac{2}{\pi x}}\left\{\frac{3-x^2}{x^2}\sin x-\frac{3}{x}\cos x\right\}$ **(4)**

c) Express $f(x)=x^4+3x^3-x^2+5x-2$ in terms of legendre polynomials **(8)**

OR

3. a) Show that $J_n(x)=\frac{1}{\pi}\int_0^{\pi}\cos(n\theta-x\sin\theta)d\theta$, n being an integer **(8)**

b) State and prove orthogonal property of legendre polynomials **(8)**

Unit - IV

4. a) In a certain college, 4 percent of the men and 1 percent of the women are taller than 6 feet. Furthermore, 60 percent of the students are women. suppose a randomly selected student is taller than 6 feet. Find the probability that the student in a women. **(4)**

b) Suppose the temperature T during May is normally distributed with mean $\mu = 68^0$ and standard deviation $\sigma = 6^0$. Find the probability p that the temperature during May is

i) between 70^0 and 80^0

ii) less than 60^0(Area Under Normal Curve from 0 to $x = \Phi(x)$; $\Phi(2.00) = 0.4772$ $\Phi(0.33) = 0.1293$ $\Phi(1.33) = 0.4082$ **(4)**

c) Obtain the rank correlation co-efficient for the following data

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

(8)

OR

4. a) Six coins are tossed 6400 times. Using the Poisson distribution, determine the approximate probability of getting six heads x times **(4)**

b) Find the expected value of X for the density function $f(x) = \begin{cases} 2e^{-2x}, & x > 0 \\ 0, & x \le 0 \end{cases}$ **(4)**

c) The equations of two regression lines obtained in a correlation analysis of 60 observations are: 5x=6y+24 and 1000y=768x-3608. What is the correlation coefficient? Show that the ratio of coefficient of variability of x to that of y is 5/24. **(8)**

Unit - V

5. a) On what curves can the functional

$$I[y(x)] = \int_0^1 \{(y')^2 + 12xy\}dx$$ be extremized? **(8)**

$y(0) = 0, y(1) = 1$

b) Show that the time t[y(x)] spent by a particle on translation along a curve y=y(x), moving with velocity $\frac{dy}{dx} = x$ from the point(0,0) to the point(1,1) is minimum if the curve is a circle having its centre on y-axis **(8)**

OR

5. a) Derive Euler's equation **(8)**

b) Find the external of the functional I[y(x)]= $\int_{x_0}^{x_1} (y^2 + y'^2 - 2y\sin x)dx$ **(8)**
