

U.G. 3rd Semester Examination - 2019

**MATHEMATICS**

[HONOURS]

Skill Enhancement Course (SEC)

Course Code : MATH(H)SEC-IA&B

Full Marks : 40

Time : 2 Hours

*The figures in the right-hand margin indicate marks.*

*Symbols have their usual meaning.*

**Answer all the questions from selected Option.**

**OPTION - A**

**MATH(H)SEC-IA**

1. Answer any **five** questions:  $3 \times 5 = 15$
- a) What is symbolic logic? Write the following statement using symbolic logic:  
If the barometer falls, then either it will rain or it will snow.
  - b) Write the truth tables of disjunction and conjunction.
  - c) When a statement form is called contradiction? Show that  $(p \wedge \sim p)$  is a contradiction.
  - d) Translate the following sentence into symbols, first using no universal quantifiers, then using no existential quantifiers:  
'Not all birds can fly'.

[Turn over]

- e) Prove for sets A and B that  $A \subseteq B$  if and only if  $A \cup B = B$ .
- f) Define partial order on a set with an example.
- g) Prove that  $A \cap (B \Delta C) = (A \cap B) \Delta (A \cap C)$ .
- h) What do you mean by 'addition modulo n'. Write the elements of  $\mathbb{Z}_5$ .

2. Answer any **five** questions: 5×5=25

- a) Verify whether  $(\sim(p \wedge q))$  is logically equivalent to  $((\sim p) \wedge (\sim q))$ .
- b) Define tautology. Show that if A and  $(A \rightarrow B)$  are tautologies, then B is a tautology.
- c) Show that the pairs  $\{\sim, \wedge\}$ ,  $\{\sim, \vee\}$  and  $\{\sim, \rightarrow\}$  are adequate sets of connectives.
- d) Define an enumerable set with an example. Show that the union of a finite set and an enumerable set is enumerable.
- e) Show that an equivalence relation  $\rho$  on a set S determines a partition of S. Is the converse true? Justify.
- f) Let Z be the set of all integers. If  $a, b \in Z$ , then  $a \equiv b \pmod{5}$  if and only if  $a-b$  has factor 5. Prove that  $\equiv$  is an equivalence relation.
- g) Write the laws of algebra of sets. Prove by using law of algebra of sets  $A \Delta B = B \Delta A$ .
- h) Define conditional statement. Prove that  $\sim(p \rightarrow q) \equiv p \wedge (\sim q)$  by using truth table.

**OPTION - B**  
**MATH(H)SEC-IB**

1. Answer any **five** questions:  $2 \times 5 = 10$
- a) What is pixel?
  - b) What is scan conversion?
  - c) Differentiate between raster scan display and random scan display.
  - d) What is homogeneous coordinate system?
  - e) Define aspect ratio.
  - f) What is animation?
  - g) What is resolution?
  - h) What do you mean by interactive computer graphics?
2. Answer any **two** questions:  $5 \times 2 = 10$
- a) Write down the advantages and disadvantages of DDA line drawing algorithm. 5
  - b) What is clipping. Explain a polygon clipping algorithm. 1+4
  - c) Describe major components of a CRT device. 5

d) Perform a 45 degree rotation of triangle  
A(0, 0), B(1, 1) and C(5, 2): 2+3

i) About the origin

ii) About a point (-1,-1).

3. Answer any two questions: 10×2=20

a) Describe the working principle and advantages  
of LCD system. 7+3

b) Explain various types of 2D transformations  
with suitable examples. 10

c) Write short notes on any two: 5×2=10

i) Character generation

ii) Flood fill algorithm

iii) Geometric projection.

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