UG-A-1173 **BMS–21X/ BMC–21X**

U.G. DEGREE EXAMINATION — JULY, 2022.

Mathematics

(From CY – 2020 onwards)

Second Year

GROUPS AND RINGS

Time : 3 hours Maximum marks : 70

PART A — ($3 \times 3 = 9$ marks)

Answer any THREE questions.

1. Define binary operation * on a set A.

2. Show that in a group, $x^2 = x$ if and only if $x = e$.

3. State Lagrange's theorem on a group G.

4. Define a commutative ring.

5. Define an Euclidean domain.

PART B — $(3 \times 7 = 21$ marks)

Answer any THREE questions.

6. Show that $f : R - \{3\} \rightarrow R - \{1\}$ given $f(x) = \dfrac{x - 2}{x - 3}$ is a bijection and find its inverse.

7. Let H be a non-empty finite subset of G. If H is closed under the operation G then prove that H is subgroup of G.

8. State and prove fundamental theorem of homomorphism.

9. The set R of all matrices of the form $\begin{bmatrix} a & b \\ -b & a \end{bmatrix}$ where $a, b \in R$ prove R is ring under matrix addition and matrix multiplication.

10. Prove that the ring of Gaussian integers $R = \{a + bi / a, b \in z\}$ is a Euclidean domain where we define $d(a + ib) = a^2 + b^2$.

PART C — $(4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Define function and explain types of function.

12. Let H be a subgroup of G. Then prove that the number of left coset of H is the same as the number of right coset of H.

13. Let $G = \{1, i, -1, -i\}$ prove that G is group under usual multiplication.

14. State and prove Cayley's theorem.

15. Prove that any finite cyclic group of order n is isomorphic to $(z_n, \oplus)$.

16. Prove that z_n is a integral domain if and only if n is prime.

17. Let R is a commutative ring with identity any ideal M of R is maximal if and only if R/M is a field.

UG-A–1177	BMC–22X

U.G. DEGREE EXAMINATION — JULY, 2022.

Mathematics

(From CY – 2020 Onwards)

Second Year

CLASSICAL ALGEBRA AND NUMERICAL METHODS

Time : 3 hours Maximum marks : 70

PART A — (3 × 3 = 9 marks)

Answer any THREE questions out of Five question in 100 words.

All questions carry equal marks.

1. Find the coefficient x^n in the expansion of $\dfrac{1+2x-3x^2}{e^x}$.

2. Find the quotient and remainder when $2x^6 + 3x^5 15x^2 + 2x - 4$ is divided by $x + 5$.

3. What are the merits of Newton's method of iteration?

4. Write the Newton's backward interpolation formula.

5. Given $\frac{dy}{dx} = x + y$, $y(0) = 1$ find $y(0.1)$ by Euler's method.

PART B — $(3 \times 7 = 21$ marks)

Answer any THREE questions out of Five question in 200 words.

All questions carry equal marks.

6. Find the sum to infinite of the series $1 + \frac{3}{4} + \frac{3.5}{4.8} + \frac{3.5.7}{4.8.12} + \dots$.

7. Determine completely the nature of the roots of the equation $x^5 - 6x^2 - 4x + 5 = 0$.

8. Find the negative root $x^3 - 2x + 5 = 0$ by Newton-Raphson method correct to 3 decimals.

9. Using Lagrange's interpolation formula find $y(20)$ given that $y(1) = 1$, $y(2) = 8$, $y(3) = 27$, $y(4) = 64$.

10. Divide the range into 10 equal parts, find the approximate value $\int_0^{\pi} \sin x \, dx$ by Trapezoidal rule.

PART C — (4 × 10 = 40 marks)

Answer any FOUR questions out of Seven question in 500 words.

All questions carry equal marks.

11. Sum the series $\sum_{n=1}^{\infty} \frac{n^2+3}{n+2} \cdot \frac{x^n}{n!}$.

12. Solve the equation

$6x^5 - x^4 - 43x^3 + 43x^2 + x - 6 = 0$.

13. Solve the following equation by Gauss – Seidal method.

$x + 17y - 2z = 48$; $30x - 2y + 3z = 75$;

$2x + 2y + 18z = 30$.

14. Find the positive root of $xe^x = 2$ by false position method.

15. Using the following data, find $f'(5)$ and $f''(6)$

x:	0	2	3	4	7	9
y:	4	26	58	112	466	922

16. By using Newton's divided difference formula find $f(6), f(8), f(9), f(15)$ given

x:	4	5	7	10	11	13
y:	48	100	294	900	1210	2028

17. Apply fourth order Runge –Kutta method to find an approximate value of y when $x = 0.2$ given that $\frac{dy}{dx} = x + y$, $y(0) = 1$, $h = 0.1$.

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UG-A-1178	BMC-23X

U.G. DEGREE EXAMINATION –
JULY, 2022.

Mathematics

(From CY – 2020 onwards)

Second Year

PROGRAMMING IN C AND C++

Time : 3 hours Maximum marks : 70

PART A — ($3 \times 3 = 9$ marks)

Answer any THREE questions each in 100 words.

1. What are constants?

2. What is an external variable?

3. What are self-referential structures?

4. What is the general form of declaring and opening a file?

5. Differentiate between object and class.

PART B — ($3 \times 7 = 21$ marks)

Answer any THREE questions.

6. Explain the basic structure of a C program with an example.

7. Write a C program to find the largest element in an array.

8. What is structure? Explain the C syntax of structure declaration with example

9. What are the file opening modes? Explain.

10. Explain the characteristics of OOPS in detail.

PART C — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. What is an operator? List and explain various types of operators.

12. What is array? Explain the declaration and initialization of one dimensional and two dimensional array with an example.

13. Write a C program to pass structure variable as function argument.

14. Write a C program to read name and marks of n number of students from user and store them in a file.

15. Explain the various types of constructors that are available in C++ with suitable examples.

16. Write a C program to find the factorial of a number using recursion.

17. Explain function overloading with an example program.

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