B. N. BANDODKAR COLLEGE OF SCIENCE, THANE

S. Y. B. Sc. A.T.K.T. /FAILURE EXAMINATION

AUGUST-2011

DATE: **SUBJECT: MATHEMATICS**

PAPER-III

DURATION: 3 hours **TOTAL MARKS: 90**

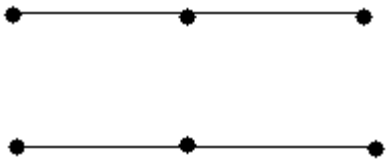
INSTRUCTIONS TO THE CANDIDATE:

1 All questions are compulsory.

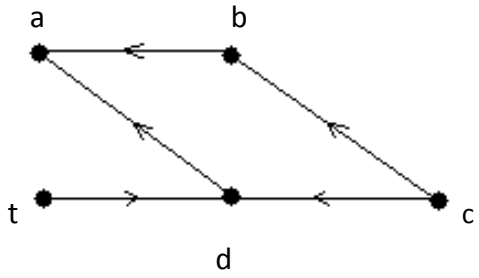
2. Figures to right indicate marks.

SECTION I

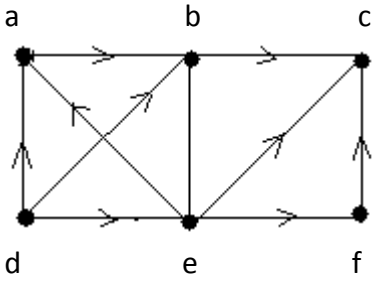
Q.1	**(a)**		Define algorithm. Write an algorithm which will exchange the given values of a and b.	**03**
	(b)		**Attempt any three of the following:**	
		(i)	Write an algorithm which will find and display the factorial of an inputed positive integer using function.	**04**
		(ii)	Write an algorithm which will find the maximum of the n sequence of positive integers,	**04**
		(iii)	Convert the given binary number into hexadecimal form $(11001\ 0110)_2$	**04**
		(iv)	Write an algorithm to find the transpose of given m x n matrix.	**04**
		(v)	Write an algorithm which will display "HELLO" 20 times.	**04**
Q.2	**(a)**		State Handshaking theorem. Find the total number of edges in a graph with 6 vertices each of degree 8.	**03**
	(b)		**Attempt any three of the following:**	
		(i)	Define complete graph. Draw a complete graph on 5 vertices.	**04**
		(ii)	Define complementary graph and draw the complementary graph of the given graph.	**04**



(iii) Check whether the given graph is weakly connected also check whether it is strongly connected. **04**



(iv) Find the in-degree and out-degree of vertices a, b, e, f **04**



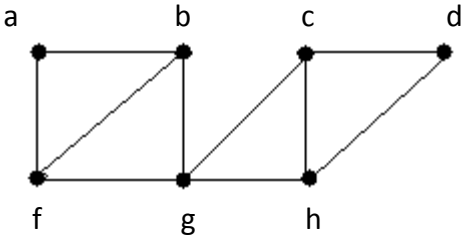
(v) Define Hamiltonion path and bipartite graph. **04**

Q.3 **(a)** Define tree ,forest and binary tree. **03**

(b) **Attempt any three of the following:**

(i) Write any four properties of a tree. **04**

(ii) Find the spanning tree of a given graph using depth first search (DFS). **04**



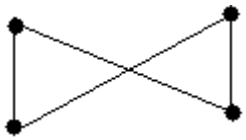
(iii) Explain each of these in one line: **04**

a. Parent of a vertex.
b. A child of a vertex.
c. A sibling of a vertex.
d. The ancestor of a vertex.

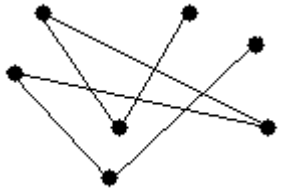
(iv) Draw a decision tree for sorting three distinct integers. **04**

(v) Which of the following are trees: **04**

a)



b)



SECTION II

Q.4 **(a)** Investigate the convergence of

$$\int_1^{\infty} e^{-x^2}\, dx.$$ **03**

(b) **Attempt any three of the following:**

(i) State direct compaison test and limit form of a comparison test. **04**

(ii) Calculate the value for **04**

$$\int_{-\infty}^{\infty} \frac{1}{1+x^2}\, dx$$

(iii) Find the area of the region bounded by given curves **04**

$$y = 0, y = 2x + 3, x = 0 \; and \; x = 1$$

(iv) Determine whether the integral or diverges. **04**

$$\int_0^{\infty} \frac{dx}{1+x^2}$$

(v) Define improper integral and check whether the given integral is proper or improper. **04**

$$\int_{-3}^{10} \frac{2}{4-x}\, dx$$

Q.5 **(a)** Derive the Newton-Raphson formula. **07**

(b) **Attempt any three of the following:**

(i) Discuss the convergence of fixed point iteration method. **04**

(ii) Factorise the matrix using Do-little LU decomposition method. **04**

$$A = \begin{pmatrix} 3 & 2 & 1 \\ 2 & 3 & 2 \\ 1 & 2 & 3 \end{pmatrix}.$$

(iii) Discuss the convergence of Newton-Raphson method. **04**

(iv) Explain Descarte's rule of signs. How many positive real roots the polynomial $p(x) = 3x^4 - 4x^3 - 3x^2 + 2x + 1$ has? **04**

Q.6 (a) Derive the formula for second order Runge –Kutta method. **07**

(b) **Attempt any three of the following:**

(i) Explain Picard's method for solving the ordinary differential equation. **04**

(ii) Write the formula for Adams-Bashforth and Adams –Moulton method. **04**

(iii) Write any four one-step method. **04**

(iv) Explain Euler's method for solving the ordinary differential equation. **04**

……THE END……..