

**B.A/B.Sc 3<sup>rd</sup> Semester (Honours) Examination, 2020 (CBCS)**

**Subject: Mathematics**

**Course: BMH3SEC11 (Logic & Sets)**

Time: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.*

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

[Notation and Symbols have their usual meaning]

**Answer any eight questions:**

$8 \times 5 = 40$

1. Define a difference and symmetric difference of two sets. Which one of these two operations is commutative? Support your answer with proper justification. [2+3]
2. (i) For any two sets  $A$  and  $B$ , show that  $A \cup B = B$  and  $A \cap B = A$  if and only if  $A \subseteq B$ . [2]  
(ii) Show that for three sets  $A, B, C$ ,  $A \cap (B \cup C) = (A \cap B) \cup C$  if and only if  $C \subseteq A$ . [3]
3. (i) Can you define an equivalence relation on a set? Give an example with proper justification. [3]  
(ii) Let  $X$  be the set of all straight lines in a plane. Define a relation  $\rho$  on  $X$  by for two lines  $l, m$ ,  $l \rho m$  if and only if  $l$  and  $m$  are parallel. Check that whether it is an equivalence relation on  $X$ . [2]
4. Suppose that  $P$  be a partition on a non-empty set  $X$ . Can you define an equivalence relation on  $X$  for which the equivalence classes will coincide with the partition blocks? [5]
5. For  $(a, b), (c, d) \in \mathbb{Z}^+ \times \mathbb{Z}^+$ , define  $(a, b) \sim (c, d)$  if and only if  $a + d = b + c$ . Check whether it is an equivalence relation or not. If yes then find out the equivalence classes. [3+2]
6. (i) Show that every partition of a set induces an equivalence relation on that set. [3]  
(ii) Give an example of a relation which is reflexive and symmetric but not transitive. [2]
7. (i) Write down the truth table for the statement form  $p \rightarrow (q \vee r)$ , where  $p, q, r$  are statement variables. [3]  
(ii) Show that the statement form  $((\sim p) \vee q)$  will have the same truth function as that of  $(p \rightarrow q)$ . [2]
8. Define a tautology. Which of the following statement forms are tautologies? [1+2+2]
  - (i)  $(p \rightarrow (q \rightarrow r))$
  - (ii)  $((\sim p) \rightarrow q) \rightarrow (p \rightarrow (\sim q))$
9. What do you mean by logically equivalent statement forms? Show that the statement forms  $((p \vee q) \wedge r), ((p \wedge r) \vee (q \wedge r))$  are logically equivalent. [1+4]
10. How to symbolize the Universal Quantifier and Existential Quantifier? [1+2+2]  
Symbolize the following in terms of two quantifiers simultaneously :
  - (a) Some real numbers are rational.
  - (b) Every integer has a prime factor.

**B.A/B.Sc 3<sup>rd</sup> Semester (Honours) Examination, 2020 (CBCS)**

**Subject: Mathematics**

**Course: BMH3SEC12 (Computer graphics)**

Time: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.*

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[Notation and Symbols have their usual meaning]

**Answer any eight questions:**

$8 \times 5 = 40$

1. Discuss RGB true color system in brief. [5]
2. Discuss Raster scan in brief. [5]
3. Briefly describe the working principle of dot matrix printer. [5]
4. Write down the DDA line drawing algorithm. [5]
5. Develop the Bresenham's line drawing algorithm. [5]
6. Discuss the midpoint circle drawing algorithm. [5]
7. Briefly discuss flood fill algorithm. [5]
8. Discuss linear translation of a rigid body in brief. [5]
9. Briefly discuss homogeneous coordinate system. [5]
10. Write a short note on line clipping. [5]

**B.A/B.Sc 3<sup>rd</sup> Semester (Honours) Examination, 2020 (CBCS)**

**Subject: Mathematics**

**Course: BMH3SEC13 (Object Oriented Programming in C++)**

Time: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.*

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

[Notation and Symbols have their usual meaning]

**Answer any eight questions:**

$8 \times 5 = 40$

1. (i) Explain the benefits of object-oriented approach. [2]  
(ii) What are objects and classes? Give examples. [3]
2. (i) How do the structures in C and C++ differ? [3]  
(ii) What are global variables? Give example. [2]
3. What are different types of errors? Explain with examples. [5]
4. (i) What is the significance of logical operators? [2]  
(ii) What are the uses of logical '&&' and '|>| operators? [3]
5. Explain *else-if* and *switch* structures with examples. [5]
6. What is a friend function? What are the merits and demerits of using friend functions? [2+3]

7. Write a program to find the reverse of an integer 3456 using a function. [5]
8. (i) Write the general form of an operator overloading function. [3]
- (ii) Write the syntaxes of the overloading functions for insertion operator ‘>>’ and extraction operator ‘<<’. [2]
9. Write a class template by name vector and find the smallest of the elements in the vector with user defined size. [5]
10. What is the need for namespaces? Explain with example. [5]