B. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of Second Year)

COMPUTER SCIENCE & IT

Paper - I : Mathematics - III

Time : 3 Hours   **Maximum Marks : 75**

Answer question No.1 compulsory   *(15)*

Answer ONE question from each unit   *(4 × 15 = 60)*

1)
a) Define odd function with examples.

b) Define periodic function.

c) Write the form of the Euler's formula.

d) Define half range cosine series.

e) Define Integral transform.

f) Evaluate $\Delta^2 \cos 2x$

g) Newton's forward interpolation formula.

h) Define Numerical integration.

i) Define trapezoidal rule.

j) Write iterative of Newton's method.

k) Write iterative of regula falsi method.

l) Write Bessel's formulae.

m) Write the formula for unequal spaced values of the arugents of x.

n) Evaluate $\Delta \tan^{-1} x$

o) Write the formula $\left(\frac{dy}{dx}\right)_{x=x0}$

UNIT - I

2) a) Find a Fourier series to represent $f(x) = x - x^2$ from $x = -\pi$ to $x = \pi$

b) Find the Fourier series expansion for $f(x)$

$$f(x) = -x \quad \text{if} \ -\pi < x < 0$$
$$= +x \ \text{if} \quad 0 < x < \pi$$

Deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} \ldots\ldots \ldots\ldots = \frac{\pi^2}{8}$

OR

c) Express $f(x) = x$ as a half – range cosine series $0 < x < 2$

d) Expand $f(x) = e^{-x}$ as a Fourier series in the interval (-1 1)

UNIT – II

3) a) Find the Fourier transform of $f(x) = \frac{1}{1+x^2}$

b) Find the Fourier sine transform of the function $f(x) = e^{-2x} + 4e^{-3x}$

OR

c) Find the Fourier sine transform of $f(x) = e^{-ax}$ and deduce the invervision formula.

d) Show that $f(x) = e^{-x^2/2} - \infty < x < \infty$ is self reciprocal.

UNIT – III

4) a) Give the values :

1. x	2. 5	3. 7	4. 11	5. 13	6. 17
7. $f(x)$	8. 150	9. 392	10. 1452	11. 2366	12. 5202

Evaluate $f(q)$ using Newton's divided difference formula.

b) Apply Lagrange's interpolation method find the value of x when $f(x) = 15$ from the given data :

x	5	6	9	11
$f(x)$	12	13	14	16

OR

c) Given sin 45° = 0.7071, sin 50° = 0.7660, sin 55° = 0.8192, sin 60° = 0.8660 find sin 62° using backward interpolation formula.

d) Find $y'(0)$ and $y''(0)$ from the following table

x	0	1	2	3	4	5
y	4	8	15	7	6	2

UNIT - IV

5) a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using simpson's $\frac{1}{3}rd$ rule taking h=$\frac{1}{6}$.

b) Solve $\frac{dy}{dx} = x + y, y(1) = 0$ numerically up to $x = 1.2$ with $h = 0.1$.

OR

c) Apply Runge – kulta method to find an approximate value of y for x = 0.2 in steps of 0.1 if $\frac{dy}{dx} = x + y^2$ given that y = 1 where x = 0 take h = 0.1 and carry out the calculation in two steps.

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