2021
MATHEMATICS HONOURS
SEMESTER-1
INTERNAL ASSESSMENT
Full Marks of each Course:10

The figures in the margin indicate full marks.
Symbols and notations used here carry their usual meaning.
Candidates are required to give their answers in their own words as far as practical.

Course: CC1
(Calculus, Geometry & Vector Calculus)

Answer all the questions with proper justification: 5x2=10

1. If a, b, c are non-zero coplanar vectors then
    (i)   *the volume of the parallelopiped formed by them is* 0
    (ii) $a \times b = 0 \; or \; b \times c = 0 \; or \; c \times a = 0$
    (iii) $a.b = 0 \; or \; b.c = 0 \; or \; c.a = 0$
    (iv)   none of these
    (v)

2. Equations of the planes parallel to z-axis are
    (i) $ax + cz + d = 0$
    (ii) $ax + by + d = 0$
    (iii) $by + cz + d = 0$
    (iv) $ax + by + cz = 0.$

3. If a straight line makes angles α, β, γ with the axes of co-ordinates , then
    $\cos 2\alpha + \cos 2\beta + \cos 2\gamma$ is equal to
    (i)   -1,   (ii)   1,   (iii)   0,   (iv)   2

4. Find $\lim_{x \to 0}\left(1 + \frac{1}{x}\right)^{x}$

   (i) 1   (ii) e   (iii) $1/e$ (iv) e^2

5. The conic $11x^2 + 4xy + 14y^2 - 26x - 32y + 23 = 0$ represents a/an

(i)   Ellipse
(ii)   Circle
(iii)   Hyperbola
(iv)   Parabola

Course: CC2
(Algebra)

Answer all the questions with proper justification: 5x2=10

1. Let A and B be two finite sets of n elements and a mapping $f: A \to B$ is injective. Then

    $(i) \; f \; bijective \; (ii) \; f \; is \; not \; onto \; (iii) \; f \; may \; not \; be \; onto \; (iv) \; none \; of \; these$.

2. A relation ρ defined on, the set of all integers, by "$a\rho b$ iff $ab > 0$" for $a, b \in Z$. Then

   (i) ρ is equivalence relation(ii) ρ is reflexive but not symmetric(iii) ρ is not reflexive and transitive(iv) ρ is not reflexive but is symmetric and transitive

3.   Consider the equation $x^{100} - 100x + 99 = 0$. Then the multiplicity of the root $x = 1$ is

                (i)   50,   (ii)   3,   (iii)   4,   (iv)   2

4.   The number of real roots of the equation $x^6 + 3x^2 - 2x - 3 = 0$ is

                (ii)   6,   (ii)   4,   (iii)   2,   (iv)   0

5.   Let A be an $m \times n$ matrix then which on is true ?

(i) Rank of A $= m$ (ii) Rank of A $= n$

(iii) Rank of A $\leq \max\{m, n\}$ (iv) Rank of A $\leq \min\{m, n\}$