

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:

$$5 \times 5 = 25$$

- 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 ρ on a set S determines a partition of S. Is the converse true? Justify.
- f) Let Z be the set of all integers. If $a, b \in \mathbb{Z}$, 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.