Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
Semester End Examination – Nov./ Dec. 2023
Faculty: Science and Technology

Program: B.Sc. Code (BScGen03) Semester : III **SET: A**
Program (Specific) : Mathematics **Course Type: Elective**
Class: S.Y.B.Sc.(Regular) **Max. Marks : 35**
Name of the Course: Graph Theory
Course Code: 23-MT-232(B) **Time: 2 Hrs.**
Paper: II

Instructions to the candidate:

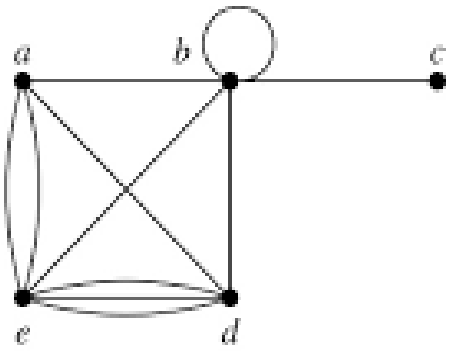
1) There are 3 sections in the question paper. Write each section on separate page.
2) All sections are compulsory.
3) Figures to the right indicate full marks.
4) Draw a well labelled diagram wherever necessary.

SECTION - A

Q.1) Solve any five. [Marks 10]

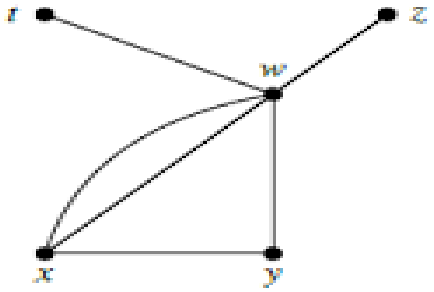
i) Define (a) Complete graph (b) Self Complementary graph

ii) Verify Handshaking Lemma for the following graph.



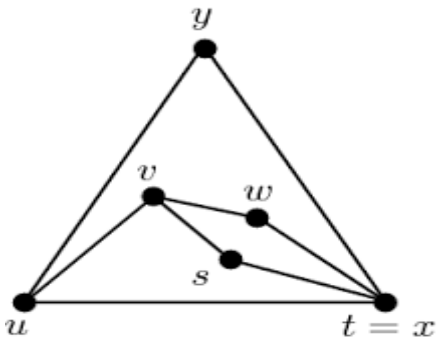
G

iii) Draw G – {w , x}



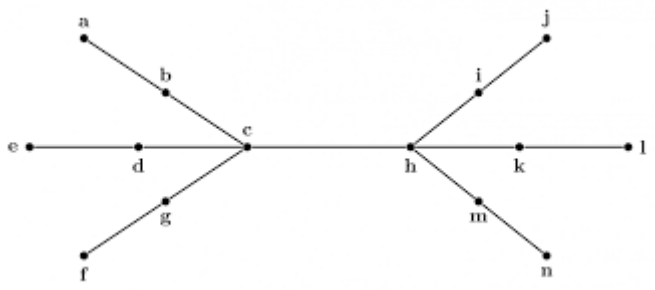
G

iv) For the following graph F find cycles of length 4 and 5.



F

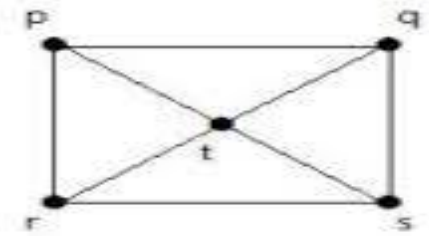
v)Find the centre of the following graph T.



T

vi) Does there exist a binary tree with 450 vertices ? Justify your answer.

vii) Find the edge connectivity in the following graph G.



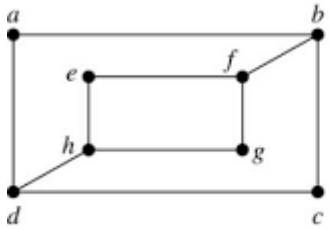
G

SECTION - B

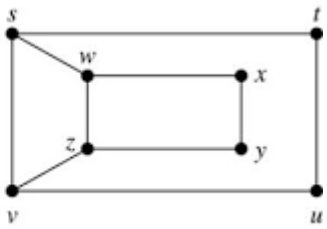
Q.2) Solve any three. [Marks 15]

i) Determine whether the degree sequence 6 , 6 , 6 , 6 ,4 , 3 , 3 , 0 is graphical.

ii) Determine whether the following graphs are isomorphic. Justify.

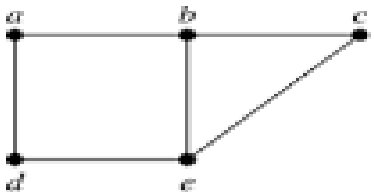


G_1

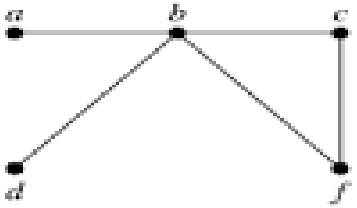


G_2

iii) Find $G_1 \cup G_2$



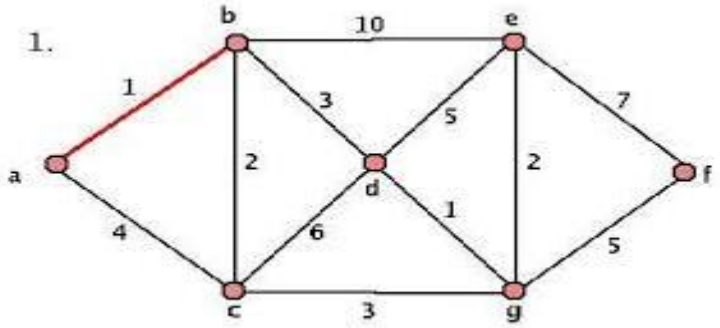
G_1



G_2

iv)Prove that “If in a graph T there is exactly one path between any two vertices then T is a tree”.

v)Use Kruskal’s algorithm to find a minimal spanning tree in the following weighted graph.

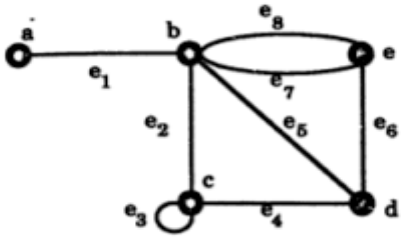


SECTION - C

Q.3) Solve any two. [Marks 10]

i)Prove that graph G (V, E) has an even number of vertices of odd degree.

ii) Fuse the vertices b and d in the following graph.



iii)Write the expression $(5x + 8)\,(7y^3 - 2)^7$ in Polish notation.