S–265(A to C)

B. Sc. (Sixth Semester)
EXAMINATION, 2019
(Skill Enhancement Course)
COMPUTER SCIENCE

Time : Two Hours] [*Maximum Marks : 70*

S–265 (A)

(Modelling and Simulation)

[SOS/C.S./SEC—004(A)]

Note : (i) Attempt any *five* questions from Section A and any *three* questions from Section B.

(ii) Answer each question of Section A within 50 words.

(iii) Limit your answers within the given answer book. Additional answer book (B-Answer book) should not be provided or used.

Section—A

Note : Attempt any *five* questions. Each question carries 5 marks.

1. What is Modelling ? Describe.

2. When to use simulation ? Define.
3. Write about discrete simulation.
4. Describe the random numbers.
5. Define the continuous system simulation.
6. Define characteristics of queuing system.
7. Discuss about the verification of simulation model.

Section—B

Note : Attempt any *three* questions. Each question carries 15 marks.

1. Explain the model building.
2. Discuss the state space model.
3. Explain the Poisson process.
4. What are the properties of random numbers ? Explain.
5. Discuss the inverse transformation for random variate generation.
6. Explain about the statistical models in simulation.

S–265 (B)

(Graph Theory)

[SOS/C.S./SEC—004(B)]

Note : (i) Attempt any *five* questions from Section A and any *three* questions from Section B.

(ii) Answer each question of Section A within 50 words.

(iii) Limit your answers within the given answer book. Additional answer book (B-Answer book) should not be provided or used.

Section—A

Note : Attempt any *five* questions. Each question carries 5 marks.

1. Define the following terms :
   (a) Complete graph
   (b) Euler circuit
   (c) Path
   (d) Walk
   (e) Rings Sum of graph
2. Discuss the basic properties of graphs.
3. Differentiate between Symmetric and Asymmetric diagraphs with examples.
4. State and prove Euler's formula.
5. Prove that if a graph has exactly two vertices of odd degree, there must be path joining these two vertices.
6. Define bipartite graph and complete bipartite graph with an example.

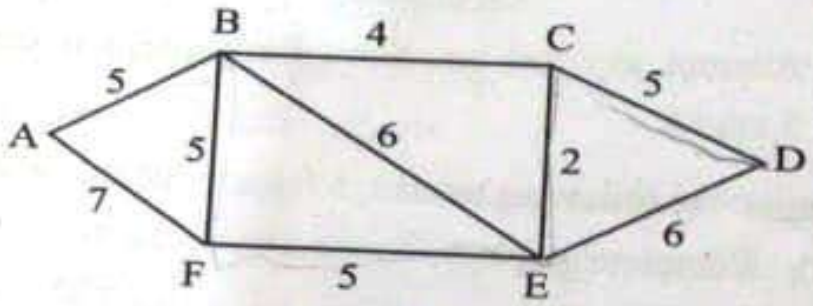
7. Prove that a connected graph G is a Euler graph if and only if it can be decomposed into circuits.

Section—B

Note : Attempt any *three* questions. Each question carries 15 marks.

1. (a) State Travelling-Salesman problem and how Travelling-Salesman problem solution is related with Hamiltonian circuits.

   (b) Bring out major steps in Prim's algorithm and find the shortest spanning tree of a weighted graph shown below :



2. (a) Show that in a group G, the number of odd degree vertices is always even.

   (b) Determine $|V|$ for the following graphs :

   (i) G has 9 edges and all vertices have degree 3.

   (ii) G is registered with 15 edges.

   (iii) G has 10 edges with 2 vertices of degree 4 and all others of degree 3.

3. (a) Define Hamiltonian circuits and paths with example. Find out the number of edge disjoint Hamiltonian circuits possible in a complete graph, with five vertices.

(b) Prove that any *two* simple connected graph with n vertices all of degree 2 are isomorphic.

4. (a) List down any *four* properties of adjacency matrix.

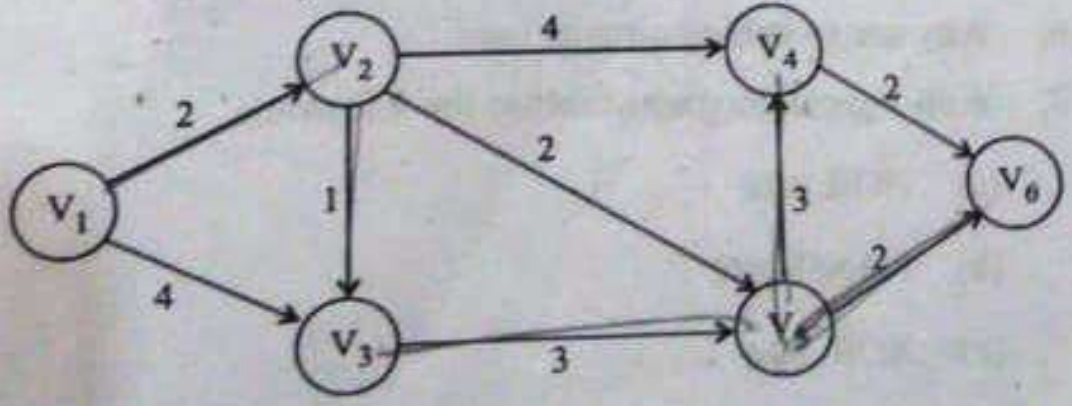
(b) Construct an adjacency matrix (X) for the following graph and also mention how the concept of edge sequences is described with X^3 (no need to find X^3 from X).

5. (a) Prove that a graph is bipartite if it has no odd cycle.

(b) Prove that the isomorphism relation is an equivalence relation on the set of simple graph.

6. (a) Explain the various steps of Floyd-Warshall algorithm with the help of a suitable example.

(b) Write the Dijkstra's algorithm. Apply this algorithm to find the shortest path between V_1 and V_6.



S–265 (C)

(Boolean Algebra)

[SOS/C.S./SEC—004(C)]

Note : (i) Attempt any *five* questions from Section A and any *three* questions from Section B.

(ii) Answer each question of Section A within 50 words.

(iii) Limit your answers within the given answer book. Additional answer book (B-Answer book) should not be provided or used.

Section—A

Note : Attempt any *five* questions. Each question carries 5 marks.

1. State Distributive law.
2. What is duality principle ?
3. Explain Absorption law and Idempotent law briefly.
4. Verify any *one* of the De-Morgan's law using truth table.
5. Explain distribution lattice with example.
6. Why are switching circuits used ?
7. With logical diagrams discuss the following :
   (a) NOR gate
   (b) NAND gate
   (c) XOR gate

Section—B

Note : Attempt any *three* questions. Each question carries 15 marks.

1. Define Karnaugh Map. What do you understand by map rolling ?
2. Find the dual of the following :
   (a) $(a + b)(b + c)(a + c)$
   (b) $(1 + a)(ac)$
   (c) $(a + 0)(b + 1)(c + 1 + 0)$
   (d) $a'c + b'a$
3. Convert $(x + z)(z + y)$ into canonical POS form.
4. Construct a Boolean function of three variables p, q, r that has an output 1 when exactly two of p, q, r are having values 0 and output 0 in all other cases.
5. A Boolean function F is defined on three inputs X, Y, Z is 1. Iff number of 1 input is odd (for ex F is 1 if X = = 1, Y = 0, Z = 0).

   Draw the truth table for the above function and express it in canonical sum of product form.
6. Find the complement of the following Boolean function, with gates diagram :

$$F1 = (a + b)(c' + a')(b + d)$$