

FACULTY OF ENGINEERING**B.E 3/4 (Civil) I Semester (Main & Backlog) Examination, December-2017****Subject: Transportation Engineering****Time: 3 hours****Max.Marks: 75****Note: Answer All Questions from Part-A and any FIVE questions from Part-B.****PART-A [Marks: 25]**

1. State any three main recommendations of Jayakar committee for development of road network in India. [3]
2. Explain PIEV theory in total reaction time. [2]
3. Differentiate between condition diagram and collision diagram. [2]
4. Explain the terms space-mean speed and time-mean speed. Also give the relation between them. [3]
5. Explain the terms (i) ESWL (ii) ESAL. [2]
6. List the different joints in cement concrete roads and explain briefly the necessity of each. [3]
7. What is negative super-elevation? [2]
8. Draw typical dimensional cross-section of a B.G track on embankment on a straight track. [3]
9. Why the corrections are needed for a basic runway length? [2]
10. If the airport site is at MSL and is on a level ground, calculate the actual runway length to be provided, if the basic runway length is 2000m and airport reference temperature is 40°C. [3]

PART-B [Marks: 50]

11. (a) List the engineering surveys to be conducted for alignment of a new highway. Explain each. [4]
- (b) Calculate the safe overtaking sight distance for a design speed of 96 kmph for (i) one way traffic road (ii) two way traffic road, given average reaction time of driver and average acceleration during overtaking as 2 seconds and 2.5 kmph/sec respectively. Assume all other data suitably. Also calculate and show the details of overtaking zone with a neat sketch. [6]
12. (a) Explain origin and destination study. What are the various uses of O & D studies? [5]
- (b) The following data obtained from the spot speed studies carried out on a city road during a certain period of time. Calculate the (i) Speed limit for regulation (ii) Speed to check geometric design elements. [5]

Mid speed	15	25	35	45	55	65	75	85	95
Number of vehicles	0	6	16	34	28	17	6	3	2

- 13.. (a) Explain the various factors to be considered for the pavement design. [5]
 (b) The following data is obtained from an axle load survey on a highway. Determine the vehicle damage factor (VDF) for a standard axle load of 80kN. [5]

Axle load (kN)	30	40	50	60	70	80	90	100	110	120	130	140
Frequency (%)	5.45	6.30	7.20	7.50	9.60	12.00	13.50	10.50	8.40	7.50	5.00	7.05

- 14 (a) What is creep? Discuss the theories propounded for the probable causes of creep. [5]
 (b) A five degree curve diverges from a three degree main curve in reverse direction in the layout of B.G yard. If the speed on the branch line is restricted to 35kmph, determine the restricted speed on the main line. [5]
- 15 (a) What is wind rose diagram? What is its utility? What are its types? Explain each type. [5]
 (b) The runway gradation map indicates that there is rising gradient of 1.0 percent meeting a falling gradient of 0.70 percent. There is again an upgrade of 0.70 percent. Design the runway profile as per FAA specifications. [5]
- 16 (a) Explain the concept of traffic signal design by Webster's method. [5]
 (b) Discuss the different types of sleepers in use on Indian Railways and state relative merits and demerits of each. [5]
17. Write short notes on any **four** of the following: [10]
 a. Camber
 b. Clover leaf intersection
 c. Bitumen & Tar
 d. Construction of railway track
 e. Airport layout and its components.

FACULTY OF ENGINEERING**B.E. 3/4 (EIE/Inst) I – Semester (Main & Backlog) Examination, December 2017****Subject: LINEAR INTEGRATED CIRCUITS****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part – A and any five questions from Part – B.****PART – A**

- 1 Name the different methods used in fabrication of integrated circuits? (2)
- 2 The output impedance of op-amp is 100Ω . It's $A_d=10^7$ what is the output impedance of voltage follower? (3)
- 3 How the precision diode is different from diode rectifier and draw the output Voltage waveforms? (3)
- 4 What is the function of instrumentation amplifier? (2)
- 5 Draw the functional diagram of 555 timer? (2)
- 6 What is the main drawback of dual slope ADC? (3)
- 7 Define the term lock in range of PLL ? (2)
- 8 What is the two quadrant multiplier? (3)
- 9 What is the power amplifier? (2)
- 10 What are the limitations of IC723 general purpose regulator ? (3)

PART – B

- 11 With simple schematic of differential amplifier, explain the function of operational amplifier? (10)
- 12 Briefly explain about constant current source ? (10)
- 13 Briefly explain techniques used for frequency compensation? (10)
- 14 Define capture range and lock range. Explain the process of capturing the lock and also derive for capture range and lock range? (10)
- 15 With neat simplified internal diagram. Explain the working principle of operational Transconductance amplifier? (10)
- 16 Write short notes on
 - (a) R-2R Ladder type DAC (5)
 - (b) Weighted resistor DAC (5)
- 17 (a) Design a phase shift oscillator to oscillate at 100Hz? (5)
- (b) Write short notes on voltage to frequency converter? (5)

FACULTY OF ENGINEERING

B.E. 3/4(ECE) I- Semester(Main & Backlog) Examination, Dec, 2017

Subject : Automatic Control Systems

Time : 3 hours

Max. Marks : 75

Note : Answer all questions from Part-A and any Five Questions from part-B

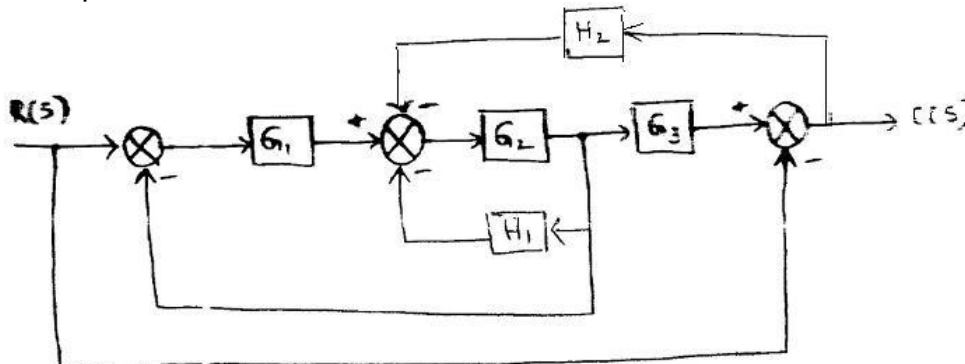
PART – A (25 Marks)

1. Distinguish between open loop and closed loop control system? [2]
2. " Potentiometer acts as a error detector" Justify. [2]
3. The standard form of a second order system whose closed loop poles are located at $S = -3 \pm j4$ then calculate rise time. [3]
4. The transfer function of forward path and feed back element is given by

$$G(S) = \frac{S+4}{S(S+2)} \quad , \quad H(S) = \frac{S^3 + 2S^2 + S}{S^2(S^2 + 5S + 4)}$$
 then determine type and order of the system. [3]
5. Define gain margin and phase margin. [2]
6. What is principle of argument? [2]
7. List out the drawbacks of digital control system? [3]
8. Compare analog and digital control system. [3]
9. Compute resolvent matrix if the system matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$. [3]
10. Write the properties of state transition matrix. [2]

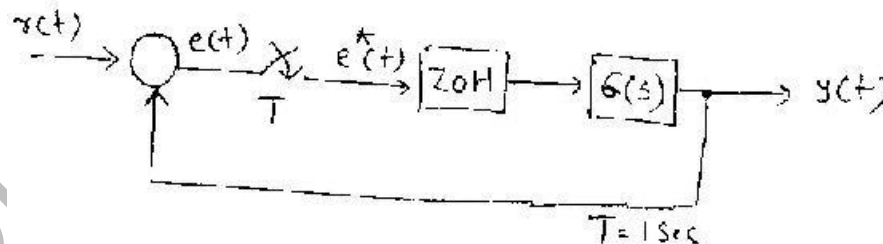
PART – B (50 Marks)

11. Determine transfer function $\frac{C(S)}{R(S)}$ for a given system using block diagram reduction technique. [10]



-2-

12. The open loop transfer function of a control system is $\frac{K}{S(S+2)(S^2+2S+5)}$.
- Draw the root locus and determine closed loop system stability. [7]
 - Determine the value of K at any break away point. [3]
13. a) Determine the range of K such that the characteristic equation. $S^3 + 3(K+1)S^2 + (7K+5)S + 4K + 7 = 0$ has roots more negative than -1 [4]
- b) A unity feed back system is characterized by an open loop transfer function $G(S) = \frac{K}{S(S+5)}$. Determine the gain 'K' so that the system will have damping ratio of 0.4. For the value of 'K' determine setting time, peak over shoot and peak time. [6]
14. The open loop transfer function of a system is given by $G(S) = \frac{K(S+2)}{S^2(S+4)}$. Sketch the nyquist plot and determine range of K for closed loop system to be stable. [10]
15. a) Describe the architecture of a digital control system. [4]
- b) Obtain the unit step response of the system shown in figure if $G(S) = \frac{1}{S(S+2)}$. [6]



16. A system is characterized by the following state equations.

$$\begin{pmatrix} \dot{x}_1 \\ \dot{x}_2 \end{pmatrix} = \begin{bmatrix} -3 & 2 \\ -4 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u; \quad y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

- Find the transfer function of the system. [5]
 - Identify whether the given system is controllable or not. [5]
17. Write short notes on the following [10]
- Lag and Lead Compensators.
 - Syncro's
 - Gain Margin and Phase Margin

FACULTY OF ENGINEERING

B.E. 3/4 (Mech) I – Semester (Main & Backlog) Examination, December 2017

Subject: Manufacturing Processes

Time: 3 Hours

Max.Marks: 75

Note: Answer ALL questions from Part – A and any FIVE questions from Part – B.

PART – A [10 X 2.5 = 25 Marks]

- 1 State the pressurized and non Pressurised gating ratio.
- 2 Draw the graph between permeability VS strength of the sand mould behaviour
- 3 State the reasons for prefer wax as pattern?
- 4 Name the tests conducted on to Cast Components.
- 5 State the classification welding Process.
- 6 State the chemical reactions equation is oxy acetylene welding.
- 7 List the applications of spot welding in sheet metal metal industry
- 8 Suggest a manufacturing method to join two aluminum plates give reasons.
- 9 Explain spring back in sheet metal and its nomenclature
- 10 What are the disadvantages of cold working process of sheet metal

PART – B (10 X 5 = 50 Marks)

- 11 a) Explain Skelton and follow board patterns with the help of simple sketches.
b) What is the purpose of core and explain various types of cores?
- 12 a) Explain any two various testing methods of castings in detail
b) Explain CO₂ moulding process and mention five industrial applications
- 13 a) What are the applications of submerged arc welding and how it is different from the inert gas shielded metal are welding process.
b) What is heat effected zone? How it affects the weldment.
- 14 a) Explain explosive welding with help of neat sketch
b) Differentiate between spot welding and seam welding with respect to pressure current variations
- 15 a) Explain wire drawing and rolling and states their limitations with neat sketch
b) Differentiate between cold working and hot working and corresponding changes mechanical properties changes

- 16 a) Explain properties required for good quality moulding sand.
b) Explain the principle of centrifugal casting process with help of neat diagram

17 Write short notes on

- a) Projection welding b) yield criteria c) Ultrasonic welding

OU - 1607 OU - 1607

FACULTY OF ENGINEERING**B.E. 3/4 (Prod.) I – Semester (Main & Backlog) Examination, December 2017****Subject: Metal Forming Technology****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part – A and any five questions from Part – B.****PART – A (25 Marks)**

- | | | |
|----|---|---|
| 1 | Differentiate between plane stress and plane strain condition with an example. | 3 |
| 2 | What is work hardening and how it is affected by grain size. | 2 |
| 3 | Write the most likely causes and remedies of the wrinkling phenomenon in deep drawing. | 3 |
| 4 | The Shear strength of a sheet metal is 300 MPa. Estimate the blanking force required to produce a blank of 100 mm diameter from a 1.5 mm thick sheet. | 2 |
| 5 | Sketch hydrostatic Extrusion. | 3 |
| 6 | What is Tube Sinking? | 2 |
| 7 | Write about Hot Isostatic Pressing. | 2 |
| 8 | Differentiate between Fullering and Edging with neat Sketches. | 3 |
| 9 | Sketch swaging process | 3 |
| 10 | What is roll Separation force? | 2 |

PART – B (10 X 5 = 50 Marks)

- | | | |
|----|--|---|
| 11 | a) Explain yield criteria for ductile materials. | 5 |
| | b) Explain briefly slip mechanism. | 5 |
| 12 | a) Explain the variable which can affect punch force in deep drawing operation. | 6 |
| | b) Explain Edge Bending with a neat Sketch. | 4 |
| 13 | a) Derive an expression for extrusion force for homogeneous deformation. | 5 |
| | b) Explain the important process variables in drawing operation that effect drawing force. | 5 |
| 14 | a) Explain stretch forming process with its advantages. | 5 |
| | b) Write briefly about extrusion defects. | 5 |
| 15 | a) Explain Machine Forging process along with forging die design consideration. | 5 |
| | b) Discuss forging defects, and the Remedial measures to be adopted. | 5 |

- 16 a) Explain the Principle rolling process and Classify rolling mill. 6
b) Write about Planetary rolling mill. 4
- 17 Write Short notes on any two of the following: 10
a) Compound Die
b) Press Forging
c) Flow Forming

OU - 1607 OU - 1607

FACULTY OF ENGINEERING**B.E. 3/4 (A.E.) I-Semester (Main & Backlog) EXAMINATION, December 2017****Subject: Production Technology****Time: 3 Hours****Max. Marks: 75****Note: Answer all questions from part – A & Any five questions from part - B****Paper – A**

1. What are the advantages and limitations of die casting. [3]
2. Name the various types of patterns. [2]
3. What are the defects in welding. [2]
4. What is the principle of resistance welding. [2]
5. Name the pattern allowances which can be quantitatively specified. [2]
6. List the advantages and limitations of rolling. [3]
7. Differentiate between orthogonal and oblique cutting. [3]
8. Sketch a single point cutting tool showing tool angles. [3]
9. Define tool life? What are the factors on which it depend [3]
10. List the types of operations performed on lathe. [2]

PART-B

11. a) Explain about the steps involved in making a casting.
b) Briefly explain the defects in casting.
12. a) Explain GMA welding process with a neat sketch.
b) Briefly discuss about resistance spot welding.
13. a) Explain the types of rolling mills.
b) With a neat sketch explain the backward extrusion process.
14. a) Discuss the various types of chips produced during metal cutting.
b) Explain merchants force circle.
15. a) Explain the principle of working of lathe with a neat sketch.
b) Discuss about lapping, honing and super finishing operations.
16. Write a short note on the following
 - a. Pattern materials
 - b. Solid state welding process
 - c. Tube drawing.
17. Write short note on the following
 - a. Investment casting
 - b. Machinability
 - c. Deep drawing.

FACULTY OF ENGINEERING**B.E. 3/4 (CSE) I – Semester (Main & Backlog) Examination, December 2017****Subject: Data Communications****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A and any five questions from Part B.****PART – A (25 Marks)**

- | | | |
|----|---|---|
| 1 | What are the functions of Data Link Layer? | 2 |
| 2 | Define Manchester and Differential Manchester Encoding. | 2 |
| 3 | What is Piggy backing? Explain. | 3 |
| 4 | Define Flow Control. | 2 |
| 5 | What are the characteristics of Virtual Channel connection? | 3 |
| 6 | What is Pulse stuffing? | 3 |
| 7 | Define Multiplexing. | 2 |
| 8 | What are the differences between Layer 2 and Layer 3 Switch? | 3 |
| 9 | What Geometric shape is used in cellular system design and why? | 3 |
| 10 | What is fading? | 2 |

PART – B (5x10 = 50 Marks)

- | | | |
|-------|---|----|
| 11 a) | Explain about TCP/IP Protocol Architecture. | 6 |
| b) | Define channel capacity and different types of transmission modes. | 4 |
| 12 a) | Explain in detail about CRC detection techniques with suitable example. | 6 |
| b) | Explain Flow Control Protocols. | 4 |
| 13 a) | Compare and Contrast Circuit Switching and Packet Switching. | 6 |
| b) | Explain about Asymmetric Digital Subscriber Line. | 4 |
| 14 | Explain about CSMA/CD algorithm and its operation. | 10 |
| 15 a) | What are some key characteristics that distinguish third generation and second generation cellular systems. | 6 |
| b) | List five ways of increasing the capacity of Cellular Systems. | 4 |
| 16 | Explain the basic characteristics and frame structure of HDLC. | 10 |
| 17 a) | Explain about transmission of ATM cell using cell based physical layered approach. | 6 |
| b) | Explain about statistical time division multiplexing. | 4 |

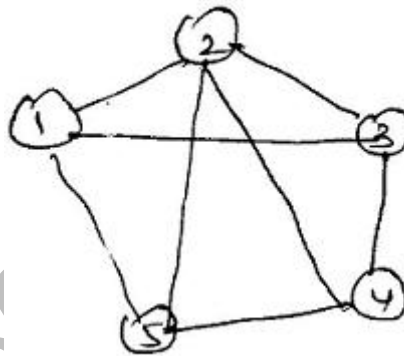
FACULTY OF ENGINEERING**B.E. 3/4 (CSE) I – Semester (Old) Examination, December 2017****Subject: Design and Analysis of Algorithms****Time: 3 Hours****Max.Marks: 75****Note: Answer all questions from Part A and any five questions from Part B.****PART – A (25 Marks)**

- 1 Solve the recurrence relation $T(n) = 9T(n/3) + n$. 3
- 2 List out collision resolution techniques in hashing. 2
- 3 Define optimal storage on tapes. 3
- 4 Write control abstraction for greedy method. 2
- 5 List out the properties of Bi connected graphs. 3
- 6 Define principle of optimality. 2
- 7 What are explicit and implicit constraints in backtracking algorithm? 3
- 8 What is a Hamiltonian cycle? Give an example. 2
- 9 State Cook's theorem. 2
- 10 Differentiate FIFO and LC branch and bound techniques. 3

PART – B (50 Marks)

- 11 a) What is asymptotic complexity of an algorithm? Give an example of an algorithm whose complexity is $O(n \log n)$. 4
 - UNION (1,2,2)
 - UNION (2,3,3)
 - :
 - :
 - UNION (n-1, n, n)
 - FIND (1)
 - FIND (2)
 - FIND (n)
 - i) Write the tree after (n-1) UNION operations. 3
 - ii) Compute the cost of n FIND instructions. 3
- 12 a) Write an algorithm to sort N numbers in descending order using Quick sort and analyze time complexity in best, average, worst cases. 5
- b) Consider the following instance of knapsack problem $n=7, m=21$
 (P1, P2, P3, P4, P5, P6, P7) = (10, 5, 15, 7, 6, 18, 3) and
 (W1, W2, W3, W4, W5, W6, W7) = (2, 3, 5, 7, 1, 4, 11,) solve by using Greedy approach. 5

- 13 a) How to find articulation point and Bi-connected components from given graph? Explain with an example. 5
- b) Design a three stage system with devices D1, D2, D3. The costs are \$30, \$15, \$20 respectively. The cost of the system is to be no more than \$105. The reliability of each device type is 0.9, 0.8, 0.5. 5
- 14 a) Present an algorithm how the techniques of back tracking can be applied to solve the 8 Queens problem. 5
- b) Define chromatic number. Draw the state space tree for the following graph with $n=5$, $m=3$. 5



- 15 a) Write non deterministic algorithm for searching. 4
- b) Explain in brief, NP Hard and NP Complete problems. 6
- 16 a) Construct OBST for the following data $n=4$, $(a_1, a_2, a_3, a_4) = (\text{do}, \text{if}, \text{int}, \text{while})$ and $P(1:4) = (3, 3, 1, 1)$ and $Q(0:4) = (2, 3, 1, 1, 1)$. 6
- b) Write an algorithm to find maxmin of a given list of elements. 4
- 17 Write short notes on any two of the following: 10
- Priori and posteriori analysis
 - Satisfiability problem
 - Big oh and Theta notation.

FACULTY OF INFORMATICS

B.E. 3/4 (IT) I-Semester (Main & Backlog) Examination, December 2017

Subject : Theory of Computation

Time : 3 hours

Max. Marks : 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

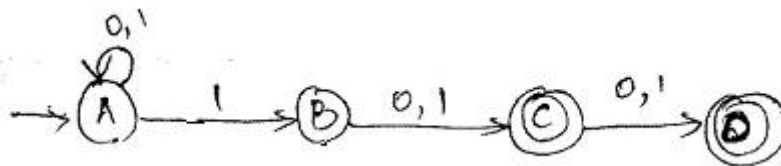
- 1 Construct NFA do accept the substring 'abba' for $\Sigma = \{a, b\}$. 3
- 2 Compare and contrast DFA, NFA, ϵ -NFA. 3
- 3 Find whether the given grammar is ambiguous or not. 3
 $E \rightarrow E+E \mid E-E \mid E * E \mid (E) \mid id$
- 4 Write the regular expression to accept strings of 0's and 1's starting and ending with 1. 2 3
- 5 State algebraic laws of regular expressions. 3
- 6 State and explain the formal definition of PDA. 2
- 7 State pumping Lemma for CFL's. 2
- 8 What is multitape turing machine? 2
- 9 What are intractable problems? Give an example. 3
- 10 Give the formal definition of a Turing Machine. 2

PART – B (50 Marks)

- 11 Convert the following NFA to DFA. 10

	0	1
$\rightarrow q_0$	{q ₁ }	{q ₂ }
q ₁	{q ₁ }	{q ₁ , q ₃ }
q ₂	ϕ	ϕ
q ₃	{q ₀ , q ₃ }	{q ₃ }

- 12 State and prove pumping Lemma for regular languages. 10
- 13 a) Convert the following DFA to RE by Eliminating States. 6



- b) Construct ϵ -NFA for the regular expression $ab(a+b)^*$. 4
- 14 Construct a PDA to accept the language of palindromes. 10

- 2 -

- 15 Construct a turing machine to accept the language 10
 $L = \{0^n 1^n 2^n \mid n \geq 1\}$
- 16 Find the solution for the given PCP instance. 10

	List A	List B
i	w_i	x_i
1	110	110110
2	0011	00
3	0110	110

- 17 a) What is a satisfiability problem. Explain with an example. 5
b) Explain different types of programming techniques for turing machines. 5

FACULTY OF INFORMATICS
B.E. 3/4(IT)I-Semester (Old) Examination, Dec, 2017
Subject : Theory of Automata

Time : 3 hours

Max. Marks : 75

Note : Answer all questions from Part-A and any Five Questions from part-B

PART – A (25 Marks)

- | | |
|---|---|
| 1. Define NFA and give an example. | 3 |
| 2. What are the applications of regular expressions? | 2 |
| 3. Define context-free grammar and context-free languages. | 3 |
| 4. Write any four closure properties of regular languages. | 2 |
| 5. Define deterministic push-down automata and give an example. | 3 |
| 6. What are the decision properties of context-free languages? | 2 |
| 7. Define an unrestricted grammar. | 2 |
| 8. Describe about extension of the Turing machine? | 3 |
| 9. Define the P, NP, NP-Complete and , NP-Hard Problems. | 3 |
| 10. Define a recursively enumerable language. | 2 |

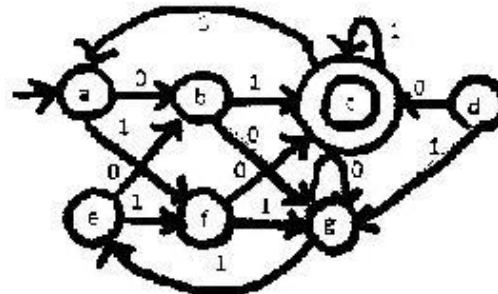
PART – B (5X10=50 Marks)

11. a) Convert the following NFA into its equivalent DFA. 4

	$\rightarrow q_0$	q_1	$\textcircled{q_2}$
a	q_0	q_2	\emptyset
b	$\{q_0, q_1\}$	q_3	\emptyset

- b) Construct DFA equivalent to regular expression : $(a+b)^* (aa+bb) (a+b)^*$. 6

12. For DFA M whose transition diagram is given below find DFA M' with minimum number of states equivalent to DFA M.



13. a) State and prove pumping lemma for context –free languages. 6
 b) Examine whether the language $L = \{0^n 1^n 2^n \mid n \geq 1\}$ is context –free or not. 4
14. Explain the programming techniques for Turing machines with examples. 10

15. Design a post's correspondence problem for the language $L = \{ 0^n 1^n \mid n \geq 1 \}$. 10

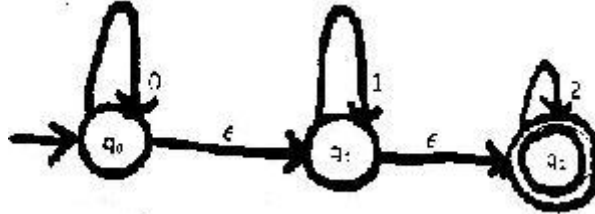
16. a) Draw the derivation tree to obtain **bacb** from the grammar.:

$S \rightarrow AaBb; A \rightarrow a \mid b \mid v; B \rightarrow b \mid c$

4

b) For NFA with v – moves M whose transition diagram is given below, find NFA without v – moves M' equivalent to M .

6



17. Write short notes on the following;

a) The problems that computer cannot solve.

4

b) Applications of context –free grammars.

3

c) Decision properties of regular languages.

3

OU - 1607