

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 arguments of x .
- n) Evaluate $\Delta \tan^{-1}x$
- o) Write the formula $\left(\frac{dy}{dx}\right)_{x=x_0}$

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 $f(x)$

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

$$= +x \quad \text{if } 0 < x < \pi$$

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

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 inversion 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 $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.8660$ find $\sin 62^\circ$ 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.

