



RAMAIAH
College of Arts, Science &
Commerce

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M S Ramaiah College of Arts, Science and Commerce

Re-accredited 'A' by NAAC, Permanently Affiliated to Bengaluru City University,

Approved by Government of Karnataka, Approved by AICTE, New Delhi,

Recognized by UGC under 2f & 12B of UGC act 1956



(National Institutional Ranking Framework, Ministry of Education, Govt of India)

Ranked 62nd in NIRF India Ranking by MHRD, New Delhi

DBT Star College Scheme

REF: MSRCASC/MATH/2021-2022/002

Date:08-10-2021

CIRCULAR

DEPARTMENT OF MATHEMATICS

This is to inform that, Department of Mathematics is organizing Value Added Course on “**Applications of Graph Theory**” from 13th October 2021 to 3rd January 2022 for the students 3rd year B.Sc(EMCs) between 3:30 PM and 4:30 PM. Interested students can enroll their names with event coordinator Mr. Ravindranath

HOD

**HEAD OF THE DEPARTMENT
MATHEMATICS
RAMAIAH COLLEGE
OF ARTS, SCIENCE & COMMERCE
BANGALORE-560054**

PRINCIPAL

Principal,
**M.S. Ramaiah College of Arts, Science & Commerce
MSRIT Post, MSR Nagar
Bangalore - 560 054**

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E principal.msrmasc@gmail.com
W www.msrmasc.edu.in

ABOUT THE COLLEGE

Ramaiah College of Arts, Science and Commerce was established in 1994 by our founder Late Dr.M.S Ramaiah offering both under graduate and postgraduate degrees under Bangalore City University in Arts, Science, Commerce and Management streams. The college is approved by AICTE, New Delhi, recognized by the Government of Karnataka. The college is re accredited 'A' grade by NAAC.

ABOUT THE DEPARTMENT

The Department of Mathematics was established since the inception of the college in 1994. The department is strong with all the members of the faculty having more than 10 years of experience. We go by the vision and mission of the college. Department has approximately 220 students. Apart from following the curriculum, the department concentrates in training the students to face all competitive exams boldly and confidently. We encourage the students who attend workshops, seminars in other colleges.

COURSE OUTLINE

- Graphs and Simple Graphs, Graph Isomorphism
- Pictorial diagram of the graph
- Connectivity, Euler and Hamilton Paths
- Konigsberg Bridge's Problem
- Fundamental Circuits
- Dijkstra's Algorithms
- Trees and its Applications.
- Fundamental Circuit Matrix
- Applications – The Shortest Path Problem, Sperner's Lemma

OBJECTIVE

The course is designed to provide basic knowledge of applications of Graph Theory. To understand the fundamental concepts in graph theory. To understand the method of finding shortest path in road or a network in Graph theory.

OUTCOME

Through this value added course students will be able to define the basic concepts of graphs, directed graphs, and weighted graphs. The students will be able to apply principles and concepts of graph theory in practical situations.

PATRONS

Dr.M.R.Jayaram Chairman
GEF

Sri.M.R.Janakiram Director
GEF

Sri.M.R.Kodandaram
Director GEF

Sri. B.S Ramaprasad Chief
Executive GEF(E & GS)

Sri.G.Ramachandra Chief of
Finance GEF(E & GS)

ORGANIZING

COMMITTEE MEMBERS

Mr.Ravindranath.K

Mrs.Haritha.A

Mrs.Thulasi R Mudakavi

RESOURCE PERSON

Haritha.A

Assistant Professor

Dept of Mathematics

MSRCASC

Event co-ordinator

Mrs.Ravindranath.K

FREE REGISTRATION



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Value Added Course
on

Applications of Graph Theory

Organized by
DEPARTMENT OF
MATHEMATICS

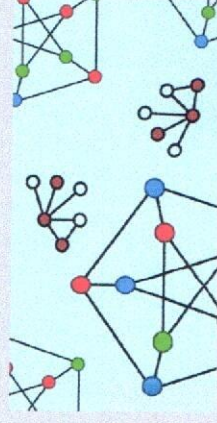
Program Schedule

Date : 13-10-2021 to

03-01-2022

Time : 3:30 pm to 4:30 pm

Venue: Room No.311



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DEPARTMENT OF MATHEMATICS**REPORT ON VALUE ADDED COURSE CONDUCTED FROM****13TH OCTOBER 2021 TO 03RD JANUARY 2022****Title:** Applications of Graph Theory**Date:** 13/10/2021 to 03/01/2022**Venue:** Room No - 311**Participants :** 3rd year B.Sc(EMCs) students.**Resource Person:** Mrs. Haritha A**Number of Students:** 30**Event Co-Ordinator:** Mr.Ravindranath K

Objective: The course is designed to provide Basic knowledge of applications of Graph Theory. To understand and apply the fundamental concepts in graph theory. To understand the method of finding shortest path in road or a network in Graph theory.

Department of Mathematics organized value added course on Applications of Graph Theory from 13th October 2021 to 03rd January 2022 for the students of 3rd year B.Sc(EMCs) through offline mode. The value added course was inaugurated by Dr.A.Nagarathna, Principal under the patronage of Sri.M.R. Janakiram (Honorable Director, Gokula Education Foundation), Sri.M.R.Kodandaram (Honorable Director, Gokula Education Foundation) and Sri.Ramprasad(Chief Executive, Gen Science, Gokula Education Foundation). The resource person to the course was Mrs. Haritha A. This course was conducted for 30 hrs.

The registration process started on 8th October 2021. The program started at 3:30pm on 13th October 2021 followed by the inauguration and then the sessions began with the brief introduction of the resource person and few words delivered by principal madam.

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The session started with the history of graph theory and she explained about Definition of a graph, identifying edges and vertices. Finding the degree of a vertex with examples.

She explained pseudo graph, planar graph, operations on graphs, Bipartite graphs, isolated vertex, pendent vertex, distance and centre of the graph, application of Euler graph, cayley's theorem, weighted graphs, rank of an incidence matrix, converting matrix to graph, rank of a circuit matrix.

The following are the topics covered in the sessions:

- Graphs and Simple Graphs, Graph Isomorphism
- Pictorial diagram of the graph
- Subgraphs, Vertex Degrees
- Connectivity, Euler and Hamilton Paths, Directed Graphs
- Konigsberg Bridge's Problem
- Fundamental Circuits, Defines bipartite graphs
- Lists basic properties of trees.
- Expresses and prove Cayley Theorem.
- Dijkstra's Algorithms
- Trees and its Applications.
- Fundamental Circuit Matrix
- Applications – The Shortest Path Problem, Sperner's Lemma .

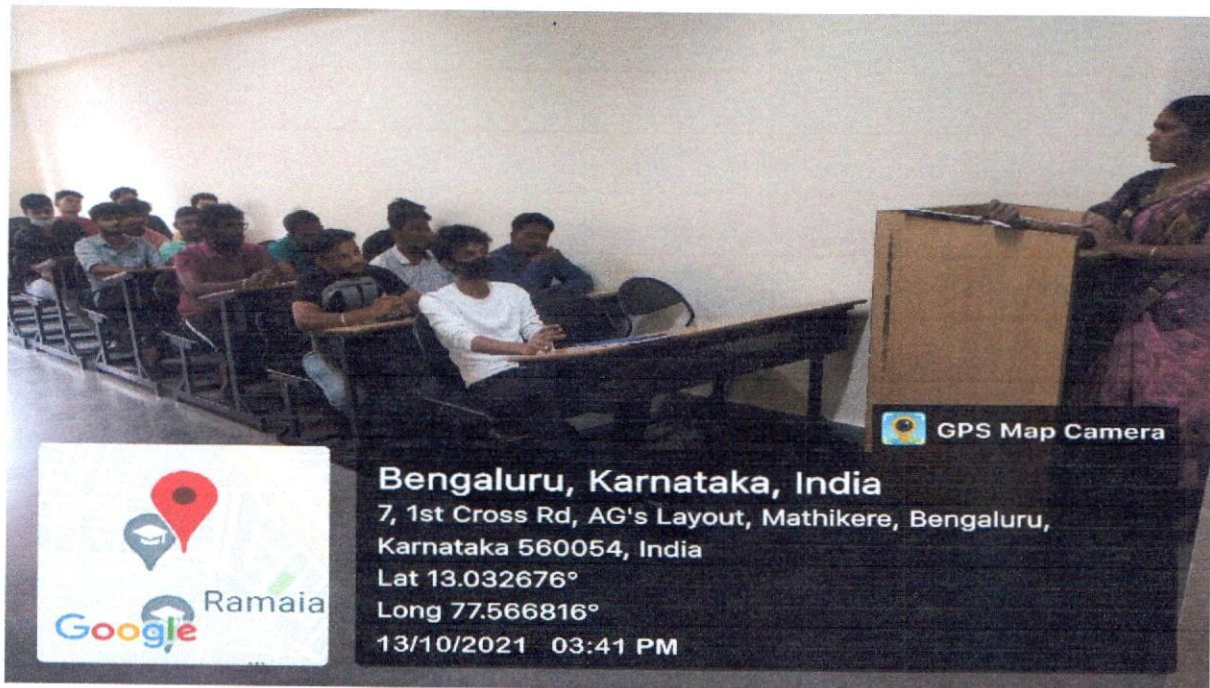
She explained about Applications of graph theory in real life. Graph is a data structure which is used extensively in our real-life.

- Social Network: Each user is represented as a node and all their activities, suggestion and friend list are represented as an edge between the nodes.
- Google Maps: Various locations are represented as vertices or nodes and the roads are represented as edges and graph theory is used to find shortest path between two nodes.
- Recommendations on e-commerce websites: The "Recommendations for you" section on various e-commerce websites uses graph theory to recommend items of similar type to user's choice.
- Graph theory is also used to study molecules in chemistry and physics.
- Modern numerical techniques for wide range of PDEs, useful in science and engineering applications.

The main conclusion of this course was connected with the enhancing of students understanding of mathematics and their interest in mathematical subjects in general.

Outcome: Through this value added course students will be able to define the basic concepts of graphs, directed graphs, and weighted graphs. The students will be able to apply principles and concepts of graph theory in practical situations.

Value Added Course on "Applications of Graph theory" Photos :



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DBT Star College Scheme

DEPARTMENT: MATHEMATICS

Name of the Programme: Applications of Graph Theory

Year:- 2021-2022

Assessment Procedure for Value Added Program:

Department of Mathematics organized value added course on "Applications of graph theory" from 13th October 2021 to 3rd January 2022 for the students of 3rd year B.Sc.(EMCs) students by the resource person Mrs.Haritha A . Total 30 students participated in this course and the course duration was 30 hours. During the training period, the students gained knowledge of Applications of Graph Theory. Bipartite Graph are used to mathematically formulate and provide the solutions involving functions of several variables. The students actively participated in the training and also solved the problems given during the session on all the days of the training program. Also viva and MCQ test was conducted for the students by the resource person. Hence the students were given the participation certificate at the end of the program.

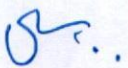
The following detail gives the marks of individual students.

Sl No	Student Name	Register Number	Attendance (10)	Quiz (MCQ)(20)	VIVA (10)	Total (40)
1	ABHISHEK G.S	S1914615	10	19	10	39
2	ALAN THOMAS	S1914616	10	20	10	40
3	BHARATH S	S1914619	10	17	9	36
4	BRUNDA H.S	S1914620	10	20	10	40
5	RAJKUMAR REDDY.C	S1914621	10	17	8	35
6	CHETAN.S	S1914624	10	18	9	38
7	DHANANJAY	S1914625	10	19	8	37
8	DUSHYANTH H.N	S1914626	10	18	7	35
9	SAINATH REDDY.G	S1914628	10	18	7	35
10	HARSHITHA B.C	S1914629	10	18	7	35

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11	IYER VIVEK GOPALAKRISHNA	S1914630	10	18	10	38
12	JIBIN K JOB	S1914631	10	20	10	40
13	KARTHIK M ACHARYA	S1914632	10	20	8	38
14	KISHORE H	S1914634	10	20	10	40
15	MOHAMMED RYHAN KHAN	S1914635	10	20	10	40
16	MUKTHA GOWDA H.K	S1914636	10	20	10	40
17	N.PAVAN	S1914637	10	20	10	40
18	NEHA KUMARI	S1914638	10	20	10	40
19	NIKHILESH.B	S1914639	10	20	10	40
20	MAHESH REDDY.P	S1914640	10	20	10	40
21	PRASHANTH M	S1914641	10	17	8	35
22	RAMYA KEERTHI Y	S1914642	10	20	10	40
23	REVATHI.V	S1914643	10	20	10	40
24	SAI PRADYUMNA.B	S1914644	10	20	10	40
25	SAYANTAN PAL	S1914645	10	19	8	37
26	SHAILENDRA SINGH	S1914646	10	17	9	36
27	SHRADHA S VADONE	S1914648	10	17	8	35
28	SUHAS SHAPUR	S1914649	10	17	8	35
29	VINITHA HANDA	S1914650	10	20	10	40
30	YASHWANTH.L	S1914651	10	18	9	37

Outcome: Through this value added course students will be able to define the basic concepts of graphs, directed graphs, and weighted graphs. The students will be able to apply principles and concepts of graph theory in practical situations.


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DEPARTMENT: MATHEMATICS

Name of the Programme: Applications of Graph Theory.

Year : 2021-2022

Assessment Procedure for Value Added Program: MCQ'S.

1.A graph is a collection of

- a.Row and Columns
- b. Vertices and edges
- c.Equations
- d.None of these

2. The Degree of any vertex of graph is

- a.The number of edges incident with vertex
- b.Number of vertex in a graph
- c.Number of vertices adjacent to that vertex
- d.Number of edges in a graph

3.A graph with no edges is known as empty graph ,Empty graph is also known as

- a.Trivial graph
- b.Regular graph
- c.Bipartite graph
- d.None of these

4.How many relations are there on a set with n elements that are symmetric and a set with n elements that are reflexive and symmetric

- a. $2n(n+1)/2$ and $2n.3n(n-1)/2$
- b. $3n(n-1)/2$ and $2n(n-1)$
- c. $2n(n+1)/2$ and $3n(n-1)/2$
- d. $2n(n+1)/2$ and $2n(n-1)/2$

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5. Radius of a graph, denoted by $\text{rad}(G)$ is defined by
- $\max\{e(v): v \text{ belongs to } V\}$
 - $\min\{e(v): v \text{ belongs to } V\}$
 - $\max\{d(u,v): u \text{ belongs to } v, u \text{ does not equal to } v\}$
 - $\min\{d(u,v): u \text{ belongs to } v, u \text{ does not equal to } v\}$
6. A partial ordered relation is transitive, reflexive and
- Antisymmetric
 - Bisymmetric
 - Anti reflexive
 - Asymmetric
7. Hasse diagram are drawn
- Partially ordered sets
 - Lattices
 - Boolean algebra
 - None of these
8. In how many ways can 5 balls be chosen so that 2 are red and 3 are black
- 910
 - 990
 - 970
 - none of these
9. Let G be a simple undirected planar graph on 10 vertices with 15 edges. If G is a connected graph, then the number of bounded faces in any embedding of G on the plane is equal to
- 3
 - 4
 - 5
 - 6
10. Length of the walk of a graph is
- The number of vertices in walk W
 - The number of edges in walk W
 - Total number of edges in a graph
 - Total number of vertices in a graph
11. Eccentricity of a vertex denoted by $e(v)$ is defined by
- $\max\{d(u,v): u \text{ belongs to } v, u \text{ does not equal to } v: \text{where } d(u,v) \text{ is the distance between } u \& v\}$
 - $\min\{d(u,v): u \text{ belongs to } v, u \text{ does not equal to } v\}$
 - Both A and B

d. None of these

12. A graph G is called a if it is a connected acyclic graph ?

- a. Cyclic graph b. Regular graph c. Tree d. Not a graph

13. Consider an undirected random graph of 8 vertices. The Probability that there is an edge between a pair of vertices is $1/2$. What is the expected number of unordered cycles of length 3?

- a. 7 b. 1 c. $1/8$ d. 8

14. Triangle free graphs have the property of clique number is _____

- a. More than 10
b. less than 5
c. equal to 5
d. greater than 3

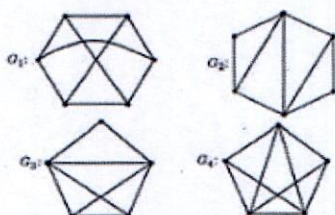
15. A K -regular bipartite graph is the one in which degree of each vertices is K for all the vertices in the graph. Given that the bipartitions of this graph are U and V respectively. What is the relation between them?

- a. Number of vertices in U = Number of vertices in V
b. Number of vertices in U not equal to Number of vertices in V
c. Number of vertices in U always greater than the Number of vertices in V
d. Nothing can be said

16. Number of edges incident with vertex V is called ?

- a. Degree of a graph b. Handshaking lemma
c. Degree of a vertex d. None of the above

17.

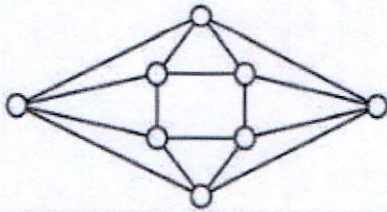


Which one of the following graphs is not planar?

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a.G1 b.G2 c.G3 d.G4

18.



The minimum number of colours required to colour the following graph , such that no two adjacent vertices are assigned the same colour, is

a.2 b.3 c.4 d.5

19. Let G be an arbitrary graph with n nodes and k components in the resultant graph must necessarily lie between

a. k and n b. $k-1$ and $k+1$ c. $k-1$ and $n-1$ d. $k+1$ and $n-k$

20. Which of the following is true about Handshaking Lemma?

- a. In Handshaking lemma, If the degree of a vertex is even, the vertex is called an even vertex
- b. The degree of a graph is the largest vertex degree of that graph.
- c. The degree of a vertex is odd, the vertex is called an odd vertex.
- d. The sum of all the degrees of all the vertices is equal to twice the number of edges.

ANSWERS

1.b 2.a 3.a 4.b 5.a 6.a 7.a 8.b 9.d 10.b
 11.a 12.c 13.a 14. 15.a 16.c 17.a 18.c 19.c 20.d

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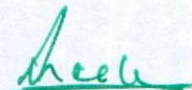
DEPARTMENT OF MATHEMATICS

Value Added Course on Applications of Graph Theory

Attendance

13th October 2021 TO 3rd January 2022 (30 Hrs)

Sl. No	Reg No	Name	26/10	29/10	1/12	2/12	3/12	6/12	9/12	10/12	13/12	15/12	16/12	17/12	20/12	24/12	31/12
1	S1914615	ABHISHEK G.S	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
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DEPARTMENT OF MATHEMATICS

Value Added Course on Applications of Graph Theory

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9	S1914628	SAINATH R.G	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
10	S1914629	HARSHITHA B.C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
11	S1914630	IYER VIVEK G	1	2	3	4	5	5	6	7	8	9	10	11	12	13	14
12	S1914631	JIBIN K JOB	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
13	S1914632	KARTHIK M A	1	2	3	4	5	6	6	7	7	8	9	10	11	12	13
14	S1914634	KISHORE H	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
15	S1914635	MD RYHAN KHAN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	S1914636	MUKTHA GOWDA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
17	S1914637	N.PAVAN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
18	S1914638	NEHA KUMARI	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
19	S1914639	NIKHILESH.B	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
20	S1914640	MAHESH REDDY.P	1	2	3	4	5	6	6	7	8	9	10	11	12	13	14
21	S1914641	PRASHANTH M	1	2	3	4	5	5	6	7	8	9	10	10	11	12	13
22	S1914642	RAMYA KEERTHI	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
23	S1914643	REVATHI.V	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
24	S1914644	SAI PRADYUMNA.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
25	S1914645	SAYANTAN PAL	1	2	3	4	5	6	6	7	8	8	9	9	10	11	12
26	S1914646	SHAIENDRA S	1	2	3	4	4	5	6	7	8	9	10	11	12	13	14
27	S1914648	SHRADHA.S V	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
28	S1914649	SUHAS SHAPUR	1	2	3	4	5	5	6	7	8	8	9	10	10	11	12
29	S1914650	VINITHA HANDA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
30	S1914651	YASHWANTH.L	1	2	3	4	5	6	6	7	8	8	9	9	10	11	12


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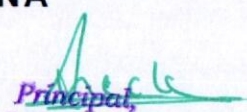
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