MCC/18/M.Sc./Sem.II/PHS/1

Second Semester Examination-2018

M.Sc. PHYSICS

Paper Code: PHS 204 (CBCS MTM)

Full Marks : 40 **Time: 2 Hours**

(Discrete Mathematics)

Answer Question no 1 and any One from the rest.

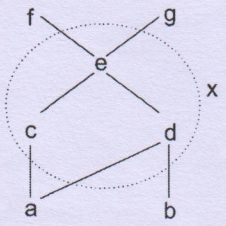
1. **Answer any five the following:** **2×5=10**
   a. Give an example of an infinite lattice with finite length.
   b. Find the minimum number of edges in a connected graph with n vertices.
   c. Give an example of an Eulerian graph which is not Hamiltonian with proper justifications.
   d. Define Boolean algebra as Lattices with an appropriate example.
   e. Give two differences between Boolean algebra and the algebra of real numbers.
   f. Define the following terms:
      i) Finite state machines ii) Generating functions.
   g. In a survey conducted on 250 persons, it was found that 180 drink tea, 70 drink coffee and 50 take both tea and coffee. How many drink at least one bevarage?
2. **Answer any five the following:** **5×4=50**
   a. Define Tautology with an appropriate example. Show that $[(pVq)\wedge(pV\sim q)\wedge(\sim pVq)\wedge(\sim pV\sim q)]$ Is a contradiction.
   b. How many integers are between 1 and 200 which are divisible by any one of the integers 2,3 and 5.
   c. State Euler's formula for connected planner graph. Verify the formula for the following Graph G and also find the degree of the outside region of G.

d. State the duality principle of Boolean algebra. Write down the Boolean identities associated with idempotent, absorption and dominance law.

e. Let S ={a,b,c,d,e,f,g} be ordered as in the given figure and let X={c,d,e}.

i) Find the upper and lower bounds of X.

ii) Identify sup (x) and inf(x) if exist.



f. Describe complexity of an algorithm with proper examples.

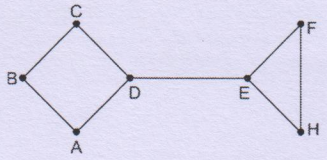
g. Define rooted tree with an appropriate example. Draw the multi-graph associated with the following adjacency matrix,

$$\begin{pmatrix} 1 & 3 & 0 & 0 \\ 3 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 0 \end{pmatrix}$$

3. Answer any two questions: **2×5=10**

a. State the principle of mathematical induction. Show that $\left(3+\sqrt{5}\right)^n+\left(3-\sqrt{5}\right)^n$ is an even integer for any natural number n.

b. Consider the following graph G. Find diameler, centre, cut points and bridge of G. Check Eulerian path and Eulerian Circuit exist in G.



c. Describe chain, antichain, maximal and minimal elements associated with a partially ordered set. Draw Hasse diagram to explain the above.