Roll No. 6211)

Total No. of Questions: 9] (2042)

[Total No. of Printed Pages: 4

BCA (CBCS) RUSA IInd Semester Examination

3743

MATHEMATICS-II

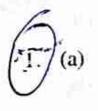
Paper: BCA-0201

Time: 3 Hours]

[Maximum Marks: 70

Note: Attempt one question from each Unit. Q. No. 9 is compulsory.

Unit-I



Verify Lagrange's mean value theorem for the function f(x) = (x - 2)(x - 3)(x - 4) in the interval [0, 4]. Also find the value of 'C'.

(b) If
$$y = (ax + b)^m$$
 and $y_n = \frac{d^n y}{dx^n}$, show that :
$$y_n = m(m-1)(m-2) \dots (m-n+1)$$

$$(ax + b)^{m-n} a^n$$

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(1)

Turn Over



- (a) By using mean value theorem find the approximate value of √66.
- Apply Leibnitz theorem to find the third order derivative of :

$$f(x) = (x^2 + 1)e^{2x}$$
 at $x = 0$

5.5

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- (a) Find the greatest common divisor of 275 and
 200 and express it in the from m.275 + n.200.
- (b) Show that the relation of divisibility in the set of integer is reflexive, transitive but not symmetric.
- 4. (a) Prove that if a and b be two integers, then $a \equiv b \pmod{m}$ if and only if a and b has the same remainder when divided by m.
- (b) For positive integer a and b show that:

GCD
$$(a, b) \times LCM$$
 $(a, b) = (a \times b) = ab$ 5.5

Unit-III

- (a) Show that the set of all 2 x 2 non-singular matrices from an infinite non-abelian group under the composition of matrix multiplication.
- (2)

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- (b) Show that the set $G = \{1, \omega, \omega^2\}$ of cube roots of unity from a finite abelian group of order 3 under multiplication of complex number. 5.5
- 6 (a) Let $M_g(I) = \left\{ \begin{bmatrix} a, b \\ c, d \end{bmatrix} \right\}$ where $a, b, c, d \in I$,

operation of matrix multiplication.

(b) Define a cyclic group and prove that every cyclic group is abelian but converse is not true. 5.5

Unit-IV

- (a) Prove that the set of integer is a ring with respect to usual addition and multiplication.
- (b)_Prove that <R, +, .> where R is set of all reals, is a commutative ring with unity. 5,5
- 8. (a) Let R be a ring. Then show that the following conditions are equivalent:
- R has no zero divisor
-) R satisfies left cancellation law
- (iii) R satisfies right cancellation law

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(b) Show that the set of rationals 'Q' is a field under composition of addition ⊕ and multiplication ⊙, given as :

$$a \oplus b = a+b-1$$
 and $a \odot b = a+b-ab$ 5,5
Unit-V

(Compulsory Question)

- Discuss applicability of Rolle's theorem for the function f(x) = |x| in [-3, 3].
 - (ii) If $f(x) = x^2 \sin 2x$, find the value of f'''(0).
 - If a/b and a/c, then show that $a/(bx + cy) \forall x$, $y \in z$.
 - (iv) Solve the following congruence $3x \equiv 4 \pmod{5}$.
 - (v) Find the LCM of (272, 1479).
 - (vi) Define a group.
 - (vii) Show that the set $G = \{1, 2, 3, ..., n-1\}$ does not form a group under multiplication modulo n, where 'n' is a composite number.
 - (viii) Let R bearing such that $x^2 = x \forall x \in R$, show that R is a commutative ring.
 - (ix) Define a ring and a ring with unity.
 - (x) Prove that every field is an integral domain.

 $3 \times 10 = 30$