P.R. GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III B.Sc. MATHEMATICS - Semester VI (w.e.f. 2018-19)
Course (Elective VII (D)): GRAPH THEORY

Total Hours of Teaching-Learning : 75 @ 5 h/week **Total credits: 05**

Objectives:

- To introduce the most application oriented field in Mathematics i.e., Graph Theory.
- To impart the awareness on applications of Graph Theory

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UNIT –I : Graphs and Subgraphs **(15 hrs)**

Graphs, Simple Graph, Graph isomorphism, The incidence and adjacency matrices, Subgraphs, Vertex degree, Hand shaking theorem, Paths and connection, Cycles.

UNIT -II : Applications, Trees **(15 hrs)**

Applications, The shortest path problem, Sperner's lemma, Trees, Cut edges and bonds, Cut vertices, Cayley's formula.

UNIT -III : Applications of Trees, Connectivity **(15 hrs)**

Applications of Trees – The connector problem.

Connectivity: Connectivity, Blocks and Applications, Construction of reliable communication Networks.

UNIT- IV : Euler Tours & Hamilton Cycles **(15 hrs)**

Euler tours, Euler Trail, Hamilton path, Hamilton cycles, Dodecahedron graph, Peterson graph, Hamiltonian graph, Closure of a graph.

UNIT- V: Applications of Eulerian Graphs **(15 hrs)**

Applications of Eulerian graphs, The Chinese postman problem, Fleury's Algorithm – The travelling salesman problem.

PRESCRIBED BOOK: Graph Theory with Applications by J.A. Bondy and U .S.R. Murthy, published by Mac. Millan Press.

REFERENCE BOOKS :

1. Graph theory with Applications by J.A.Bondy and U.S.R. Murthy published by Mac.Millan Press.
2. Introduction to Graph theory by S.Arumugham and S.Ramachandran, published by Scitech Publications, Chennai-17.
3. Graph Theory and Combinations by H.S.Govinda Rao published by Galgotia Publications.

BLUE PRINT FOR QUESTION PAPER PATTERN,

SEMESTER-VI

PAPER –VII, Elective VII D

UNIT	TOPIC	V.S.A.Q	S.A.Q (including choice)	E.Q (including choice)	Marks Allotted
I	Graphs and Subgraphs	01	01	01	14
II	Applications, Trees	01	01	01	14
III	Applications of trees, Connective	01	01	02	22
IV	Euler tours and Hamilton Cycles	01	01	02	22
V	Applications of Eulerian graphs	01	0	02	22
Total		05	05	08	94

V.S.A.Q. = Very Short answer questions (1mark)
S.A.Q.= Short answer questions (5 marks)
E.Q .= Essay questions (8 marks)

Very Short answer questions : 5 x 1 M = 05
Short answer questions : 3 x 5 M = 15
Essay questions : 5 x 8 M = 40

Total Marks : = 60

P.R. Government College (Autonomous), Kakinada

III Year B.Sc. Degree Examinations VI Semester MATHEMATICS

Course (Elective VII (D) GRAPH THEORY

PAPER - VII : MODEL PAPER (w.e.f. 2019-20)

Time: 2 Hours 30 Min Max. marks: 60 M

PART – I

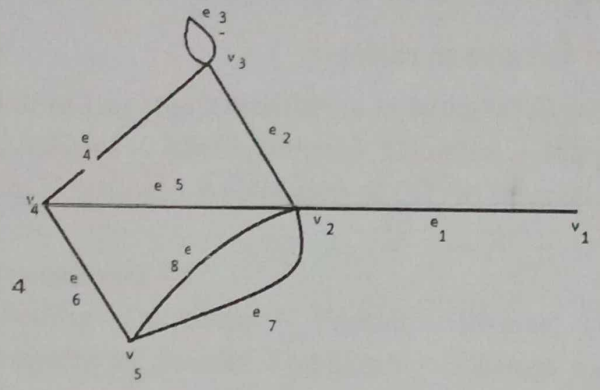
Answer ALL the following questions. Each question carries 1 mark. **5 x 1 = 5 M**

1. Define a simple graph.
2. How many edges have a tree with n vertices.
3. Define edge connectivity.
4. If a graph has an Euler trail then how many vertices have odd degree.
5. For tracing which type of graph Fleury's algorithm.

PART –II

Answer any THREE of the following questions. Each question carries 5 marks. 3 x 5 = 15 M

6. Write the vertex set, edge set and degree of every vertex of the graph.



7. Prove that in a tree, any two vertices are connected by a unique path.
8. Define the vertex cut and edge cut of a graph G(V,E) and give examples.
9. Define Eulerian graph and give an example.
10. Explain the travelling sales man problem.

PART –III

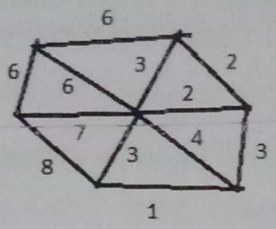
Answer any FIVE questions from the following by choosing at least TWO from each section. Each question carries 8 marks. **5 X 8 = 40 M**

SECTION – A

11. Define the degree of a vertex in a graph G and prove that the number of vertices of odd degree is even.
12. Write the Dijkastras algorithm for finding the shortest path between two vertices in a graph and give an example.
13. Prove that a connected graph is a tree if and only if every edge is a cut edge.
14. If G is connected then prove that any two vertices of G lie on a common cycle.

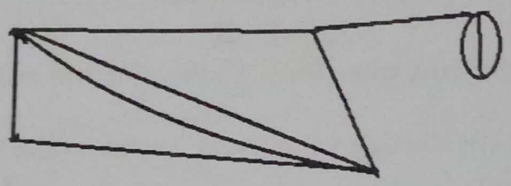
SECTION – B

15. Write the Kruskal's Algorithm for finding a minimal spanning tree and find a minimal spanning tree of the following graph.



16. Draw the Dodecahedran graph and a Hamilton cycle of it.

17. Define blocks of a graph and draw the blocks of the following graph.



18. Write the Fleury's algorithm and give an example.