SH-II/CSC/202/C4/18

B.Sc. Semester-II (Honours) Examination, 2018

COMPUTER SCIENCE (H)

Subject Code : 21502 **Course Code : SH/CSC/202/C4**

Course Title : Discrete Structures

Time: 2 Hrs. **Full Marks: 40**

The figures in the margin indicate full marks.

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

1. Answer *any five* questions: 2×5=10

(a) What is countably infinite set?

(b) What is Pigeonhole principle?

(c) What is the use of asymptotic notations?

(d) What is recurrence tree?

(e) What do you mean by a graph?

(f) What is Hamiltonian path?

(g) What is tautology?

(h) Express if-then operator ($\rightarrow$) in terms of the basic propositional operators ($\vee$, $\wedge$, $\neg$).

2. Answer *any four* questions: 5×4=20

(a) Explain bijective relation with an example. What is closure property?

(b) Discuss big–oh (o) and big-omega (Ω) notations with examples.

(c) Solve the recurrence relation:

$a_n = a_{n-1} + 2a_{n-2}$ with $a_0 = 2 \,\&\, a_1 = 7$

(d) Show that for any graph the number of odd-degree vertices is always even.

(e) Write Kruskal's algorithm for finding MST.

(f) What is Hamiltonian path and Hamiltonian circuit? Explain with example. 3+2=5

3. Answer *any one* question: 10×1=10

(a) In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels come together? Using mathematical induction prove that $\forall n \geq 1, 8^n - 3^n$ is divisible by 5. 6+4=10

(b) State and prove the propositional logic version of De Morgan's law for two variables.

Consider the following propositions:

p : Mr A is smart

q : Mr A is honest

Express the following statement in terms of p and q.

Mr. A is smart is necessary and sufficient for Mr A to be honest. 6+4=10
