

Name :

Roll No. :

Invigilator's Signature :

CS / BBA (H), BIRM, BSCM / SEM-2 / BBA-202 / 2010

2010

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)

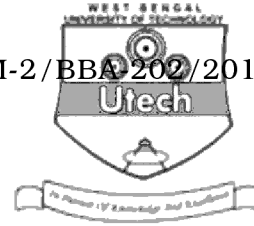
1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

i) If $f(x) = 2x^3 - 3x^2 + 4x - 2$, then the value of $f'(-2)$ is

- | | |
|------------------|--------------------|
| a) $\frac{1}{4}$ | b) $-\frac{1}{4}$ |
| c) 0 | d) $\frac{1}{3}$. |

ii) Rank of the matrix $\begin{bmatrix} 2 & 2 \\ 1 & 1 \end{bmatrix}$ is

- | | |
|------|-------|
| a) 1 | b) 0 |
| c) 2 | d) 4. |



viii) If A be a square matrix then $A + A^T$ is

- a) symmetric
- b) skew-symmetric
- c) transpose
- d) none of these.

ix) The order of minor of any element of a determinant of order 3 is

- a) 1
- b) 2
- c) 3
- d) none of these.

x) The latus rectum of the parabola $y^2 = -16x$ is

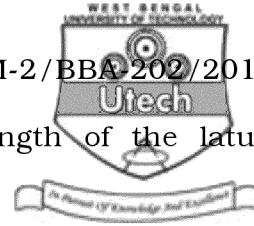
- a) 4
- b) -4
- c) 16
- d) none of these.

xi) The derivative of $x \log x$ is

- a) $1 + \log x$
- b) $1 - \log x$
- c) $\log x$
- d) none of these.

xii) The derivative of xe^x is

- a) e^x
- b) $e^x(x+1)$
- c) $e^x(x-1)$
- d) none of these.



5. Find the co-ordinates of the vertex, length of the latus rectum and the equation of the directrix of the parabola

$$x^2 + 4x + 2y - 11 = 0.$$

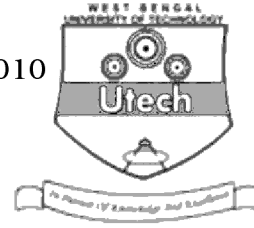
6. Find $\frac{dy}{dx}$ if $y = x^x$.
7. If the area of the circle increases at a uniform rate, show that the rate of increase of the circumference of the circle varies inversely as the radius.

GROUP - C

(Long Answer Type Questions)

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

8. a) Prove that
$$\begin{vmatrix} a^2 + b^2 & ac & bc \\ ca & c^2 + a^2 & ab \\ bc & ab & b^2 + c^2 \end{vmatrix} = \begin{vmatrix} a & b & 0 \\ c & 0 & a \\ 0 & c & b \end{vmatrix}^2$$
- b) The vertices of an ellipse are (- 1, 2) and (9, 2). If the distance between its foci be 8, find the equation of the ellipse.
- c) Find the value of $\int x \log (1+x) dx$. $5 + 5 + 5$



9. a) A function is defined as follows :

$$f(x) = x^2 \text{ for } x > 1$$

$$= 2 \text{ for } x = 1$$

$$= x \text{ for } x < 1.$$

Find $\lim_{x \rightarrow 1} f(x)$

b) Evaluate : $\int_0^1 \sin^{-1}\left(\frac{2x}{1+x^2}\right) dx$

c) If $ax^2 + 2hxy + by^2 = 1$, show that $\frac{d^2y}{dx^2} = \frac{h^2 - ab}{(hx + by)^2}$.

5 + 5 + 5

10. a) Evaluate : $\int \frac{x^2 dx}{\sqrt{1+x^3}}$

b) If $y = a \sin(mx) + b \cos(mx)$, then prove that $\frac{d^2y}{dx^2} = m^2y$.

c) If $V = \sin^{-1}\left(\frac{x^2 + y^2}{x + y}\right)$, then show that $xV_x + yV_y = \tan V$.

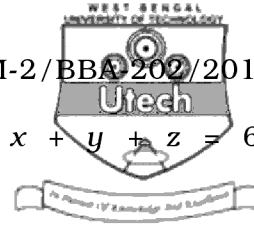
5 + 5 + 5

11. a) Prove that $\begin{vmatrix} 1 & a & a^2 - bc \\ 1 & b & b^2 - ca \\ 1 & c & c^2 - ab \end{vmatrix} = 0$

b) For the matrix $A = \begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix}$ show that $A^2 - 5A + 7I_2 = 0$

and hence find A^{-1} .

7 + 8



12 a) Solve by matrix inversion method $x + y + z = 6$,
 $x - y + z = 2$, $2x + y - z = 1$.

b) Prove that the matrix $A = \frac{1}{3} \begin{bmatrix} -1 & 2 & -2 \\ -2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ is an

orthogonal matrix and hence find A^{-1} . 8 + 7

