

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2289415

Roll No. 1508210100

**B.TECH**

Regular Theory Examination (Odd Sem - <sup>IV</sup>III), 2016-17

**LASER SYSTEM AND APPLICATIONS**



Time : 3 Hours

Max. Marks : 100

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

**Section - A**

1. Attempt all questions in brief. (10×2=20)

- a) What do understand by Planck's Hypothesis?
- b) Describe wave particle duality in short.
- c) Explain the physical significance of wave function.
- d) How is metastable state essential to achieve population inversion?
- e) Describe the factors which cause losses in a laser.
- f) Find the intensity of a laser beam of 100mW power and having a diameter of 1.3mm. Assume the intensity to be uniform.

- NOE
- g) What is an active medium?
  - h) What are Dye Lasers?
  - i) Write few applications of Ruby laser.
  - j) What is hole-burning in laser gain curve?

### Section - B

2. Attempt any three of the following:  $(3 \times 10 = 30)$

- a) What is Compton Effect? Derive an expression for Compton shift. A photon of energy 1.02 MeV scattered through  $60^\circ$  by a free electron. Calculate the energy of the photon and the electron after interaction.
- b) What are the Einstein's coefficients? Establish relation between them.
- c) Why does a two-level laser not have any physical significance? Explain working of three and four level laser systems.
- d) What are ionic lasers? Explain the construction and working of Argon ion laser.
- e) Write a note on application of laser in medicine and surgery.

### Section - C

3. Attempt any one part of the following:  $(1 \times 10 = 10)$

- a) By using Heisenberg's uncertainty principle, show that an electron cannot exist inside the nucleus but a proton can exist.



- b) Describe Davisson and Germer's electron diffraction experiment to demonstrate the wave character of electron.

4. Attempt any one part of the following : (1×10=10)

- a) What is the concept of coherence in laser? Derive a relation between coherence length and line width.
- b) What is an optical resonator and explain its various configurations.

5. Attempt any one part of the following: (1×10=10)

- a) What do you mean by loop gain? If active medium gain in laser is 1.03 with length 30 cm. The loss coefficient is  $\alpha = 1.35 \times 10^{-4} \text{ cm}^{-1}$ . The reflection coefficients of the mirrors are 0.99 and 0.94 respectively. Calculate its loss factor, loop gain and gain coefficient.

- b) What do you mean by Q-switching? Describe various methods of Q-switching in brief.

6. Attempt any one part of the following: (1×10=10)

- a) Describe the construction and working of He-Ne laser. Compare it Ruby Laser.

- b) Discuss the features, lasing transitions, operations of  $\text{Nd}^{3+}$ : YAG laser.

NO

7. Attempt any one part of the following: (12)

a) What do you mean by material processing are the various changes that can take place material processing?

b) Discuss, how Laser can be used in Metrology

Physical Constants

Rest mass of electron  $m_o = 9.1 \times 10^{-31}$

Rest Mass of Proton  $m_p = 1.67 \times 10^{-27}$

Speed of light  $c = 3 \times 10^8 \text{ m/s}$

Planck's Constant  $h = 6.63 \times 10^{-34}$

Charge on electron  $e = 1.6 \times 10^{-19}$

Boltzmann's Constant  $k = 1.38 \times 10^{-23}$



3.

4.

5.

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**THEORY EXAMINATION (SEM-IV) 2016-17  
INDUSTRIAL SOCIOLOGY**

Max. Marks : 100

Time : 3 Hours

Note : Be precise in your answer.

**SECTION - A**

10 x 2 = 20

1. Attempt all of the following questions:

- (a) What is the means of marketing theory in collective bargaining?
- (b) Explain the disciplinary procedure.
- (c) What is Bi-Partite? Explain.
- (d) Define stay-in strike.
- (e) What is the meaning of hierarchy? Explain it.
- (f) Define the workers 'participation in management.
- (g) Explain the slow down strike.
- (h) What is the means of Gender Parity?
- (i) What is the role of small scale sector?
- (j) What is the meaning of Boycott?

**SECTION - B**

5 x 10 = 50

2. Attempt any five of the following questions:

- (a) Explain the general impact of industrial disputes on the economy of a nation.
- (b) What are joint management councils? What are their functions?
- (c) What are the causes of indiscipline in Indian industries? Give suggestions to maintain discipline.
- (d) Write an essay on industrialization in India since independence.
- (e) Discuss the important weapons used by the management against the workers in an organization? Are they justified? Explain.
- (f) What are the management policies in causes of grievance? Explain.
- (g) Explain the Tripartite machinery. And what is code of Discipline?
- (h) What are the causes of indiscipline in Indian industry? Give suggestions to maintain discipline.

**SECTION - C**

2 x 15 = 30

Attempt any two of the following questions:

3. Discuss and review the working of works committees and joint management councils in India.
4. Briefly discuss the science, technology and innovation policy of India 2013.
5. What are the methods that are popularly used in the settlement of industrial Disputes? Which one do you think is most effective and why?



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**B. TECH.**  
**THEORY EXAMINATION (SEM-IV) 2016-17**  
**INDUSTRIAL PSYCHOLOGY**

Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer.

**SECTION – A**

1. Attempt all of the following questions:

10 x 2 = 20

- a) What is the role of lighting in good work environment?
- b) What is Accident Proneness? Explain.
- c) What is the meaning of Inherent hazards?
- d) Explain the clan culture.
- e) What is organizational psychology?
- f) Define the individual Autonomy.
- g) Explain the group pressures.
- h) What is the meaning of life trauma?
- i) Define the job Redesign.
- j) Explain the persuasive leaders.

**SECTION – B**

2. Attempt any five of the following questions:

5 x 10 = 50

- a) Explain the trait theory of leadership. Compare it with the behavioral theory of leadership.
- b) Explain the Autocratic leadership vs. Participative leadership.
- c) What is man-machine system? Briefly explain man-machine system in service Industries.
- d) Write a note on the physical working conditions which are necessary to obtain Higher Productivity from the workers.
- e) Define method study and briefly explain the techniques of method study.
- f) Examine the contributions of Hawthorne studies to the development of industrial Psychology.
- g) What is the relation between training, development and education? Distinguish between training a development.
- h) Explain the kinds of Psychological test.

**SECTION – C**

2 x 15 = 30

3. Attempt any two of the following questions:

3. Define organizational climate. And explain the types of organizational culture.
4. What is the purpose of training? Explain the important methods of Training of Personnel.
5. What do you understand by time and motion study? Show how their Application can Increase productivity of labour?

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**COMMON TO ALL BRANCHES**  
**THEORY EXAMINATION (SEM-IV) 2016-17**  
**HUMAN VALUES AND PROFESSIONAL ETHICS**

Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer.

**SECTION - A**

1. Attempt all of the following:

10 x 2 = 20

- (a) What do you mean by human values?
- (b) Define existence.
- (c) What do you understand by trust?
- (d) What is Sanyam?
- (e) Define harmony in nature.
- (f) What do you mean by Sukh and Suvidha?
- (g) What is the difference between prosperity and wealth?
- (h) Define SVDD & SSDD?
- (i) What do you mean by co-existence?
- (j) What do you understand by LOVE?

**SECTION - B**

2. Attempt any five of the following:

5 x 10 = 50

- (a) Human being is the co-existence of the Self and the Body'. Elaborate.
- (b) What do you mean by value education? Why there is a need of value education in your life?
- (c) "I am the seer, doer and enjoyer. The body is my instrument". Explain.
- (d) What is the difference between respect and disrespect? Which of the two is naturally acceptable to you?
- (e) What is the meaning of prosperity? How can you say that you are prosperous?
- (f) What do you mean by self exploration? What are the basic content of self - exploration?
- (g) What are the four orders in nature? Describe their activities and natural characteristics?
- (h) What is your vision of Happy and Prosperous life?

**SECTION - C**

Attempt any two of the following questions:

2 x 15 = 30

3. Suggest any two programs that you can undertake to improve the health of your body.
4. What do you mean by competence in professional ethics? Elaborate with examples.
5. What is a holistic technology? Take any two such examples from the Indian tradition and elaborate on them.



**B.TECH.**

**THEORY EXAMINATION (SEM-IV) 2016-17**

**THEORY OF AUTOMATA AND FORMAL LANGUAGES**

Time : 3 Hours

Max. Marks : 100

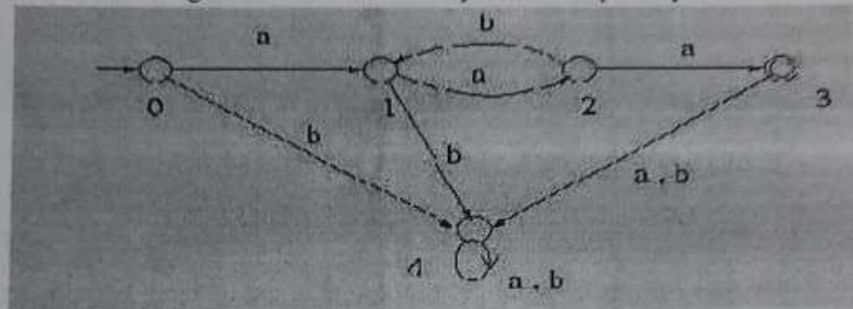
Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

**SECTION - A**

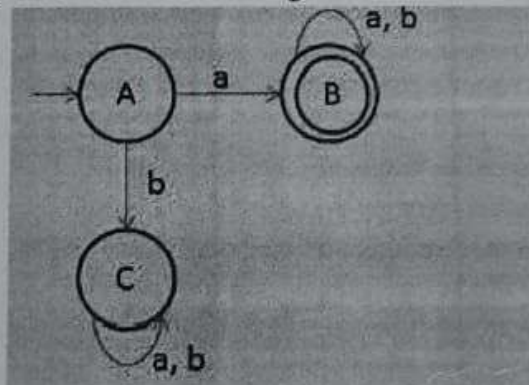
1. Explain the following:

10 x 2 = 20

- (a) Design the DFA that accepts an even number of a's and even number of b's.
- (b) Consider the DFA given below and identify the L accepted by the machine.



- (c) State the pumping lemma theorem for regular languages.
- (d) Convert the FA given below to left linear grammar.



- (e) Check whether the grammar is ambiguous or not.  
 $R \rightarrow R+R / RR / R^* / a / b / c$ . Obtain the string  $w = a+b*c$
- (f)  $S \rightarrow aB/bA$   $A \rightarrow a/aS/bAA$   $B \rightarrow b/bS/aBB$ . Identify the strings obtained from this grammar.
- (g) Define PDA. Draw the graphical representation for PDA.
- (h) Design a PDA which accepts set of balanced paranthesis  $(\{ \{ \} \})$ .
- (i) Eliminate unit productions in the grammar.  $S \rightarrow A/bb$   $A \rightarrow B/b$   $B \rightarrow S/a$
- (j) What are checking off symbols?

**SECTION - B**

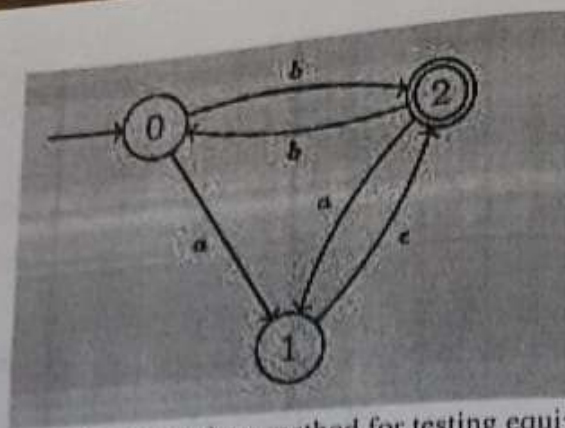
2. Attempt any five of the following questions:

5 x 10 = 50

- (a) (i) Convert the NFA-  $\epsilon$  to DFA.

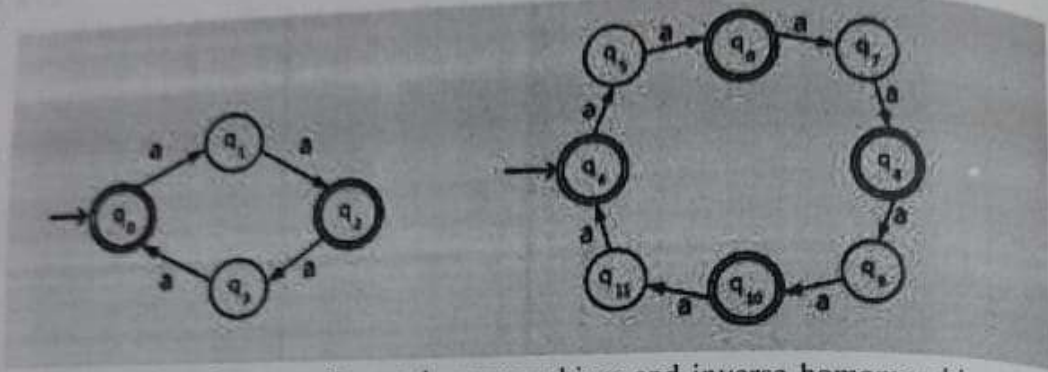


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(ii) Check with the comparison method for testing equivalence of two FA given below.

below.



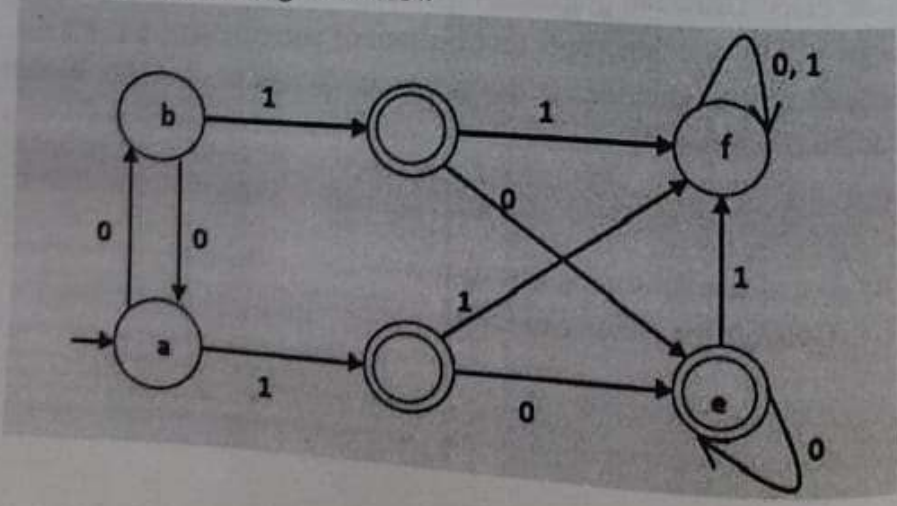
- (b) Prove that the compliment, homomorphism and inverse homomorphism, closure of a regular language is regular.
- (c) State and prove kleene's theorem with an example.
- (d) Consider the grammar with the production  $S \rightarrow aSS$   $A \rightarrow b$ . Compute the string  $aababbb$  with the left most and right most derivation. Draw the derivation tree.
- (e) (i) Find out whether the language  $L = \{x^n y^n z^n \mid n \geq 1\}$  is context free or not.  
(ii) Construct a PDA that accepts  $L = \{ww^R \mid w = (a+b)^*\}$
- (f) (i) Convert the following CFG into CNF  
 $S \rightarrow XY \mid Xn \mid p$   
 $X \rightarrow mX \mid m$   
 $Y \rightarrow Xn \mid o$   
 (ii) Convert the following CFG into CNF  $S \rightarrow ASA \mid aB, A \rightarrow B \mid S, B \rightarrow b \mid c$
- (g) Design a TM to recognize all strings consisting of an odd number of  $a$ 's.
- (h) Prove that the halting problem is undecidable.

SECTION - C

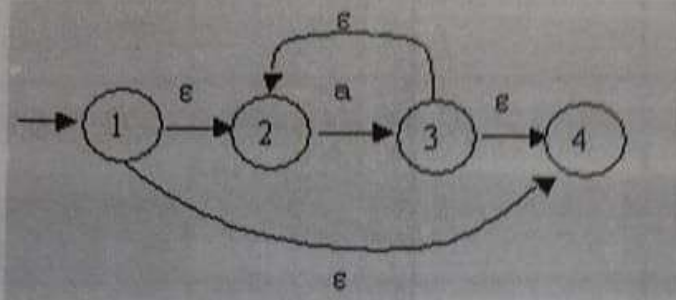
Attempt any two of the following questions:

2 x 15 = 30

3. (a) Minimize the automata given below



- (b) Compute the epsilon-closure for the given NFA. Convert it into DFA. 4/10



4. (a) Construct PDA to accept  $L = \{0^n 1^n \mid n \geq 0\}$   
 (b) Construct a PDA from the following CFG.  
 $G = (\{S, X\}, \{a, b\}, P, S)$  where the productions are -  
 $S \rightarrow XS \mid \epsilon, A \rightarrow aXb \mid Ab \mid ab$
5. (a) Prove that single tape machines can simulate multi tape machines.  
 (b) Design a TM to recognize all strings consisting of an odd number of  $a$ 's.

A given

sure of a

aababbb

t.

$\rightarrow b \mid \epsilon$

= 30



(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2012265

Roll No. 1508210100

### B.TECH.

Regular Theory Examination (Odd Sem-III), 2016-17

## DISCRETE STRUCTURES AND GRAPH THEORY

Time : 3 Hours

Max. Marks : 100

### SECTION - A

Attempt all parts. All parts carry equal marks. Write answer of each part in short. (10×2=20)

1. a) Let  $R$  be a relation on the set of natural numbers  $N$ , as  $R = \{(x, y) : x, y \in N, 3x + y = 19\}$ . Find the domain and range of  $R$ . Verify whether  $R$  is reflexive.
- b) Show that the relation  $R$  on the set  $Z$  of integers given by  $R = \{(a, b) : 3 \text{ divides } a - b\}$ , is an equivalence relation.
- c) Show the implications without constructing the truth table  $(P \rightarrow Q) \rightarrow Q \Rightarrow P \vee Q$ .
- d) Show that the "greater than or equal" relation ( $\geq$ ) is a partial ordering on the set of integers.

- NCS-302
- e) Distinguish between bounded lattice and complemented lattice.
  - f) Find the recurrence relation from  $y_n = A2^n + B(-3)^n$
  - g) Define ring and give an example of a ring with zero divisors.
  - h) State the applications of binary search tree.
  - i) Define Multigraph. Explain with example in brief.
  - j) Let  $G$  be a graph with ten vertices. If four vertices has degree four and six vertices has degree five, then find the number of edges of  $G$ .

### SECTION - B

**Attempt any 5 questions from this section**

(5×10=50)

2. Write the symbolic form and negate the following statements :
  - Everyone who is healthy can do all kinds of work.
  - Some people are not admired by everyone.
  - Everyone should help his neighbors, or his neighbors will not help him.
  
3. In a Lattice if  $a \leq b \leq c$ , then show that
  - a)  $a \vee b = b \wedge c$
  - b)  $(a \vee b) \vee (b \wedge c) = (a \vee b) \wedge (a \vee c) = b$



## NCS-302

4. State and prove Lagrange's theorem for group. Is the converse true?
5. Prove that a simple graph with  $n$  vertices and  $k$  components can have at most  $\frac{(n-k)(n-k+1)}{2}$  edges.
6. Prove by induction:  $\frac{1}{1.2} + \frac{1}{2.3} + \dots + \frac{1}{n(n+1)} = \frac{n}{(n+1)}$ .
7. Solve the recurrence relation  $y_{n+2} - 5y_{n+1} + 6y_n = 5^n$  subject to the condition  $y_0 = 0, y_1 = 2$ .
8.
  - a) Prove that every finite subset of a lattice has an LUB and a GLB.
  - b) Give an example of a lattice which is a modular but not a distributive.
9. Explain in detail about the binary tree traversal with an example.

## SECTION - C

Attempt any 2 questions from this section.

(2×15=30)

10. a) Prove that a connected graph  $G$  is Euler graph if and only if every vertex of  $G$  is of even degree.





(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2012267

Roll No. 

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**B.TECH**

Regular Theory Examination (Odd Sem - III), 2016-17

**DATA STRUCTURES USING 'C'**

Time : 3 Hours

Max. Marks : 100

**Section - A**

1. Attempt all parts. All parts carry equal marks. Write answer of each part in short. (10×2=20)
- Define time complexity and space complexity of an algorithm.
  - What are the merits and demerits of array data structures?
  - How do you push elements in a linked stack?
  - Differential linear and non linear data structures.
  - What is the significance of priority queue?
  - Define complete binary tree. Give example.
  - When does a graph become tree?
  - Prove that the number of odd degree vertices in a connected graph should be the even.

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(1)

[P.T.O.]

- i) What is sorting? How is sorting essential in database applications?
- j) Give the worst case and best case time complexity of binary search.

- 7. What is quick sort? Present all steps. [38, 81, 22, 48, 1]
- 8. Illustrate the implementation of graph along with an example.
- 9. Compare and contrast primary index files and secondary index files.

**Section - B**

**Note : Attempt any 5 questions from this section. (5x16=)**

- 2. What is recursion? Write a recursive program to find the number of digits of the given number. Also calculate the time complexity. [Ex: 259 = 16 = 7(Answer)].
- 3. Solve the following :
  - a)  $((A - (B + C) * D) / (E + F))$  [Infix to postfix]
  - b)  $(A + B) + *C - (D - E) ^ F$  [Infix to prefix]
  - c)  $7 5 2 + * 4 1 5 - / -$  [Evaluate the given postfix expression]
- 4. Write a C program to implement the array representation of circular queue.
- 5. Write a C program to implement binary tree insertion and deletion with example.
- 6. Write the C program for various traversing techniques of binary tree with neat example.

**Note : Attempt any 5 questions from this section. (5x16=)**

- 10. What is meant by a linked list? Write a program to perform the following operations on a linked list.
  - a) Creation
  - b) Insertion
  - c) Deletion
  - d) Sorting
  - e) Display
- 11. Define AVL tree. Write a program to insert and delete nodes in an AVL tree with neat example.

301/12/2016/15



7. What is quick sort? Sort the given values using quick sort; present all steps/iterations :  
38, 81, 22, 48, 13, 69, 93, 14, 45, 58, 79, 72
8. Illustrate the importance of various traversing techniques in graph along with its application.
9. Compare and contrast the difference between B+ tree index files and B tree index files with an example.

### Section - C

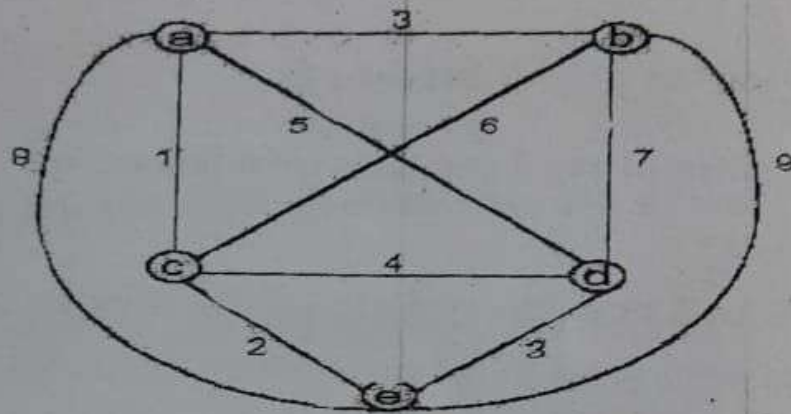
**Note : Attempt any 2 questions from this section.**

**(2×15=30)**

10. What is meant by circular linked list? Write the functions to perform the following operations in a doubly linked list.
  - a) Creation of list of nodes.
  - b) Insertion after a specified node.
  - c) Delete the node at a given position.
  - d) Sort the list according to descending order
  - e) Display from the beginning to end.
11. Define AVL Trees. Explain its rotation operations with example. Construct an AVL tree with the values 10 to 1 numbers into an initially empty tree.

NCS - 301

12. Discuss Prim's and Kruskal's algorithm. Construct minimum spanning tree for the below given graph using Prim's algorithm (Source node = a).



- 1. Ex  
(a)  
(b)  
(c)  
(d)  
(e)  
(f)  
(g)  
(h)  
(i)  
(j)
- 2. A  
(a)  
(b)



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**THEORY EXAMINATION (SEM-IV) 2016-17  
COMPUTER GRAPHICS**

Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

**SECTION - A**

1. Explain the following:

10 x 2 = 20

- Why do we need video controller?
- Trace the points for drawing a line from (0,0) to (-6,-6) using simple DDA algorithm.
- Define refresh buffer.
- Give the transformation matrix for rotation about an arbitrary point P in space.
- Prove that the two successive rotations are commutative.
- Write how shear transformation works.
- List the properties of B-spline curves.
- Differentiate between specular reflection and diffuse reflection.
- How a viewport differs from the window?
- What do you mean by aliasing and antialiasing? Give examples

**SECTION - B**

2. Attempt any five parts of the following questions:

5 x 10 = 50

- Develop the Bresenham's line drawing to draw lines of any slope. Compare this with the DDA Algorithm.
- Given a 25cm x 20cm display operating in 1024 x 768 x 16 color mode which is refreshed 30 times per second, and for which 10% of the refresh cycle is spent in retrace, calculate
  - the pixel aspect ratio,
  - the size of the frame buffer, and
  - the required data transfer rate in kilobytes per second.
- Given a window bordered by (1,2) at the lower left and (16,12) at the upper right, give the screen coordinates of a triangle with vertices (3,2), (10,7.5) and (5,5) when mapped into a viewport with corners (100,100) and (400,200). Provide accurate illustrations of the window, viewport, and the untransformed and transformed triangles with your answer.
- Explain the essential difference between the "Scan-Line" hidden surface removal algorithm and the depth buffer technique.
- Write the way of clipping a line using Cohen Sutherland algorithm.
- Give a detailed explanation about quadratic surfaces and polygon surfaces.
- Write down the detailed description of Warn model.

**SECTION - C**

Attempt any two parts of the following questions:

2 x 15 = 30

- The figure ABCD where  $A=(-2,0)$ ,  $B=(0,-2)$ ,  $C=(-2,-4)$  and  $D=(-4,-2)$  can be transformed into  $A'B'C'D'$  where  $A'=(1,-1)$ ,  $B'=(3,3)$ ,  $C'=(6,3)$  and  $D'=(4,-1)$  by the composition of simple transforms  $T_2 \cdot H_1 \cdot S_1 \cdot R_1 \cdot T_1$ . Give the matrix form of these five transformations. Then express the composite transform using only one scale, one rotation and one translation.
- Explain Area Subdivision algorithm with suitable figure? List the advantages and disadvantages of Area Subdivision algorithm.
- Discuss in detail about visible surface detection methods.

**COMMON TO ALL BRANCHES**  
**THEORY EXAMINATION (SEM-IV) 2016-17**  
**CYBER SECURITY**

Time : 3 Hours

Note : Be precise in your answer.

Max. Marks : 100

## SECTION - A

1. Attempt all of the following questions: 10 x 2 = 20
- (a) What is CIA (Confidentiality, Integrity and Availability) trade?
  - (b) What are the threats to information system?
  - (c) What is System Development Life Cycle (SDLC)?
  - (d) Define the terms RTGS and NEFT.
  - (e) What do you mean by virus, worm and IP spoofing?
  - (f) How cyber security is different from computer security?
  - (g) State the difference between Risk Management and Risk Assessment.
  - (h) Explain briefly about disposal of data.
  - (i) Define IT asset and the security of IT Assets.
  - (j) What is the need of cyber laws in India?

## SECTION - B

2. Attempt any five parts of the following question: 5 x 10 = 50
- (a) What are biometric? How can a biometric be used for access control? Discuss the criteria for selection of biometrics.
  - (b) What is Intrusion Detection System (IDS)? Explain its type in detail.
  - (c) What are the backup security measures? Discuss its type.
  - (d) What are the basic fundamental principles of information security? Explain.
  - (e) Write a short note on CCTV and its applications.
  - (f) What is Electronic cash? How does cash based transaction system differ from credit card based transactions?
  - (g) What do you mean by Virtual Private Networks? Discuss authentication mechanism used in VPN.
  - (h) Write a short note on:
    - (i) Database Security
    - (ii) Email Security
    - (iii) Internet Security

## SECTION - C

- Attempt any two of the following questions: 2 x 15 = 30
3. What is Electronic Data Interchange (EDI)? What are the benefits of EDI? How can it be helpful in governance?
  4. What is digital signature? What are the requirements of a digital signature system? List the security services provided by digital signature.
  5. Explain the following in detail :
    - (i) Private Key cryptosystem and Public key cryptosystems.
    - (ii) Firewall.



Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

## SECTION - A

1. Attempt all of the following questions:

10 x 2 = 20

- Calculate the number of memory chips needed to design 8K byte memory if the memory chip size is 1024 x 1
- What is the difference between hardware interrupts and software interrupts of 8085 microprocessor?
- What is the significance of pipelining in 8086 microprocessor?
- Define the RIM and SIM instruction of 8085 microprocessor.
- Write instructions to read the data at input port 07H and at the port 08H. Display the input data from 07H at output port 00H and store the input data from port 08H in register B.
- Explain the significance of HOLD and READY pin of 8085 microprocessor.
- What do you mean by wait state?
- State the difference between RAL and RRC instructions.
- What operation can be performed by using the instruction SUBA? Specify the status of Z and CY.
- Write the control word format for BSR mode of 8255.

## SECTION - B

2. Attempt any five of the following questions:

5 x 10 = 50

- Explain the flag register of 8085 microprocessor with the help of example.
  - Identify the register contents and flag status as the following instructions are executed:

	A	B	S	Z	CY
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SUB A

MOV B, A

DCR B

INR B

SUI 01H

HLT

- Draw and explain the timing diagram of MVI A, 46H and the total time required for the execution of this instruction.
- With the help of the block diagram, describe 8237 DMA Controller in detail.
- Sixteen bytes of data are stored in memory locations at 2050H to 205FH. Write a programme to transfer the entire block of data to new memory locations starting at 2070H.
  - A string of six data bytes is stored starting from memory location 2050H. The string includes some blanks. Write a program to eliminate the blanks from the string.
- Draw the PIN diagram of 8086 microprocessor and discuss about each pin.
- Write a assembly language program based on 8085 to count from 0 to 9 with a one second delay between each count. At the count of 9, the counter should reset itself to 0

and repeat the sequence continuously. Use register pair HL to set up the delay and display each count at one of the output ports. Assume the clock frequency of the microprocessor is 1 MHz.

- (g) (i) Write an assembly language program for conversation of Binary to BCD with flow chart.
- (ii) Write an assembly language program for conversation of BCD to seven segment decoder.
- (h) (i) Write a short note on STACK and UBROUTINE.
- (ii) Draw a neat diagram for interfacing 8K SRAM and 8K EPROM with the system lines of 8085 microprocessor with memory map.

SECTION - C

Attempt any two of the following questions:

- 3 (i) Explain the role of interrupts in programming. Explain the interrupt used in 8085. List out all the vectored interrupts of 8085 and give their vector address.
- (ii) Explain the addressing modes of 8085 microprocessor in detail with example.
- 4 (i) Write a BSR control word subroutine to set bits PC7 and PC3 and reset them after 10ms. The address of control word register is 83H. Also, write subroutine of 10ms.
- (ii) Write instructions to generate a 1 KHz square wave from counter 1 of 8254. Assume the gate of counter 1 of 8254 is tied to +5V through 10K resistor and port address for counter 1 and control word register is 81H and 83H respectively. Explain the significance of connecting the gate to +5V.
- 5 (i) Explain the architecture of 8255 PPI with neat diagram.
- (ii) Define the modes of 8254 PIT in detail with the help of diagrams.

Time : 3 Hours  
Note : Be precise

- 1. Explain
  - (a)
  - (b)
  - (c)
  - (d)
  - (e)
  - (f)
  - (g)
  - (h)
  - (i)
  - (j)
- 2. Attempt
  - (a)
  - (b)
  - (c)
  - (d)
  - (e)
  - (f)
  - (g)
  - (h)
- Attempt
  - 3.
  - 4.
  - 5.





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24

**THEORY EXAMINATION (SEM-IV) 2016-17**  
**ELECTROMAGNETIC FIELD THEORY**

Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

**SECTION - A**

1. Attempt all parts of the following questions:

10 x 2 = 20

- Explain the physical significance of Divergence and Curl.
- Derive an expression for inductance per unit length of coaxial conductors.
- Express  $B = \left(\frac{10}{r}\right)r + r \cos \theta \theta$  in cylindrical coordinates.
- Explain the terms - Transmission coefficient and reflection coefficient.
- Prove the electric field vector  $E = (\text{grad } V)$ , where  $V$  is a scalar potential field.
- Transform the point (1, 1, 6) to spherical coordinates.
- Verify whether the scalar field  $S = \rho^2 z \cos 2\Phi$  in cylindrical coordinates is a solution of Laplace's equation.
- A copper wire carries a conduction current of 1 amp at 60 Hz. What is the displacement current in the wire? Assume  $\mu = \mu_0$ ,  $\epsilon = \epsilon_0$  and  $\sigma = 5.8 \times 10^7$  ohm/m.
- State Stoke's theorem and Divergence theorem.
- State Gauss's law and derive the related Maxwell equation.

**SECTION - B**

2. Attempt any five of the following questions:

5 x 10 = 50

- Derive and explain the mathematical form of Poynting theorem.
- Given that  $D = \left(\frac{5r^2}{4}\right)r$  in spherical co-ordinate. Find the volume enclosed between  $r=1$  and  $r=2$ .
- Explain the phenomenon of polarization and its types.
- Prove that the magnetic field due to an infinite conductor carrying current  $i$  at a distance  $r$  is  $H = \frac{i}{2\pi r}$  A/m
- Explain the tangential and normal boundary conditions between two dielectrics for static electric fields.
- Calculate  $E$  at  $P(1, 1, 1)$  in free space caused by four identical 3-nC point charges located at  $p_1 = (1, 1, 0)$ ,  $p_2 = (-1, 1, 0)$ ,  $p_3 = (-1, -1, 0)$  and  $p_4 = (1, -1, 0)$ .
- State and explain Maxwell's equations for time varying fields in differential and integral forms and their significance.
- A uniform plane wave propagating in good conductor. If the magnetic field intensity is given by  $H = 0.1e^{-15} \cos(2\pi \times 10^8 t - 15z) i$  A/m, determine the conductivity and corresponding component of  $E$  field. Also calculate the average power loss in a block of unit area and thickness  $t$ .

**SECTION - C**

Attempt any two of the following questions:

2 x 15 = 30

- A uniform plane wave propagating in a medium has  $E = 2e^{-az} \sin(10^8 t - \beta z) j$  V/m. If a medium is characterized by  $\epsilon_r = 1$ ,  $\mu_r = 20$  and  $\sigma = 3$  S/m, determine  $\alpha$ ,  $\beta$  and  $H$ .
- Discuss the solution of plane wave equation in conducting media (Lossy Dielectric). Derive the above up to Propagation Constant, Attenuation Constant and Phase Constant.
- Explain the reflection of plane wave for the normal incidence. Discuss about Reflection and Transmission coefficient for  $F$  and  $H$ .



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**THEORY EXAMINATION (SEM-IV) 2016-17**  
**NETWORK ANALYSIS AND SYNTHESIS**

Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

**SECTION - A**

1. Attempt all of the following questions:

10 x 2 = 20

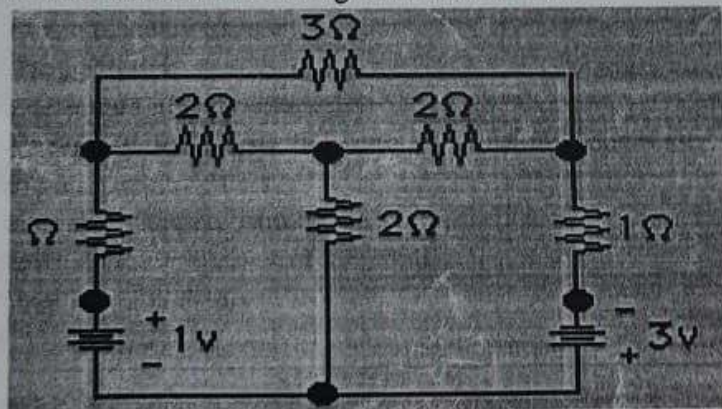
- (a) Define a two port network.
- (b) Define network synthesis.
- (c) What do you mean by transfer function?
- (d) Define twig and link.
- (e) Write a definition of convolution.
- (f) How you can say that a network is stable .Give definition.
- (g) What do you mean by filters?
- (h) Give statement of superposition theorem.
- (i) Write down all the properties of loop impedance matrix.
- (j) Define tree in graph theory.

**SECTION - B**

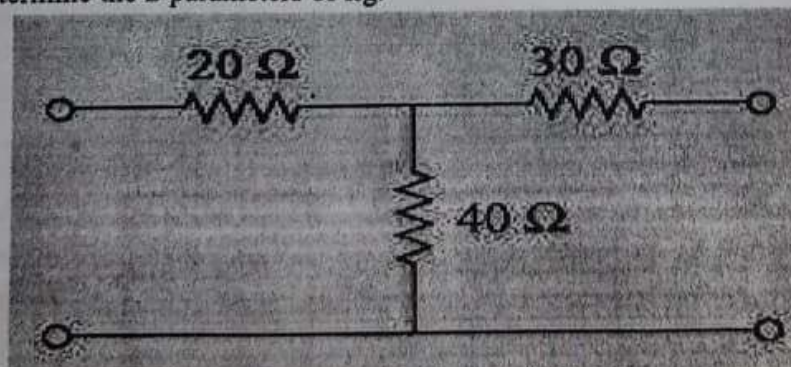
2. Attempt any five of the following questions:

5 x 10 = 50

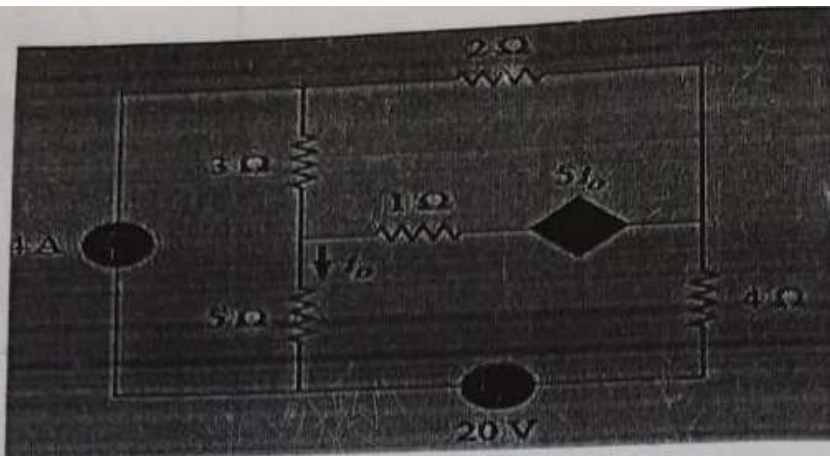
- (a) Explain Z-impedance parameter in detail.
- (b) Give classification of filters.
- (c) Obtain cut-set matrix for following electrical network.



- (d) Determine the z-parameters of fig.



- (e) Find
- $i_o$
- in the circuit in Fig. using superposition theorem.



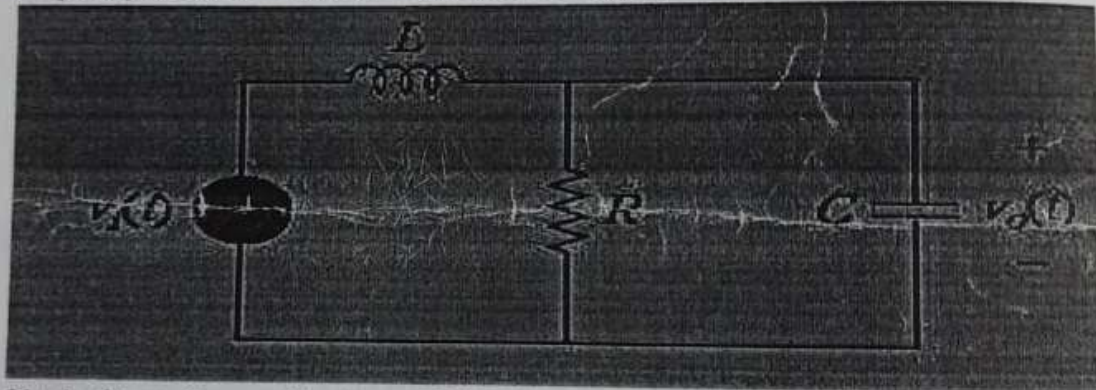
- (f) Explain admittance parameters in detail
- (g) Explain in detail band stop filter, with prove.
- (h) Give statement and prove maximum power transfer theorem.

**SECTION - C**

Attempt any two of the following questions:

2 x 15 = 30

- 3 With example explain first Foster form realization of LC networks.
- 4 Determine what type of filter is shown in Fig. 14.39. Calculate the corner or cutoff frequency. Take  $R = 2\text{ k}\Omega$ ,  $L = 2\text{ H}$ , and  $C = 2\text{ }\mu\text{F}$ .



- 5 Obtain Cauer form realization of following and obtain network.

$$Z(s) = \frac{(s+1)}{s(s+2)}$$

$$Z(s) = \frac{(s+1)(s+3)}{s(s+2)}$$

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## B. TECH.

## THEORY EXAMINATION (SEM-IV) 2016-17

## GEOINFORMATICS

Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

## SECTION-A

1 Explain the following :

(10×2=20)

- a) Stereoscopy
- b) Relief Displacement
- c) Parallax
- d) Active Remote Sensing
- e) Passive Remote Sensing
- f) Flight Planning
- g) Sun-synchronous Satellites
- h) Geo-synchronous Satellites
- i) Resolution
- j) Spectral Reflectance Curve

## SECTION-B

2 Attempt any five of the following :

(10×5=50)

- a) Derive an expression for the scale of a vertical photograph. Explain how the ground coordinates and the distances can be obtained from a vertical photograph.
- b) Define relief. Derive an expression for the displacement due to ground relief.
- c) Two consecutive photographs were taken with a camera of focal length 37.5 cm, at a height of 7200 m. The overlap was exactly half and the prints were 22.5 cm X 22.5 cm. The height was same for both the exposures and the aircraft flew on even peel with no drift. The ground was flat at approx. 2500 m above m.s.l. Determine the scale of the photograph and the length of the airbase.
- d) How will you extract information from an aerial photograph? Explain.
- e) What is a satellite image? Write short note on characteristics and formats of satellite image.
- f) What do you understand by 'Image Enhancement'? Explain with reference to the Satellite Remote Sensing.
- g) What do you understand by Land Use / Land Cover Classification? Explain.
- h) What is GIS? What are the applications of GIS? Explain in detail.

## SECTION-C

Attempt any two of the following :

(15×2=30)

3. Explain the various segments of GPS.
4. Differentiate between kinematic and differential GPS.
5. How has GPS revolutionized our life? Explain..

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B.TECH.

**THEORY EXAMINATION (SEM-IV) 2016-17  
HYDRAULICS AND HYDRAULIC MACHINES**

Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

**SECTION - A**

1. Explain the following:

10 x 2 = 20

- What do you understand by uniform and non-uniform flow in the case of channels?
- State and discuss the assumptions made in the derivation of the dynamic equation for gradually varied flow.
- Write down the Manning's equation for uniform flow in open channel.
- Briefly explain in gradually varied flow.
- Write down the dynamic equation for gradually varied flow in wide rectangular channel.
- Discuss the characteristics of surface profiles.
- Explain the working principles of reciprocating pump.
- Explain the functions of air vessels in a reciprocating pump.
- What are the uses of a draft tube?
- Describe the surge tank and a forebay and what are their functions?

**SECTION - B**

2. Attempt any five of the following questions:

5 x 10 = 50

- A trapezoidal channel with a base width of 6m and side slopes of 2 horizontal to 1 vertical conveys water at  $17\text{m}^3/\text{s}$  with a depth of 1.5m. Is the flow situation sub or super critical.
- State the conditions under which the rectangular section of an open channel will be most economical. Derive these conditions.
- At what height from water surface a centrifugal pump may be installed in the following case to avoid cavitation; atmospheric pressure 101kpa; vapour pressure 2.34kpa; inlet and other losses in suction pipe 1.55m; effective head of pump 52.5m; and cavitation parameter  $\sigma = 0.118$ .
- Show that the maximum inertia head in a reciprocating pump without air vessel is given by

$$H_a = \frac{l}{g} \times \frac{A}{a} C_0^2 r$$

- What is Chezy's formula? How is it derived?
- Show that for a trapezoidal channel of given area of flow, the condition of maximum flow requires that hydraulic mean depth is equal to one half the depth of flow.
- A rectangular channel 10m wide is laid with a break in its bottom slope from 0.01 to 0.0064. If it carries  $125\text{m}^3/\text{s}$ , determine the nature of the surface profile and compute its length. Take  $n=0.015$ .
- Explain with neat a sketch, the construction details and working principles of a centrifugal pump.

**SECTION - C**

2 x 15 = 30

Attempt any two of the following questions:



29

3. (a) A trapezoidal channel has a bottom width of 6m and side slopes of 1:1. the depth of flow is 1.5m at a discharge of  $15\text{m}^3/\text{s}$ . determine the specific energy. If the critical depth is 0.9m, discuss the type of flow corresponding to the critical depth.
- (b) For a hydraulic jump in a horizontal triangular channel show that

$$3Fr_1^2 = \frac{r^2(r^3 - 1)}{r^2 - 1}$$

where

$$Fr_1^2 = (v_1^2 / gy_1)$$

$$r = (y_2 / y_1)$$

4. (a) A horizontal rectangular channel 4m wide carries a discharge of  $16\text{m}^3/\text{s}$ . Determine whether a jump may occur at an initial depth of 0.5m or not. If a jump occurs, determine the sequent depth to this initial depth. Also determine the energy loss in the jump.
- (b) Design a pelton wheel which is required to develop 1500kW, when working under a head of 160m at a speed of 420rpm. the overall efficiency may be taken as 85% and assume other data required.
5. An inward flow reaction turbine is required to develop 300kW at 200rpm. the active head at the turbine is 18m. determine the outside and inside diameters, the inlet and exit angles for the vanes and the exit angle for the guide vanes. Assume the inlet diameter equal to twice the outlet diameter, the hydraulic efficiency as 80%, the constant radial velocity of flow of  $3.6\text{m}^3/\text{s}$  through the runner, the mechanical efficiency as 95% and the width ratio as .10, water leaves the runner radially.

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B.TECH.

**THEORY EXAMINATION (SEM-IV) 2016-17  
ENGINEERING GEOLOGY**

Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

**SECTION - A**

1. Explain the following:

10 x 2 = 20

- (a) Rock and Mineral
- (b) Moh's scale of hardness of mineral
- (c) Luster and streak of mineral
- (d) Unconformity
- (e) Focus & epicenter of earth quake
- (f) Rock cycle
- (g) Pozzolanic material
- (h) Dips strike of Bed
- (i) Aquifer and aquiclude
- (j) Alkali Aggregate Reaction

**SECTION - B**

2. Attempt any five of the following questions:

5 x 10 = 50

- (a) What are faults? Give their terminology and their classification with suitable diagrams.
- (b) What is mass movement? Explain the causes of landslide and preventive measures.
- (c) Write a note on the importance of geology in civil engineering.
- (d) What are sedimentary rocks? How are they classified? Give a brief description of each class with examples.
- (e) How will you differentiate between Richter magnitude and Mercalli intensity scale of earth quake?
- (f) Write a detailed note on the ground water province of India.
- (g) What do you mean by building stones? Describe their engineering properties.
- (h) Define Seismic Zones? Briefly describe the different Seismic Zones of India.

**SECTION - C**

Attempt any two of the following questions:

2 x 15 = 30

3. Describe the Geology investigation for site selection of Dam and Reservoir.
4. Give a comparative account of Electrical and seismic methods of geological investigations.
5. What do you mean by minerals? Explain the physical and chemical properties of all rock forming minerals.



**THEORY EXAMINATION (SEM-IV) 2016-17  
ELECTRICAL MACHINES AND CONTROL**

Time : 3 Hours

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided. Max. Marks : 100

**SECTION - A**

1. Attempt all of the following questions:

10 x 2 = 20

- (a) Define efficiency and voltage regulation of transformer.
- (b) What are different applications of DC motor?
- (c) Draw the torque slip characteristic of 3-Φ induction motor.
- (d) Draw the torque speed characteristic of ac servo motor.
- (e) What are the types of test signals? Give their representation.
- (f) Write the analogous electrical elements in force current analogy for linear mechanical system.
- (g) What are asymptotes? How will you find the angle of asymptotes?
- (h) Define PID controller.
- (i) Using Routh criterion determine the stability of the system represented by characteristic equation:

$$2s^4 + 2s^3 + s^2 + 3s + 2 = 0$$

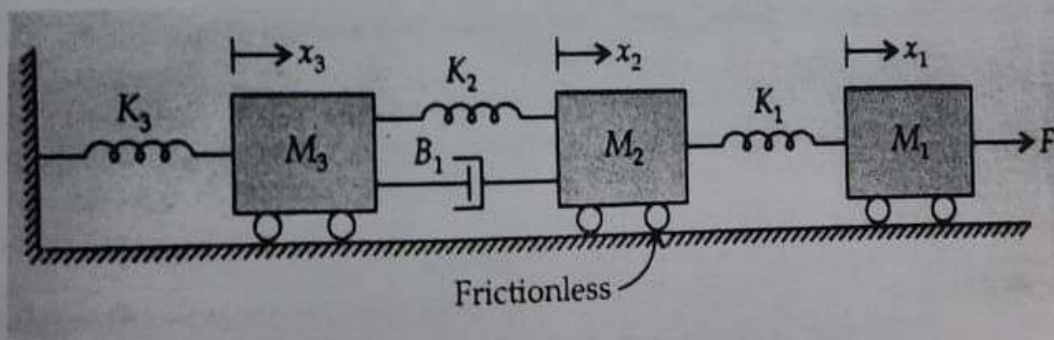
- (j) Write applications of autotransformer

**SECTION - B**

2. Attempt any five of the following questions:

5 x 10 = 50

- (a) Explain in detail Open circuit test and Short circuit test of a single phase transformer.
- (b) The open loop transfer function of a unity feedback transfer system is given by  $G(s) = \frac{K}{s(s^2+4s+8)}$  Sketch the root locus.
- (c) Obtain f - v and f - i analogous of the given system in fig.1. Also write the differential equations.



(d) Sketch the polar plot of the following:

(i)  $G(s) = \frac{1}{s(1+s)}$

(ii)  $G(s) = \frac{10}{s(s+1)}$

(e) The open loop transfer function of a unity feedback transfer function is given by:

$$G(s) = \frac{K}{s(1+Ts)}$$

Find by what factor amplifier gain K is to be multiplied so that damping ratio is increased from 0.3 to 0.9

(f) A 200 V dc series motor runs at 500 rpm when taking a current of 25 A. the resistance of armature is 0.5 Ω and that of field is 0.3Ω. If the current remains constant, calculate

- the resistance necessary to reduce the speed to 250 rpm.
- (g) What is a Transformer? Give the different types of transformers losses and explain each. How can be they minimized?
- (h) Give constructional details of three phase transformer.
- (i) Explain the working of P, PI, PID controllers.

### SECTION - C

Attempt any two of the following questions:

2 x 15 = 30

3 Explain in detail various methods used for speed control of dc motor.

- 4 (i) Discuss conversion from 3 phase to 2 phase using Scott connection.  
 (ii) Sketch the Root Locus for the given unity feedback system:

$$G(s) = \frac{K}{s(s+4)(s+5)}$$

5 What do you understand by Bode plot? What is its importance?

Draw the Bode plot for the transfer function:

$$G(s) = \frac{16(1+0.5s)}{s^2(1+0.125s)(1+0.1s)}$$

From the graph determine :

- (i) Phase cross over frequency
- (ii) Gain cross over frequency
- (iii) Phase Margin
- (iv) Gain Margin
- (v) System stability



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## B.TECH.

**THEORY EXAMINATION (SEM-IV) 2016-17**  
**MANUFACTURING SCIENCE & TECHNOLOGY-I**

Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

## SECTION - A

1. Explain the following:

10 x 2 = 20

- (a) Classify Manufacturing process.-
- (b) Define Recrystallisation.
- (c) Define forgeability.
- (d) Differentiate between Plane Stress and plane Strain.
- (e) Define the terms, Angle of Bite and Neutral plane in Rolling.
- (f) Write down different pattern Allowances
- (g) Define Notching and Nibbling operations.
- (h) What is Curing in Plastic?
- (i) Write the basic steps of Casting.
- (j) Differentiate the basic difference between Hot working

## SECTION - B

2. Attempt any five of the following questions:

5 x 10 = 50

- (a) Differentiate between open and closed die forging .What are the advantages and disadvantages. Explain the defects in rolling operation.
- (b) Differentiate between jigs and fixture. Also explain the types of Jigs with neat sketch.
- (c) Differentiate between punching and blanking. Also derive the relation between force applied by punch having flat face and that having shear.
- (d) What are the design considerations of powder metallurgy?
- (e) State Tresca's and Von Mises' criteria for plastic deformation. Derive a suitable expression for both criteria.
- (f) What are different types of dies used in sheet metal forming? Explain any two with neat sketch.
- (g) Describe the Gating system in casting with neat sketch.
- (h) Briefly explain principle and mechanism of rolling process. Also derive the relation for max draft obtained in rolling process.

## SECTION - C

3. Attempt any two of the following questions:

2 x 15 = 30

- 3 From first principles, derive the formula for the extrusion of wire with friction where  $\sigma$  refers to the stress in wire at inlet to the die,  $D_B$  and  $D_a$  are the inlet and outlet diameters of the wire,  $B = \mu \cot \alpha$  ( $\mu$  is coeff. of friction and  $\alpha$  is half die angle) and  $K$  is the critical shear stress.
- 4 (i) Write a note on rolling defects indicating the defects, their causes and remedies. (ii) Calculate the bite angle when rolling 15mm thick plates using rolls of 400 mm diameter, Final thickness of plates 12mm.
- 5 Derive an expression of radial stress in deep drawing of a cup.

## B. TECH.

THEORY EXAMINATION (SEM-IV) 2016-17  
MEASUREMENT AND METROLOGY

Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

## SECTION - A

1. Attempt all parts of the following questions:

10 x 2 = 20

- (a) What is meant by static response?
- (b) Define interchangeability.
- (c) Mention any four precautions to be taken while using slip gauges.
- (d) What is progressive error in screw gauge?
- (e) Define limit and tolerance.
- (f) Name any four instruments used for temperature measurement.
- (g) Distinguish between force and torque.
- (h) What is comparator?
- (i) Define straightness.
- (j) What are the chances of errors using sine bars?

## SECTION - B

2. Attempt any five of the following questions:

5 x 10 = 50

- (a) Give the structure of generalized measuring system and explain it in detail.
- (b) Explain in detail various types of errors that may arise in engineering measurements.
- (c) Explain with a neat sketch the construction and working of sigma comparator.
- (d) Explain the working principle of AC laser interferometer and explain how the straightness is measured?
- (e) Explain how V-Block and three point probe are used for measurement of roundness. What are the limitations of V-Block?
- (f) Describe with neat sketch the measurement of pitch of internal and external threads using a pitch measuring machine
- (g) With a sketch explain the displacement measurement using Linear Variable Differential Transformer (LVDT)
- (h) Explain the Taylor's principle of gauge design. Define ring gauge and plug gauge.

## SECTION - C

Attempt any two of the following questions:

2 x 15 = 30

3 Describe with neat sketches:

- (i) Thermocouples
- (ii) Strain gauge torque meter

4 Describe the followings in connection with pressure measurement:

- (i) Piezo-electric pressure transducer.
- (ii) Variable capacitance transducer.

5 (i) Explain with a neat sketch how a vernier caliper is used for linear measurements.

- (ii) Why is sine bar not suitable for measuring angle above  $15^\circ$ .