

The order of precedence (from highest to lowest) is $^{\wedge}$, \times , $+$, $-$.
Then find the postfix expression corresponding to the infix
Expression $a + b \times c - d \wedge e \wedge f$

4. Attempt any one part of the following:

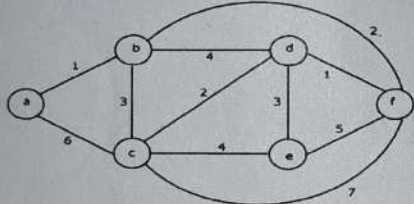
- a. Draw the Huffman tree for the following symbols (each of 7 bits) whose frequency
Of occurrence of a message is stated along with the symbols below:
M1: 0.45 M2: 0.02 M3: 0.24 M4: 0.18 M5: 0.11
decode the following message
10110011011111001100101111101101100.
and what is the average number of bits required per message.
- b. Write algorithm for Floyd warshall algorithm also explains with a suitable
example.

7 x 1 = 7

5. Attempt any one part of the following:

- a. Write C function for following in Binary Tree
(i) Count the number of total nodes.
(ii) Height of Binary Tree.
- b. Write Prim's algorithms and Find the Minimum Spanning tree for following graph

7 x 1 = 7



6. Attempt any one part of the following:

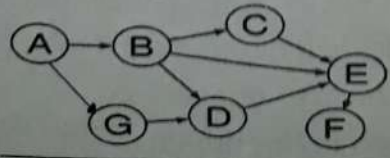
- a. Construct a binary tree for the following preorder and inorder traversals. Explain with
a neat diagram:
Preorder: ABDIEHJCFKLG
Inorder: DIBHJEAFLKCGM
- b. Explain Binary Search algorithm and its time complexity? Implement the binary
search in C language.

7 x 1 = 7

7. Attempt any one part of the following:

- a. Discuss what type of data structure is used in DFS. Write an algorithm for DFS, Traverse
the given graph starting from node A using DFS

7 x 1 = 7



- b. Construct an expression tree for the expression $(-b + \sqrt{b^2 - 4ac}) / 2a$. Give pre-order,
in-order and post-order traversals of the expression tree so formed

B.TECH
(SEM IV) THEORY EXAMINATION 2017-18
HYDRAULICS & HYDRAULIC MACHINES

Time: 3 Hours

Total Marks: 70

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

2 x 7 = 14

- a. Define Different types of flow.
- b. Determine the maximum discharge through a rectangular open channel of area 8m^3 with a bed slope of $1/2000$. Assume manning's constant 0.022 .
- c. Define the velocity contour's in open channel flow.
- d. What is the Back Water Curve?
- e. Write the types of Surge.
- f. What assumptions will take in Velocity Triangles?
- g. Write the main Parts of Kaplan Turbines.

SECTION B

2. Attempt any three of the following:

7 x 3 = 21

- a. Uniform flow occurs at a depth of 1.5 m in a long rectangular channel 3 m wide and laid to a slope of 0.0009 . If manning's $n=0.015$. Calculate (a) Maximum height of hump on the floor to produce critical depth (b) The width of contraction which will produce critical depth without increasing the upstream depth of flow.
- b. In an open channel, the Froude number F remains constant at all depths. if the specific energy E is constant Show that

$$\frac{T}{B} = \left(\frac{E}{E-h} \right)^{\left(\frac{1+F^2}{2} \right)}$$

- c. Prove that Hydraulically most efficient trapezoidal section is half of regular Hexagon.
- d. Integrate the differential equation of G.V.F. for a Horizontal Channel to get the Profile equation as

$$x = \frac{h_c}{S_c} \left[\frac{\left(\frac{h}{h_c} \right)^{N-M+1}}{N-M+1} - \frac{\left(\frac{h}{h_c} \right)^{N+1}}{N+1} \right] + \text{constt.}$$

- e. What is NPHS of centrifugal Pump? How it is related to cavitation in Pump?

SECTION C

3. Attempt any one part of the following: 7 x 1 = 7

- (a) An open channel to be made of concrete is to be designed to carry 1.5m³/s at a slope of 0.00085. Find the most efficient cross section for (a) Rectangular section (b) Trapezoidal section (c) Semicircular section
- (b) Define the following with formula (a) Kinetic Energy Correction factor (b) Momentum correction factor

4. Attempt any one part of the following: 7 x 1 = 7

- (a) Using Basic differential equation of G.V.F. show that dh/dx is positive for S₁, M₃ and S₃ Profiles.
- (b) How you will define Transitions between Sub Critical Flow And Super Critical Flow? Also draw the Diagram.

5. Attempt any one part of the following: 7 x 1 = 7

- (a) A rectangular channel carrying a super critical stream is to be provided with a hydraulic jump type of energy dissipater. It is desired to have an energy loss of 5 m in hydraulic jump when inlet Froude's number is 8.5. What are the segment depths of this jump?
- (b) Derive the relation between velocity and depths of flow where positive surges moving upward.

6. Attempt any one part of the following: 7 x 1 = 7

- (a) In order to predict the performance of a large centrifugal pump, a scale model of one sixth size was made with following specifications. Power = 25 KW, H_{man} =7 mtr, N=1000rpm. If prototype works against 22m. Calculate its working speed, the power required to derive it and the ratio of flow rates handled by to pups.
- (b) Define cavitation. And what precautions taken against Cavitation?

7. Attempt any one part of the following: 7 x 1 = 7

- (a) A Pelton wheel is to be designed for the following specification. Shaft power =11722 KW, Head =380 mtr, speed =750rpm, η_p = 86% Jet diameter (d) not to exceed one-sixth of wheel diameter. Determine (i) The wheel Diameter (ii) Number of jet required (iii) Diameter of jet Take velocity ratio K_{v1}=0.985 and speed Ratio K_{u1}=0.45
- (b) Define different types of efficiency of Hydraulic turbines.

B. Tech.
(SEM IV) THEORY EXAMINATION 2017-18
GEOINFORMATICS

Time: 3 Hours

Total Marks: 70

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14
- What is photogrammetric survey?
 - Define remote sensing.
 - Discuss electromagnetic spectrum concept in remote sensing.
 - What do you mean by digital image processing?
 - Define GIS.
 - Describe Attribute Data.
 - What is GPS?

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21
- What do you understand by the term 'Aerial Photography'? Also write a short note on the factors that influence aerial photography.
 - What do you understand by the term 'Remote Sensing'? Discuss the advantages of remote sensing. Also explain ideal remote sensing system.
 - What is digital image? Enumerate and explain the various digital image data formats.
 - Discuss GIS and all its components in detail.
 - Explain the principle which helps GPS to determine the position of place.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7
- Differentiate between 'Aerial Photography' and 'Aerial Photogrammetry'.
 - A flooded area is covered by 140 dots on a 25 dot/cm² grid on a 1:25000 vertical aerial photographs. Find the ground area flooded.
4. Attempt any *one* part of the following: 7 x 1 = 7
- Explain the following:
 - Spectral Reflectance Curves and Atmospheric Windows.
 - Resolution of Remote Sensing System.
 - Describe multi-concept in Remote Sensing. Explain how remote sensing helps in flood related studies.
5. Attempt any *one* part of the following: 7 x 1 = 7
- What is Image Rectification? Explain the various types of image rectifications.
 - What do you understand by Image Classification? Differentiate between supervised and unsupervised classification.
6. Attempt any *one* part of the following: 7 x 1 = 7
- Describe the following:
 - Raster Data
 - Vector Data
 - Explain the functions of GIS. What are the applications of GIS?
7. Attempt any *one* part of the following: 7 x 1 = 7
- Explain the functional segments of GPS.
 - Explain the working principle of DCPS

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B TECH
(SEM IV) THEORY EXAMINATION 2017-18
STRUCTURAL ANALYSIS

Time: 3 Hours

Total Marks: 70

Note: Attempt all Sections. If require any missing data: then choose suitably

SECTION A

1. Attempt all questions in brief.

2 x 07 = 14

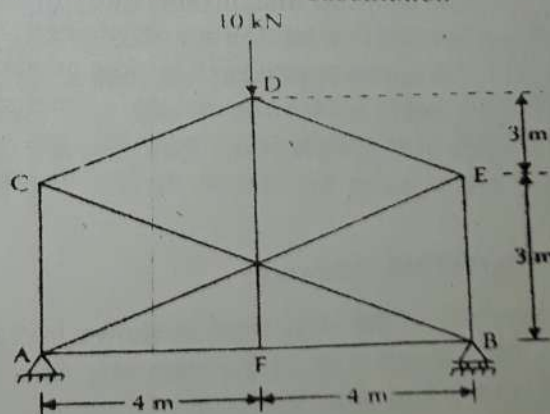
- What do you mean by degree of redundancy?
- Write statement of Castigliano's first theorem.
- What is the effect of temperature change in the cable?
- Write the name of the different types of joint and supports used in structures.
- What are the objectives of structural analysis?
- What are the uses of influence lines?
- State the Muller - Breslau principle of influence line.

SECTION B

2. Attempt any three of the following:

07 x 3 = 21

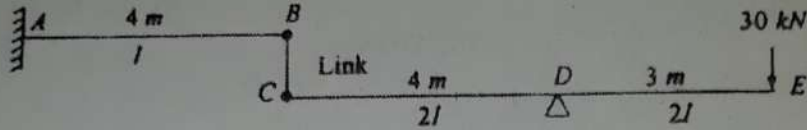
- A cable of span 120 m and dip 10 carries a load of 6 kN/m on horizontal span. Find the maximum tension in the cable and the inclination of the cable at the support. Find also the forces transmitting to support the pier, if the cable passes over smooth pulley on the top of the pier. The anchor cable is at 60° to the vertical. Determine the maximum bending moment for the pier, if the height of the pier is 15 m.
- Analyze the complex truss shown in figure while a load of 10 kN acts at the apex point D of the truss. Use method of substitution.



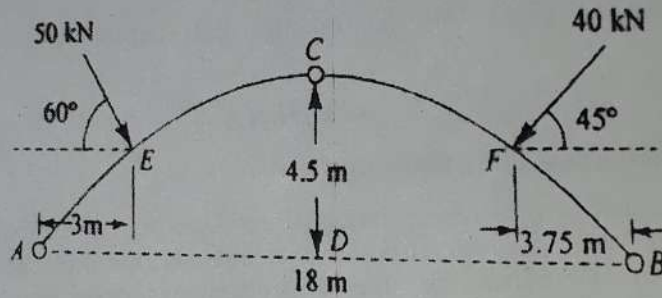
- A simply supported beam of 16 m span is subjected to a uniform dead load of 5000 N/m and a uniformly live load (longer than span) of 8000 N/m. Determine
 - Maximum and minimum shear force at left hand quarter point
 - Maximum bending moment at the same point
 - The range over which shear force may have + ve and - ve values.
- For the beam shown in figure find.
 - The deflection at E and B
 - The slope at B and C.

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Take $I = 830 \times 10^7 \text{ mm}^4$ and $E = 200 \text{ kN/mm}^2$



- e. A circular segmental three hinged arch at the ends and at the crown has a span of 18 m and a rise of 4.50 m. The arch carries the loads as shown in figure. Find the reactions at the supports and the bending moments at the loaded points.



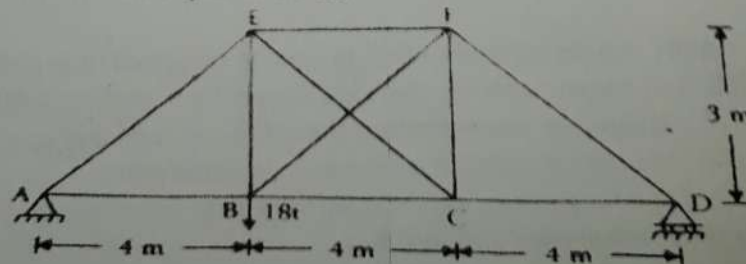
SECTION C

3. Attempt any *one* part of the following: 07 x 1 = 07

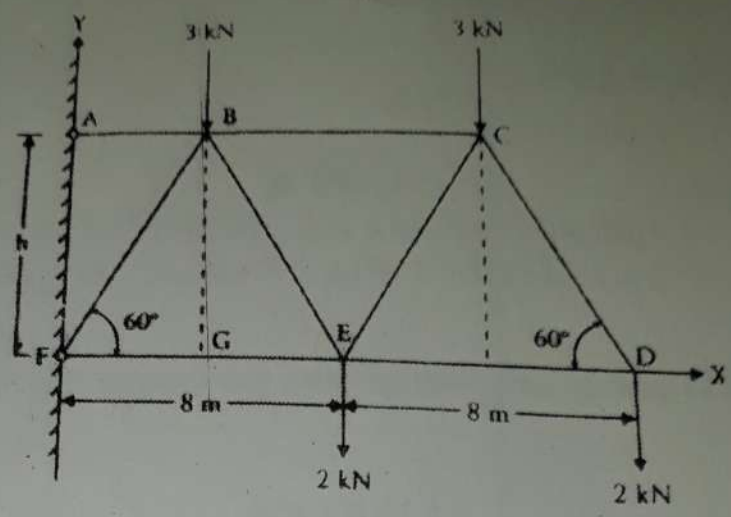
- (a)
 - i. Explain briefly the classification of structures.
 - ii. What is method of tension coefficient? Explain with suitable example.
- (b) A cable, 18 m long, is supported at two ends at the same level 16 m apart. The cable supports three loads of 8, 10 and 12 N dividing the 16 m distance in equal four parts. Find the shape of the string and tension in various portions.

4. Attempt any *one* part of the following: 07 x 1 = 07

- (a) All the members of the steel truss as shown in figure may be assumed pin jointed. Calculate forces in all the members. Area of cross section of all the members is same and equal to 30 cm^2



- (b) Analyze the truss shown in figure for the member forces using method of tension coefficients method.



5. Attempt any *one* part of the following: 07 x 1 = 07
- (a) A simply supported beam of span l carries a concentrated load P at distances a and b from the two ends. Find the strain energy stored by the beam.
 - (b) Determine the slope and deflection at the free end of a cantilever beam of span l subjected to a point load w at the free end, using unit load method. Take EI as constant.
6. Attempt any *one* part of the following: 07 x 1 = 07
- (a) State and prove the propositions used for several point loads moving over a simply supported beam.
 - (b) A uniformly distributed load of 20 kN/m intensity covering a length of 6 m moves over a simply supported beam of 15 m span. Determine the maximum positive shear force, maximum negative shear force and maximum bending moment at a section located at 5 m from the left support.
7. Attempt any *one* part of the following: 07 x 1 = 07
- (a) A three hinged parabolic arch carrying a point loads of 20 kN and 30 kN at a distance of 17 m and 13 m from the right support and a UDL of intensity 25 kN/m on the right half of the arch. It has a span 20 m and central dip of 5 . Find resultants reactions, Bending moment, normal thrust and radial shear at a distance 15 m from right hinged and Maximum negative bending moment.
 - (b) A three hinged parabolic arch ACB is hinged at the supports A and B which are below the crown hinge C by 3 m and 6.75 m respectively. The span of the arch is 22.5 m . The arch carries a UDL of 30 kN/m from A to C . Find the reactions at the supports and the maximum positive and negative bending moment.

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B. TECH
(SEM IV) THEORY EXAMINATION 2017-18
THEORY OF AUTOMATA AND FORMAL LANGUAGES

Time: 3 Hours

Total Marks: 70

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

2 x 7 = 14

- Define alphabet, string and language.
- Design a regular expression that accepts all the strings for input alphabet {a,b} containing exactly 2 a's.
- Design a NFA that accepts all the strings for input alphabet {a,b} containing the substring abba.
- Define Chomsky hierarchy.
- Is context free language closed under union? If yes, give an example.
- Convert NFA into equivalent DFA by taking any suitable example.
- Remove useless productions from the given productions: $S \rightarrow AB|ab$, $A \rightarrow aA|B|a$, $B \rightarrow D|E$

SECTION B

2. Attempt any three of the following:

7 x 3 = 21

- Define Deterministic Finite Automata (DFA) and design a DFA that accepts the binary number whose equivalent is divisible by 5.
- State recursive definition of regular expression and construct a regular expression corresponding to the state transition diagram as shown in Fig.1

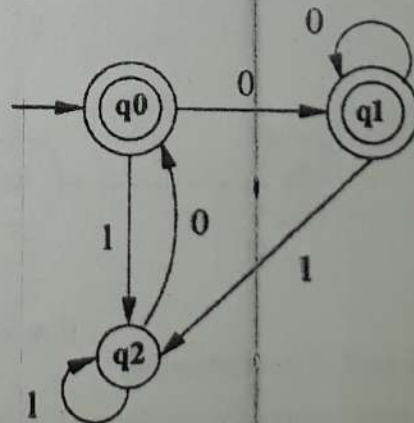


Fig.1

- Reduce the given grammar $G = (\{S, A, B\}, \{a, b\}, P, S)$ to Chomsky Normal Form. Where P is defined as:

$$S \rightarrow bA \mid aB$$

$$A \rightarrow bAA \mid aS \mid a$$

$$B \rightarrow aBB \mid bS \mid b$$
- What is Push Down Automata (PDA)? Design the PDA for the language $L = \{wcw^R \mid w \in \{a, b\}^*\}$
- Define Turing Machine (TM). Construct the TM for the language $L = \{a^n b^n \mid n > 0\}$.

SECTION C

3. Attempt any one part of the following: 7 x 1 = 7

(a) Describe Mealy and Moore machines with example. Convert the given Mealy machine as shown in Fig. 2 into Moore Machine.

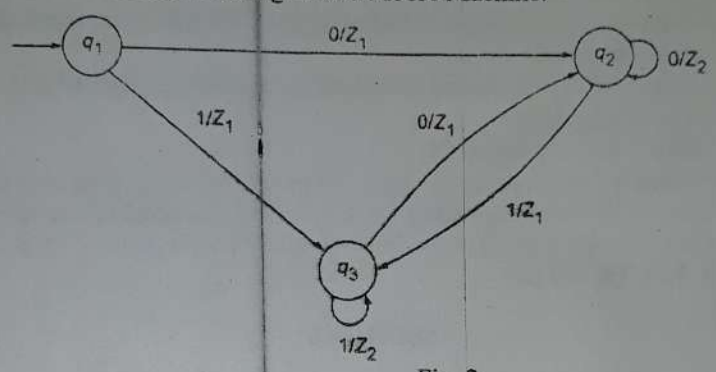


Fig. 2

(b) Construct the minimum state automata equivalent to DFA described by Fig. 3

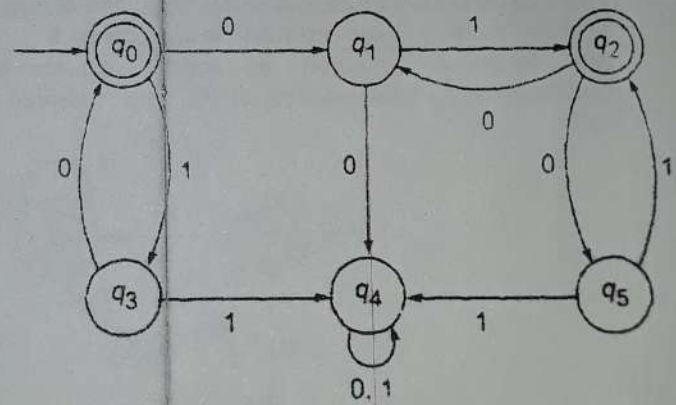


Fig. 3

4. Attempt any one part of the following: 7 x 1 = 7

- (a) State Pumping Lemma for regular sets. Show that the set $L = \{a^p \mid p \text{ is a prime}\}$ is not regular.
- (b) Discuss closure properties i.e. concatenation, union, intersection, complement of regular languages.

5. Attempt any one part of the following: 7 x 1 = 7

- (a) Discuss inherent ambiguity of context free languages with suitable example. Construct the context free grammar that accepts language $L = \{a^i b^j c^k \mid i = j \text{ or } j = k; i, j, k \text{ are positive integers}\}$.
- (b) Define parse tree. Find parse tree for the string $abbcd$ considering the productions-
 $S \rightarrow aAcBe$
 $A \rightarrow Ab$
 $A \rightarrow b$
 $B \rightarrow d$
 Is this ambiguous? Justify.

6. Attempt any one part of the following: 7 x 1 = 7

- (a) Differentiate between deterministic PDA (DPDA) and non-deterministic PDA (NPDA) with suitable example. Also discuss two stack PDA with example.

- (b) Construct a PDA equivalent to the following CFG productions:

$$S \rightarrow aAA, A \rightarrow aS \mid bS \mid a$$

7. Attempt any *one* part of the following:

7 x 1 = 7

- (a) Write short notes on the following:
- (i) Halting problem of Turing machine
 - (ii) Recursive Language
 - (iii) Variants of Turing Machine.
- (b) Define Post's Correspondence Problem (PCP) and Modified PCP with its applications. Find any three PCP solutions of the lists $x=(b,bab^3,ba)$ and $y=(b^3,ba,a)$.

Printed Pages:02

Paper Id: 1 1 0 4 3 1

Sub Code: RC S401

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B.TECH
(SEM IV) THEORY EXAMINATION 2017-18
Operating System

Time: 3 Hours

Total Marks: 70

- Note: 1. Attempt all Sections. If require any missing data, then choose suitably
 2. Any special paper specific instruction

SECTION A

1. -Attempt all questions in brief. 2 x 7 = 14

- a. Define Operating System. List the objectives of an operating system
- b. What are the various scheduling criteria for CPU scheduling?
- c. What is the use of inter process communication and context switching?
- d. Write the difference between internal and external fragmentation.
- e. What are the disadvantages of single contiguous memory allocation?
- f. Discuss the usage of wait-for graph method.
- g. Define Busy Waiting? How to overcome busy waiting using Semaphore operations.

SECTION B

2. Attempt any three of the following: 7 x 3 = 21

- a. Explain briefly Layered Operating system structure with neat sketch. Also explain protection and security.
- b. What is Dining Philosophers problem? Discuss the solution to Dining philosopher's problem using monitors.
- c. Consider the following snapshot of a system.

Process	Allocated			Maximum			Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P1	2	2	3	3	6	8	7	7	10
P2	2	0	3	4	3	3			
P3	1	2	4	3	4	4			

Answer the following questions using the banker's algorithm:

- 1) What is the content of the matrix need?
- 2) Is the system in a safe state?

d. Consider the following page reference string
1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6

How many page faults would occur for the optimal page replacement algorithm, assuming three frames and all frames are initially empty

- e. Is it possible to have a deadlock involving only a single process? Explain

SECTION C

3. Attempt any one part of the following: 7 x 1 = 7

- (a) Enumerate various Operating System components with their functions in brief.
- (b) Differentiate between (with one suitable example):
 - (i) Interactive and Batch processing System.
 - (ii) Multiprogramming and Time Sharing System.

4. Attempt any one part of the following: 7 x 1 = 7