



Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH(CE-OLD)/SEM-4/CE-401/2012

2012

MATHEMATICS – II

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

$$10 \times 1 = 10$$

- i) Class boundaries of 126 - 130 and 131 - 135 are

- a) 125.5 - 130.5 & 130.5 - 135.5
- b) 126.5 - 130.5 & 131.5 - 135.5
- c) 127 - 131 & 132 - 136
- d) 125 - 129 & 130 - 134.

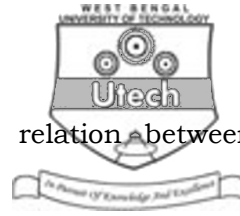
- ii) The relation between A.M., G.M. and H.M. be

$$A.M. \geq G.M. \geq H.M.$$

- a) true
- b) false.

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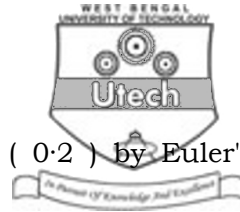
- iii) For asymmetrical distribution, the relation between Mean, Median and Mode be
- a) Mean – Mode = 3 (Mean – Median)
 - b) Mean – Median = 3 (Mean – Mode)
 - c) Mean – Mode = 2 (Mean – Median)
 - d) none of these.
- iv) Round-off the number 3.265, correct up to 2 decimal places, is
- a) 3.26
 - b) 3.27
 - c) 3.20
 - d) none of these.
- v) Mode can be calculated from
- a) Frequency Polygon
 - b) Ogives
 - c) Histogram
 - d) None of these.
- vi) Relation between E and Δ is
- a) $E \equiv 1 + \Delta$
 - b) $E \equiv 1 - \Delta$
 - c) $E \equiv \Delta - 1$
 - d) none of these.
- vii) In Simpson's $\frac{1}{3}$ rd rule for finding $\int_a^b f(x) dx$, $f(x)$ is approximated by some
- a) line segments
 - b) parabolas
 - c) circular section
 - d) parts of ellipse.

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(Short Answer Type Questions)

$$3 \times 5 = 15$$
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4. Given $\frac{dy}{dx} = x^3 + y$, $y(0) = 1$, compute $y(0.2)$ by Euler's method taking $h = 0.01$.
5. Apply Simpson's $\frac{1}{3}$ rd Rule to evaluate $\int_0^6 \frac{dx}{(1+x)^2}$, taking 6 equal intervals, correct up to 3 decimal places.
6. Using Newton-Raphson method, find the root between 0 and 1, correct up to four decimal places, of the equation $x^3 - 6x + 4 = 0$.
7. If x_1 and x_2 are two positive values of a variate, prove that their geometric mean is equal to the geometric mean of their arithmetic and harmonic means.

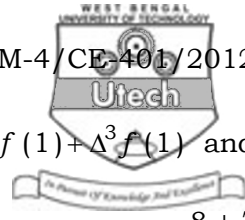
GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. a) Calculate the Mean, Median and Mode for the following frequency distribution :

Height in inches	56-60	61-65	66-70	71-75	76-80
No. of persons	7	25	43	28	7



- b) Prove that $f(4) = f(3) + \Delta f(2) + \Delta^2 f(1) + \Delta^3 f(1)$ and
 $\Delta \log f(x) = \log \left[1 + \frac{\Delta f(x)}{f(x)} \right]$. 8 + 7

9. a) Out of 400 observations, 100 observations have the value one and the rest of the observations are zero. Find the Mean and S.D. of 400 observations taken together.
- b) Using Lagrange's Interpolation Formula, find a polynomial which passes through the points (0, -12), (1, 0), (3, 6) and (4, 12). 8 + 7
10. a) Using Newton's Divided Difference formula, find $f(6)$ from the following table :

x	5	7	11	13	21
$f(x)$	150	392	1452	2366	9702

- b) Given

x	0	1	2	3	4
y	1	1	7	19	33

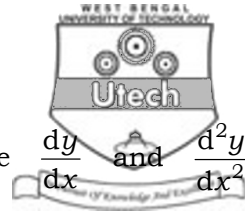
Find $y'(x)$ at $x = 0.3$ by a suitable numerical method.

- c) Find the Eigenvalues for the following matrix :

$$\begin{pmatrix} 10 & 2 & 1 \\ 2 & 10 & 1 \\ 1 & 1 & 10 \end{pmatrix}$$

5 + 5 + 5

11. a) Using Netwon-Raphson Method, establish the interative formula to calculate square root of N and hence find $\sqrt{8}$.



- b) From the following table compute $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1$:

x	1	2	3	4	5	6
y	1	8	27	64	125	216

8 + 7

12. a) Find the value of $\sin 32^\circ$ from the following table :

x	30°	35°	40°	45°	50°
$y = \sin x$	0.5000	0.5736	0.6428	0.7071	0.7660

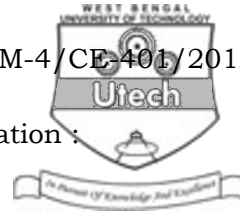
- b) Describe the Geometrical Interpretation of Trapezoidal Rule and Condition of Convergence of Newton-Raphson Method.

7 + 8

13. a) Calculate the Arithmetic Mean and Standard Deviation of the following values of World's Gold output (in millions of lbs) for 20 different years :

94, 95, 96, 93, 87, 79, 73, 69, 68, 67

78, 82, 83, 89, 95, 103, 108, 117, 130, 97.



b) Solve by Gauss-Jacobi method of iteration :

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

$$6x + 5y + 2z = 72$$

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

$$8 + 7$$

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