



NETAJI SUBHAS OPEN UNIVERSITY

স্নাতকোত্তর পাঠ্যক্রম (P. G.)

অনুশীলন পত্র (Assignment) : জুন, ২০২০ (June, 2020)

MATHEMATICS

Paper - 8B : Graph Theory

পূর্ণমান : ৫০

QUESTION PAPER CUM ANSWER BOOKLET

মানের গুরুত্ব : ২০%

(Full Marks : 50)

(Weightage of Marks : 20%)

পরিমিত ও যথাযথ উত্তরের জন্য বিশেষ মূল্য দেওয়া হবে। অসুন্দর বানান, অপরিচ্ছন্নতা এবং অপরিষ্কার হস্তাক্ষরের ক্ষেত্রে নম্বর কেটে নেওয়া হবে। উপান্তে প্রশ্নের মূল্যমান সূচিত আছে।

Special credit will be given for precise and correct answer. Marks will be deducted for spelling mistakes, untidiness and illegible handwriting.

The figures in the margin indicate full marks.

Name (in Block Letter) :

Enrolment No.

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Study Centre Name : Code :

To be filled by the Candidate	Serial No. of question answered																			TOTAL
For Evaluator's only	Marks awarded																			

Q.P. Code : **PA/4/VIIIIB**

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Signature of Evaluator with Date

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অনুশীলন পত্র (Assignment) : জুন, ২০২০ (June, 2020)

MATHEMATICS

Paper - 8B : Graph Theory

STUDENT'S COPY

Name (in Block Letter) :

Enrolment No.

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Study Centre Name : Code :

Q.P. Code : **PA/4/VIIIIB**

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Received Answer Booklet
Signature with seal by the Study-Centre

**জরুরি নির্দেশ / Important Instruction**

আগামী শিক্ষাবর্ষান্ত পরীক্ষায় (T.E. Exam.) নতুন ব্যবস্থা অর্থাৎ প্রশ্নসহ উত্তর পুস্তিকা (QPAB) প্রবর্তন করা হবে। এই নতুন ব্যবস্থার সঙ্গে পরীক্ষার্থীদের অভ্যস্ত করার জন্য বর্তমান অনুশীলন পত্রে নির্দেশ অনুযায়ী প্রতিটি প্রশ্নের উত্তর নির্দিষ্ট স্থানেই দিতে হবে।

New system i.e. Question Paper Cum Answer Booklet (QPAB) will be introduced in the coming Term End Examination. To get the candidates acquainted with the new system, assignment answer is to be given in the specified space according to the instructions.

**Detail schedule for submission of assignment for the
PG Term End Examination June, 2020**

1. Date of Publication : 20/06/2020
2. Last date of Submission of answer script by the student to the study centre : 19/07/2020
3. Last date of Submission of marks by the examiner to the study centre : 16/08/2020
4. Date of evaluated answer scripts distribution by the study centre to the students (Students are advised to check their assignment marks on the evaluated answer scripts and marks lists in the study centre notice board. If there is any mismatch / any other problems of marks obtained and marks in the list, the students should report to their study centre Co-ordinator on spot for correction. The study centre is advised to send the corrected marks, if any, to the COE office within five days. No changed / correction of assignment marks will be accepted after the said five days.) : 23/08/2020
5. Last date of submission of marks by the study centre to the Department of C.O.E. on or before : 31/08/2020

এখানে কিছু লিখবেন না

Do Not Write Anything Here



Answer Question No. 1 and any *four* from the rest.

1. Answer any *five* questions :

$2 \times 5 = 10$

- a) Draw a graph having degree sequence (1, 2, 2, 4, 5).
- b) Let $A = \{ a, b, c, d \}$ and ρ be a relation on A defined by
$$\rho = \{ (a, a), (b, a), (a, b), (c, a), (a, c), (b, b), (c, c), (d, d), (b, d), (d, b) \} .$$

Draw the digraph representing ρ . Is it an equivalence relation ?
- c) A tree can never be a regular graph — True or False ? Justify your answer.
- d) Define incidence matrix with an example.
- e) Show that if the degree of each vertex of a graph G is at least 2, then G contains a circuit.
- f) If G is a forest with n vertices & k components, find the number of edges of G .
- g) Differentiate between (i) Trail & Path, (ii) Circuit & Cycle.

First Answer :



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Second Answer :



Third Answer :



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Fourth Answer :



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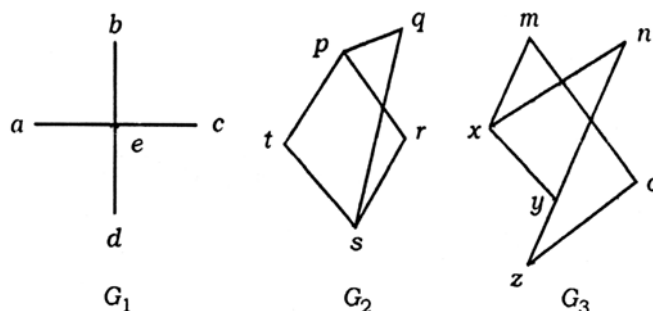
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Fifth Answer :



2. a) Establish Euler's formula for a connected planar graph. 5
b) Which of the following graphs are bipartite ? Explain your answer with justification. 5



3. a) Define a Directed graph. Briefly describe the process of representation of binary relations on finite sets by directed graphs with examples. 7
b) What do you understand by 'shortest spanning tree' of a graph ? 3
4. a) Let p denote the number of vertices of a tree T of degree 1 and q denote the number of vertices of degree ≥ 3 . If T contains at least two vertices, prove that $p \geq q + 2$. Also find the condition for equality. 5
5. a) A cycle on n vertices is isomorphic to its complement. Find the value of n . 5
b) What is a rooted tree and what is level of its vertices ? Define an m -tree. Prove that an m -tree has at most m_p vertices at level p . 5
6. a) Prove that in a connected planar graph, in which every vertex is of at least degree 3, there exists a region with fewer than 6 edges in the boundary. 5
b) Define isomorphic graphs. Prove that any two simple connected graphs with n vertices, all of degree 2, are isomorphic. 4
7. a) Prove that a connected graph G has a Euler trail if and only if it has exactly two odd-degree vertices. 6
b) Let G be a simple connected graph with 11 or more vertices. Show that either G or \bar{G} is non-planar. 6
c) Describe Kruskal's algorithm for finding a shortest spanning tree of a connected weighted graph with an example. 4

First Answer :



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Second Answer :



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QP Code : PA/4/VIIIIB

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Third Answer :



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Fourth Answer :



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