Code No. 3121 / O/S

# FACULTY OF ENGINEERING

**B.E. 3/4 (Civil) I-Semester (Old) Examination, May / June 2017**

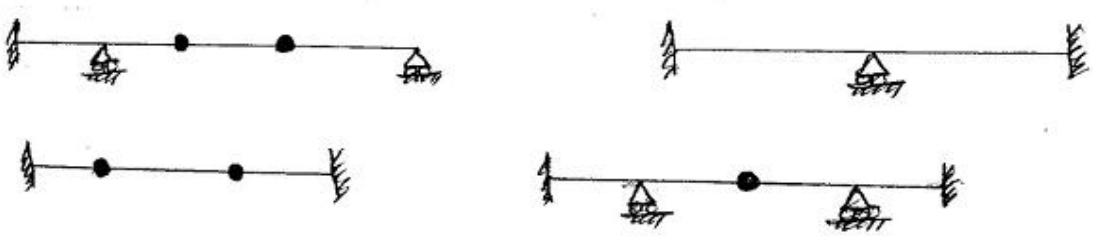
**Subject : Theory of Structures-I**

**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 Which of the following beams is unstable? 2



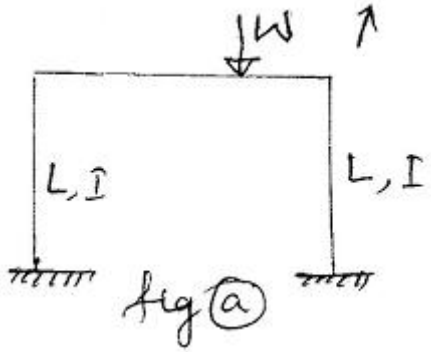
2 a) Castingliano's first theorem is applicable only when principle of superposition is valid? Is it true? 1

b) In case of a pin jointed plane frame, the frame is said to be unstable if 1
i) (m+r) < 2j ii) m+r = 2j iii) (m+r) > 2j

3 a) The moment required to rotate the near end of a prismatic beam through a unit angle without translation, the far end being simply supported, is given by which expression? 1

b) The moment required to rotate the near end of a prismatic beam through unit angle, without translation, the far end being fixed, is given by which expression? 1

4 The portal frame shown is fig.(a) will a) not sway b) sway towards right c) sway towards left d) sway either to left or right. Give write answer. 2




5 Which one of the following methods of structural analysis is a force method? 2
a) Slope deflection method b) Column analogy method c) Moment distribution method d) None of the above

6 Define shear centre with an example and also explain what is shear flow. 3

7 In the portal frame shown in the given fig.(b), the ratio of sway moments in column AB and CD will be equal to how much? Show the working to determine the same. 3

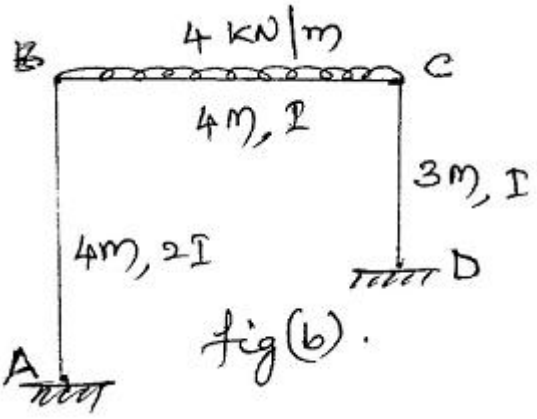
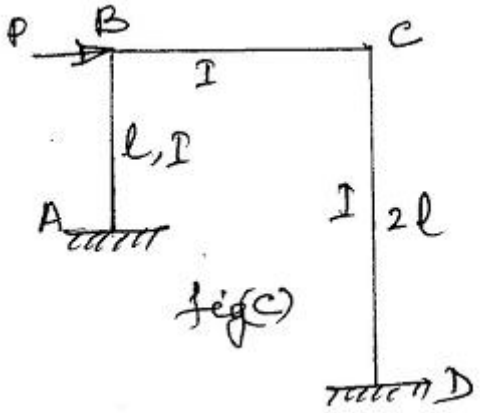


fig (b).

8 If the analysis of the frame shown in fig.(c) indicates final moment as – 40 kNm at A and B of the column AB, then compute the moment MCD. 3



fig(c)

9 Define the rotation moment and rotation factor. 3

10 A truss is shown in the given fig.(d) The cross sectional area of each member is A and the modulus of elasticity is E. Calculate the strain energy in the member XY. 3

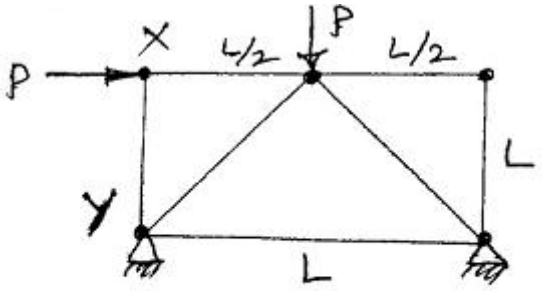
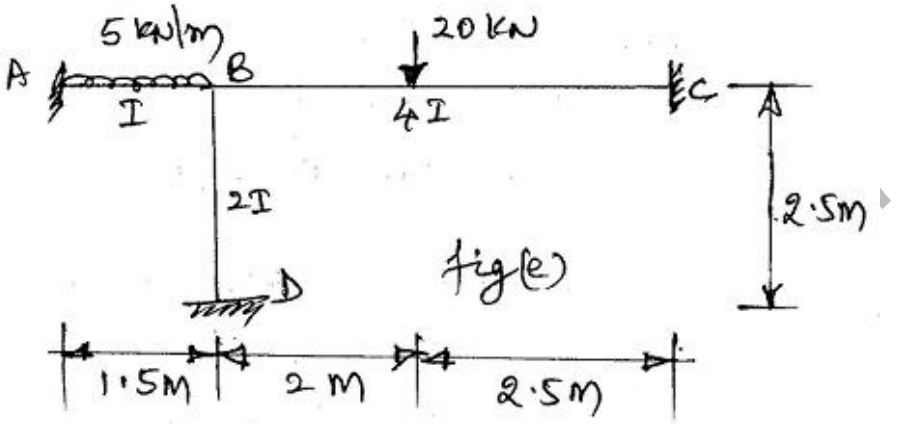


fig (d)

..3

**PART – B** (50 Marks)

11 Analyse the structure shown in fig.(e) using moment distribution method. Draw BMD, SFD. 10



fig(e)

12 Analyse the given frame shown in fig.(f) using slope deflection method. Draw elastic curve, BMD and SFD. 10

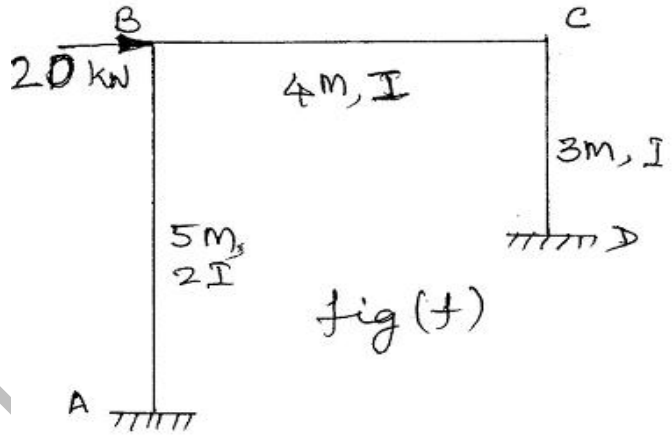
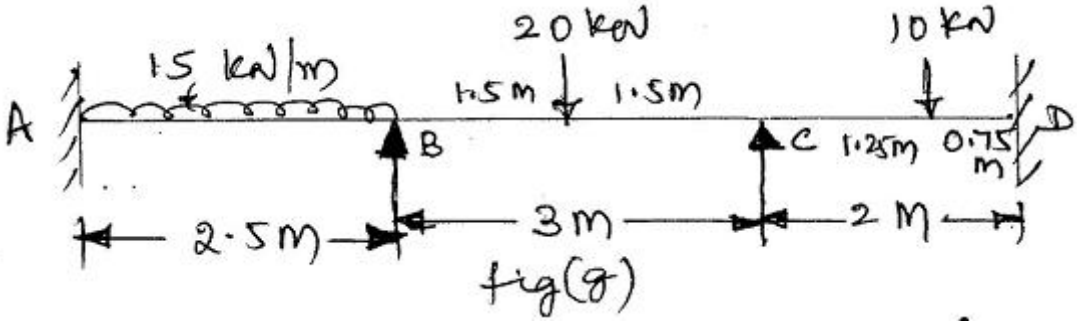


fig (f)

13 Analyse the continuous beam shown in fig.(g) using moment distribution method and draw BMD. 7+3



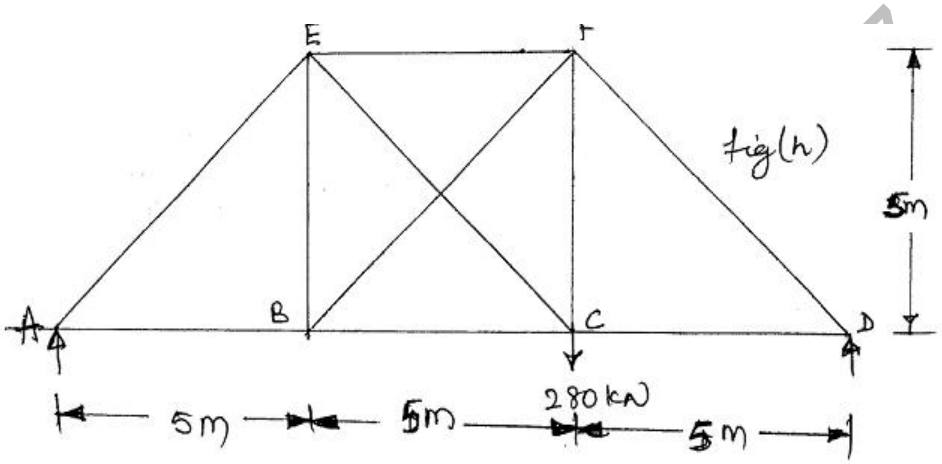
fig(g)

..4

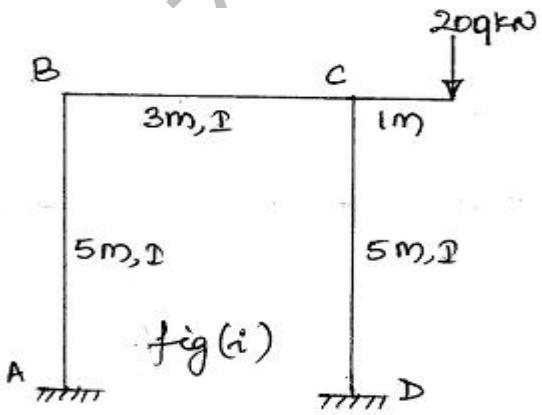
14 a) Explain about unsymmetrical bending with neat sketches along with examples. 4

b) Locate the shear centre for a channel section with the following dimensions and propertie:. Flange width = 50mm, overall depth = 100mm, thickness of flange and web = 10mm each. Also draw the shear force diagram for the section. 6

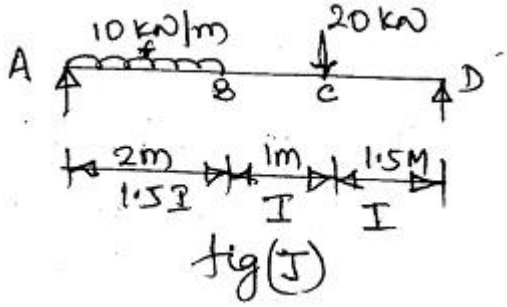
15 All the members of the truss shown in fig.(h) are to be assumed pin jointed. Calculate forces in all members. Area of cross section of all the members is same and equal to 30 sqcm. 10




16 Analyse the rigid jointed frame shown in figure and draw BMD and SFD. Use Kani's method. 10




17 a) Compute slope and deflection at the point B using unit load method. 8




b) Define Castigliano's theorem-I. 2

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**Code No. 3400 / N /S**

# FACULTY OF ENGINEERING

**B.E. 3/4 (Civil) I-Semester (New) (Suppl.) Examination, May / June 2017**

**Subject : Theory of Structures – I**

**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 a) In a rigid jointed frame, the rotation of various members meeting at the joint will be 1
   i) equal
   ii) proportional to the length of the member
   iii) proportional to the stiffness
   iv) proportional to the respective moment of inertia.

   b) In the simultaneous equations derived from slope deflection method, the matrix formed by the co-efficients of various rotations will have 1
   i) all elements equal
   ii) all elements zero
   iii) all elements along the diagonal zero
   iv) diagonal symmetry with diagonal element predominant in that respective equation

2 a) The eddy's theorem is valid for 1
   i) vertical loads only ii) horizontal loads only iii) dynamic loads only
   iv) all loads

   b) The intercept between a given arch and linear arch at a section is proportional to _____ at the section. 1

3 The ratio of stiffness of a member when far end is hinged to that of the member when the far end is fixed is _____. 2

4 In which method, sway calculation and non-sway calculation are carried out in a single operation.
When an end of continuous beam is fired, in Kani's method, the rotation contribution is which one of the following four alternatives i.e. zero , $\frac{EI}{L}, \frac{2EI}{L}, EI$. 2

5 State Castigliano's first theorem. 2

6 Explain how slope-deflection equation were developed from fundamentals. 3

..2

7 Compute vertical deflection of joint A of the frame shown in figure (a) Axial rigidity AE = 20 x $10^6$N 3

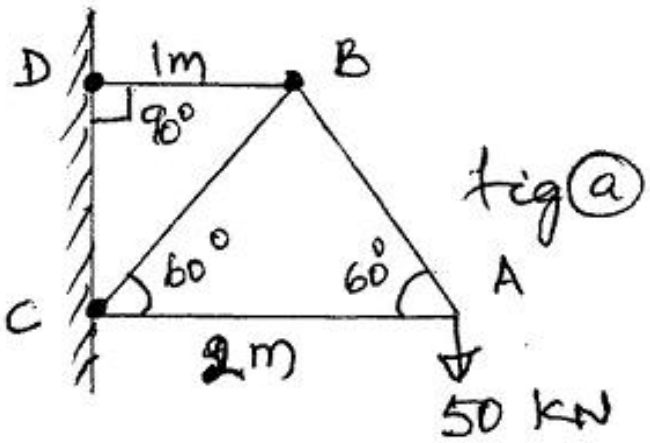



fig (a)

8 Derive the expressions for radial shear and normal thrust, in the case of three hinged arch, at any section. 3

9 The given figure (b) shows a portal frame with one end fixed and the other hinged compute ratio of the fixed moments $\frac{M_{BA}}{M_{CD}}$. 3

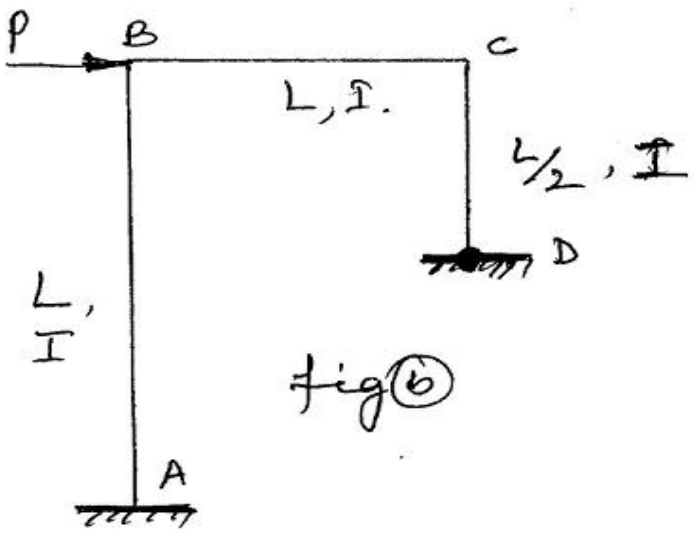


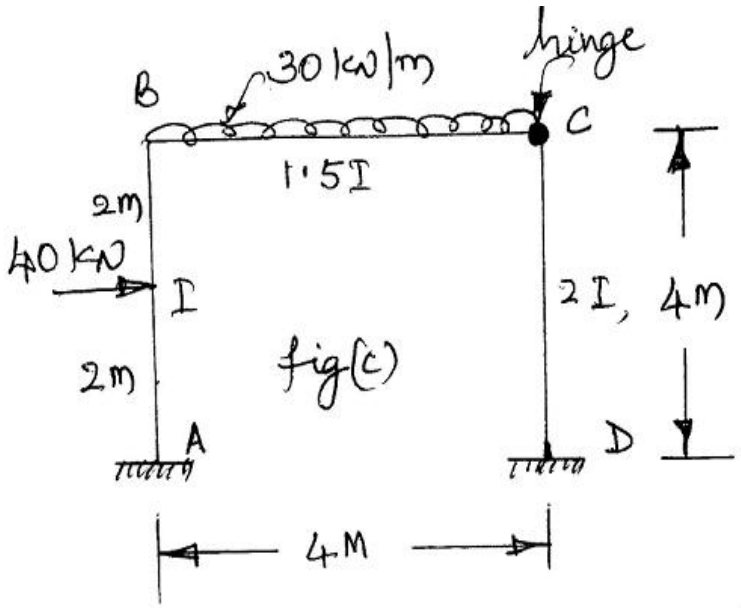

fig (b)

10 Derive the expression for displacement factor in Kani's method. 3

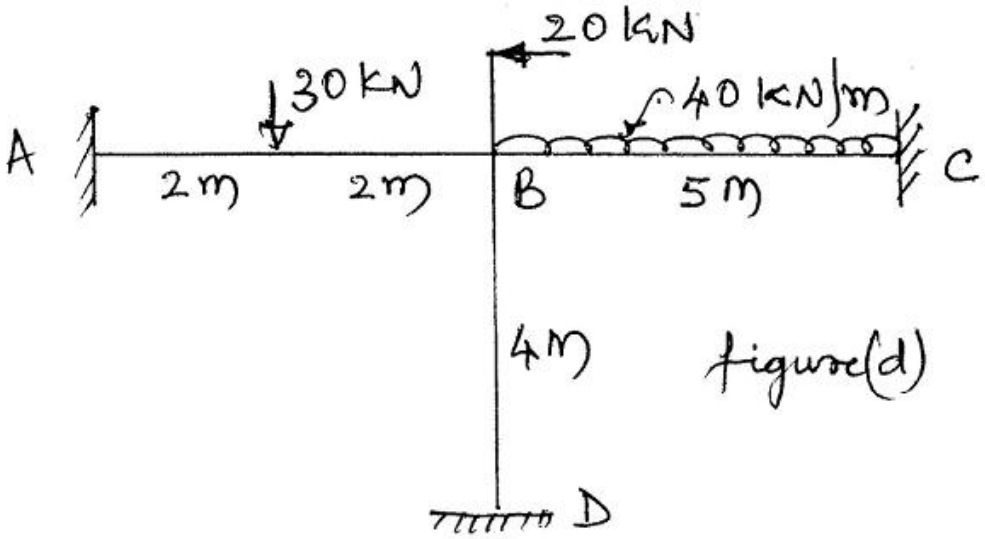
..3

**PART – B** (50 Marks)

11 Analyse the portal frame shown in figure (c) using slope-deflection method. Draw BMD and SFD indicating salient values. 10




12 Analyse the rigid frame shown in the figure(d) using moment distribution method. Draw BMD and SFD showing salient values. EI is constant. 10

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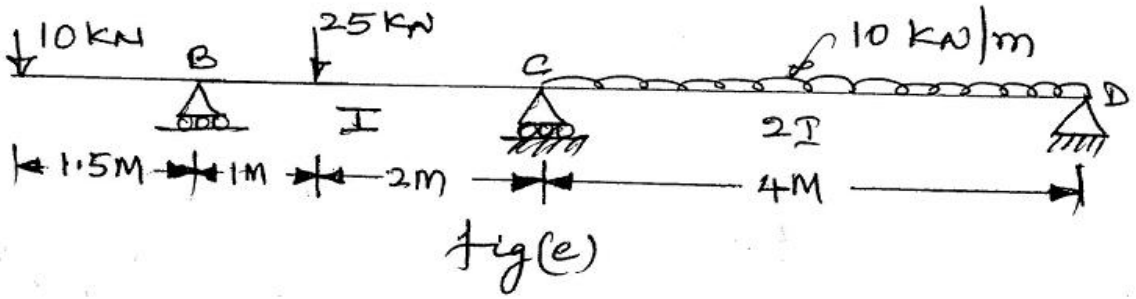
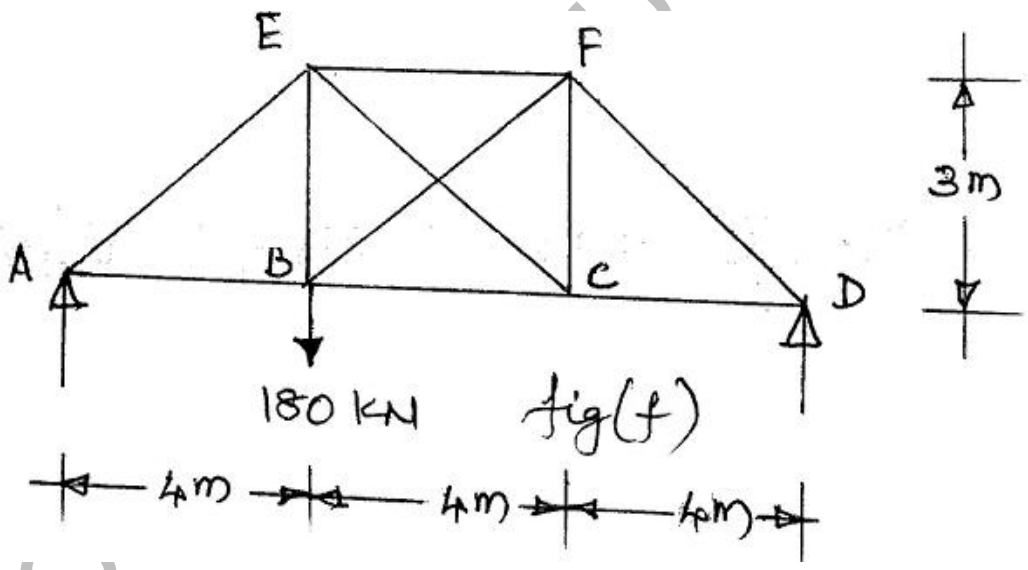
13 Analyse the continuous beam shown in fig(e) using Kani's method. Draw SFD and BMD showing salient values. 10



fig(e)

14 All the members of the truss shown in figure(f) are pinjointed. Compute the forces in all the members. Area of c/s of all the members is same and is 3000 sq mm. 10



fig(f)

15 a) A uniform arch rib covers a span of 40m, the centre line of the rib being the segment of a circle subtending an angle of $120^0$ at the centre. The arch is pinned at the two supports and carries a vertical load of 8kN at the crown of the arch. Calculate the reactions at the supports and construct the bending moment diagram. 6

b) Derive the expression for horizontal thrust at the hinge support in case of two hinged arch having supports at same level, subjected to uniformly distributed load horizontally throughout the span of arch. 4

..5

16 a) The portal frame shown in figure (g) was analysed and the final column moments were found to be as shown in figure (h). Compute the value of P. 4

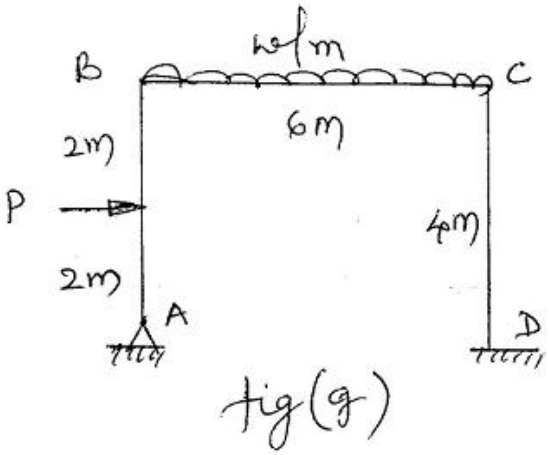



fig (g)

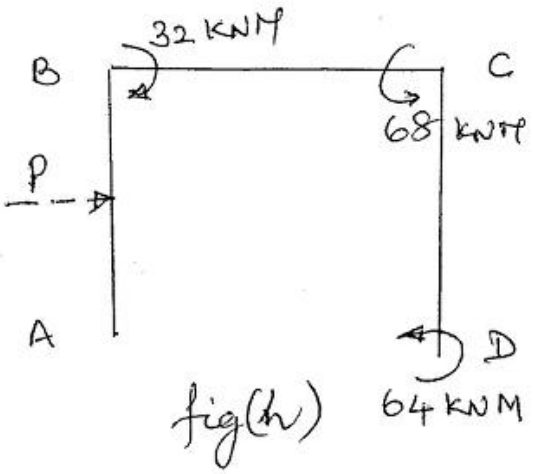



fig (h)

b) What are the advantages of Kani's method over moment distribution method? 3

c) What are the limitations and short comings of Kani's method? 3

17 a) Write the second theorem of Castigliano. 2

b) Derive the expression for force in redundant member of indeterminate pinjointed frame using principle of least work. 8

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**Code No. 3406 / N /S**

# FACULTY OF ENGINEERING

**B.E. 3/4 (EEE/Inst.) I-Semester (New) (Suppl.) Examination, May / June 2017**

**Subject : Power Electronics**

**Time : 3 hours** **Max. Marks : 75**

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

## PART – A

| | | |
|---|---|---|
| 1 | Define Depletion layer. | 3 |
| 2 | Draw V-I characteristics of ideal diode. | 2 |
| 3 | What is the applications of fast recovering diodes? | 3 |
| 4 | What are the necessary conditions for turning-on a thyristor? | 2 |
| 5 | Draw output voltage and output current waveforms of a single phase half wave thyristor rectifier with "R" load. | 3 |
| 6 | Write advantages of circulating current mode dual converter. | 2 |
| 7 | Classify the choppers interms of their operating region. | 2 |
| 8 | Define continuous mode and discontinuous mode of chopper operation. | 3 |
| 9 | Name various pulse width modulation techniques. | 2 |
| 10 | Explain the operation of a two level inverter. | 3 |

## PART – B (50 Marks)

| | | |
|---|---|---|
| 11 | Derive the relation between forward current gain and current gain of a BJT and explain how it operates like a switch. | 10 |
| 12 | Draw the waveforms and derive the average output voltage and current and rms load voltage of a single phase half wave rectifier with RL load. | 10 |
| 13 a) | Derive output voltage equation of a Buck-Boost regulator. | 5 |
| b) | For type A chopper circuit source voltage VS= 220V, chopping period T = 2000μs, on period = 600μs, R = 1Ω, L = 5mH and E = 24V. Find whether the load current is continuous or not calculate the value of average output current. | 5 |
| 14 a) | Explain multiple pulse width modulation. | 5 |
| b) | Explain how voltage source inverter is different from current source inverter. | 5 |
| 15 a) | What is the effect of source inductance on operation of AC-DC converters. | 5 |
| b) | How a freewheeling diode improves the power factor of the circuit? | 5 |
| 16 a) | Explain V-I characteristics of thyristor. | 5 |
| b) | With neat circuit diagram explain resistance firing circuit. | 5 |
| 17 a) | Describe turn on and turn off times of a thyristor with switching characteristics. | 5 |
| b) | How source inductance effects the operation of single phase fully controlled converter? | 5 |

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**Code No. 3127 / O /S**

# FACULTY OF ENGINEERING

## B.E. 3/4 (EEE/Inst.) I-Semester (Old) Examination, May / June 2017

## Subject : Power Electronics

**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 | Show the symbol and structure of BJT and PMOSFET. | 2 |
| 2 | Compare power BJT with MOSFET. | 3 |
| 3 | Draw the steady state characteristics of IGBT. | 3 |
| 4 | Draw the symbol and structure of UJT. | 2 |
| 5 | Derive average load voltage and average load current of 1-$\phi$ full wave rectifier with R-load. | 3 |
| 6 | Define phase angle control. | 2 |
| 7 | Define Chopper. Also draw the output wave forms of class-A Chopper. | 3 |
| 8 | Mention the application of AC-voltage controller. | 2 |
| 9 | What are the two gating schemes in a 3-$\phi$ inverter? | 2 |
| 10 | Explain the working principle of 1-$\phi$ half wave bridge inverter. | 3 |

### PART – B (50 Marks)

| | | |
|---|---|---|
| 11 | a) Explain working of P-channel power MOSFET with neat sketch. | 5 |
| | b) Explain two transistor analogy of SLR. | 5 |
| 12 | a) Explain RC-triggering circuits of SLR. | 5 |
| | b) Explain static characteristics of SLR. | 5 |
| 13 | Explain the operation of 1-$\phi$ fully controlled thyristor bridge converter as a rectifier as well as a line commutated inverter with relevant wave forms. | 10 |
| 14 | Explain the four quadrant operation of Chopper controlled converter. | 10 |
| 15 | Explain the operation of a 3-$\phi$ voltage source inverter with o/p wave form X. Assume $180^0$ conduction mode. | 10 |
| 16 | A 3-$\phi$ fully controlled bridge rectifier is supplied at 230V/phase and at a frequency of 50Hz. The source inductance $L_s$ = 5mH and the load current on the DC side is constant at 12A. If the load consists of a DC source voltage of 230V having an internal resistance of 2$\Omega$. Find a) firing angle "$\alpha$" b) overlap angle $\beta$ | 10 |
| 17 | a) A simple Chopper is operating at frequency of 2 KHz from a 100V DC to supply a load resistance of 10$\Omega$. The load time constant is 5MS. If average load voltage is 59V. Find i) Ton ii) Avg. load current | 5 |
| | b) Explain working of Buck converter. | 5 |

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Code No. 3417 / N/S

# FACULTY OF ENGINEERING

**B.E. 3/4 (ECE) I – Semester (New) (Suppl.) Examination, May /June 2017**

**Subject: Digital System Design with Verilog HDL**

**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 | Explain Compiler directives used in Verilog. | 2 |
| 2 | what are the uses of PLI? | 3 |
| 3 | Write a Verilog module to describe 2 bit comparator in data flow modelling. | 3 |
| 4 | Explain static timing analysis with example. | 2 |
| 5 | Write a Verilog model for D Flip flop. | 2 |
| 6 | Draw ASM chart for the arbiter FSM. | 3 |
| 7 | Explain transition and flow table in asynchronous sequential circuits. | 2 |
| 8 | Explain Partitioning Minimization Procedure. | 3 |
| 9 | Draw neat diagram of BJT SRAM cell. | 2 |
| 10 | Explain architecture of FPGA. | 3 |

## PART – B (5x10 = 50 Marks)

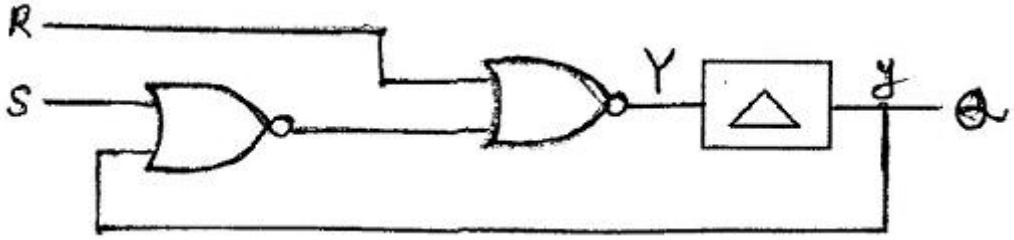
| | | | |
|---|---|---|---|
| 11 | a) | Explain representation of numbers in Verilog. | 3 |
| | b) | Write a Verilog code for the following function $F(A, B, C, D) = \Sigma m (0, 5, 7, 8, 9, 10, 12, 13) + \Sigma d (1, 6, 11, 14)$ in gate level model and write test bench to verify its functionality. | 7 |
| 12 | a) | Write Verilog code for AND gate in switch level modeling. | 4 |
| | b) | Write Verilog code for a 4-to-16 decoder and write test bench to verify its functionality. | 6 |
| 13 | a) | Differentiate between latch and Flip flop. | 2 |
| | b) | Design synchronous sequential circuit of state machine M1 shown using D Flip-flop. Assume state assignment as A = 00, B = 01 and C = 10. | 8 |

| PS | NS.z | |
|---|---|---|
| | x = 0 | x = 1 |
| A | B, 0 | A.1 |
| B | C, 0 | A, 1 |
| C | A, 1 | B, 0 |

State Machine M1

14 a) Explain controller design with one-hot method. 4

b) Analyze the given asynchronous sequential circuit. 6




15 Design a PLA to realize the following three logic functions and draw PLA programming table $F_1$ = A'B'D' + B'CD' + A'BCDE', $F_2$ = A'BE + B'CD'E, $F_3$ = A'B'D' + B'C'D'E + A'BCD, $F_1 = \overline{ABD} + \bar{B}C\bar{D} + \bar{A}BCD\bar{E}$ :: $F_2 = \bar{A}BE + \bar{B}C\bar{D}E$, $F_3 = \overline{A\bar{B}D} + \overline{BCD}E + \bar{A}BCD$. 10

16 a) Find a hazard-free minimum-cost implementation of the function $F(x_1, x_2, x_3, x_4) = \Sigma m(0, 4, 11, 13, 15) + D(2, 3, 5, 10)$. 5

b) Write Verilog code and test bench for up down counter and draw input and output waveforms. 5

17 Write short notes on the following:

a) Parity generator and checker circuits. 4

b) Incompletely specified FSM model 3

c) 6T MOS RAM Cell. 3

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**Code No. 3137 / O/S**

# FACULTY OF ENGINEERING

## B.E. 3/4 (ECE) I - Semester (Old) Examination, May/June 2017

**Subject : Microprocessors and Microcontrollers**

**Time : 3 Hours** **Max. Marks: 75**

***Note: Answer all questions from Part-A and answer any five questions from Part-B.***

### PART – A (25 Marks)

1 Differentiate between maximum and minimum mode of operation. (2)

2 Explain any two string manipulation instructions with a suitable example. (2)

3 What are assembler directives? How are they different from instructions? (2)

4 Compare and contrast PROCEDURE and MACRO. (2)

5 Write the I/O mode control word register for programming 8255 in mode 0 configuration with following specification.
Port A = IN, Port B = IN, Port CL = IN and Port CU = IN (3)

6 Draw the functional block diagram of 8251 USART. (3)

7 Explain the following instructions with an example. (3)
(i) SJMP (ii) MOVC (iii) CJNE

8 Give the function of each bit in TMOD register. (3)

9 Describe the interrupt vector table of 8051 along with their priorities. (2)

10 Interface a DAC to 8051 and write a program to generate triangular wave. (3)

### PART – B (50 Marks)

11 (a) Explain the functions of the following pins of 8086
(i) ALE (ii) READY (iii) $\overline{BHE}$ (iv) $\overline{LOCK}$ (4)
(b) Explain the following addressing modes of 8086 with an example
(i) Direct (ii) Register indirect (iii) Register relative (iv) Base Indexed (6)

12 (a) Describe interrupt vector table of 8086. (4)
(b) Write an ALP for 8086 to find square root of a 2 digit number
(Assume the number as a perfect square) using assembler directives. (6)

13 Design a memory interface with 8086 for the following specification (10)
(a) Two 8KB EPROMs ending at FFFFFH
(b) Two 8KB SRAMs starting from C0000H

14 (a) Explain operational modes of 8255. (5)
(b) Draw the interfacing diagram of 8251 USART with 8086 and explain. (5)

15 (a) Draw the port 0 structure of 8051 microcontroller and explain. (5)
(b) Write an ALP for 8051 to read 10 bytes of data from internal RAM starting at 45H and save the data in external RAM starting at 8070H. (5)

16 (a) Write a program to generate a square wave of 1 KHz frequency at port pin P1.1 using Timer 1 of 8051. (5)
(b) Write a program of 8051 microcontroller to transmit “ELECTRON” using serial communication of 8051 at 4800 baud. (5)

17 Write any **two** of the following: (10)
(a) Mode 1 and Mode 2 operation of 8051 timer
(b) Analog to Digital interfacing with 8051
(c) 8086 instruction formats

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**Code No. 3420 / N/S**

# FACULTY OF ENGINEERING

**B.E. 3/4 (M/P) I – Semester (New) (Suppl.) Examination, May/June 2017**

**Subject: Design of Machine Elements**

**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 re the important mechanical properties of materials used in design?

2 What are the different manufacturing considerations used in design?

3 Explain about S-N diagram.

4 Define importance of Notch sensitivity.

5 Define Form Stress Concentration factor and Fatigue Stress Concentration Factor.

6 Define coupling, state the different types of couplings.

7 What are the applications of cotter and knuckle joint?

8 What are the different types of locking devices?

9 State the factors to be considered in design of basket joints.

10 Classify the types of Riveted joints and mention their applications.

## PART – B (5x10 = 50 Marks)

11 A cylindrical shift made sof steel of yield strength of 700 MPa is subjected to a static loads of bending moments of 10 kN-M and a trorsional moment of 30 kN-M. Determine the diameter of the shaft using the different theories of failure, assuming factor of safety = 2. Take E = 200 GPa and Poisson's Ratio = 0.25.

12 A circular bar of 300 mm length is supported freely at its two ends. It is acted upon by a central concentrated cyclic load having a minimum value of 50 kN. Determine the diameter of the bar taking the factor of safety = 1.5, size effect of 0.5, surface finish factor of 0.9. The material properties of the bar are given by; ultimate strength of 650 MPa; yield strength of 500 MPa and endurance strength of 350 MPa.

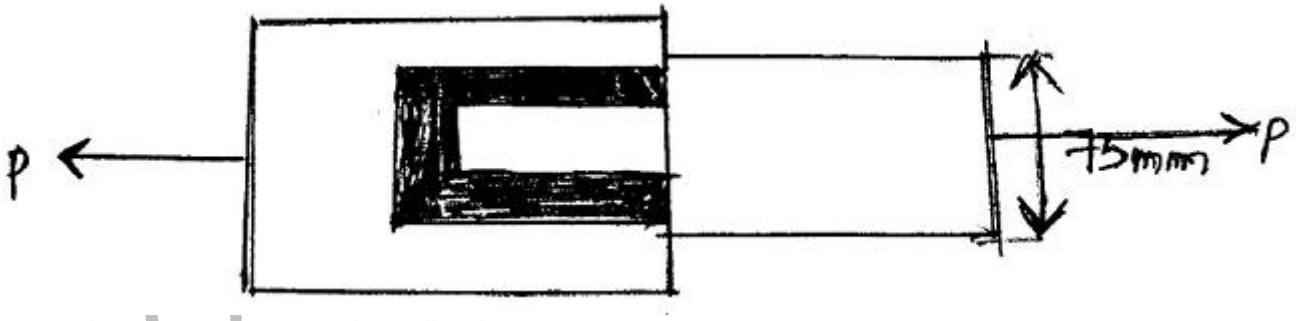
13 A mild steel shaft transmith 23 kW at 200 rpm. It carries a central load of 900 N and is simply supported between the bearings 2.5 meters apart. Determine the size of the shaft if allowable shear stress is 42 MPa and the maximum tensile or compressive

stress is not to exceed 56 MPa. What size of the shaft is required if it is subjected to gradually applied loads.

14 Design and draw a rigid coupling to transmit a torque of 250 N-M between two co-axial shafts. The shaft is made of alloy steel flanges out of cast iron and bolts of steel. Fair bolts are used to couple the flanges. The shafts are keyed to the flange hub. The permissible stresses are given below:
Shear stress of the shaft = 100 MPa, Bearing or Gushing stress on the shaft = 250 MPa
Shear stress on Keys = 100 MPa, Bearing stress on key = 250 MPa, Shearing stress of cast iron = 200 MPa. Shear stress on bolts = 100 MPa.

15 Design a knuckle joint to transmit 150 kN. The design stresses may be taken as 75 MPa in tension and 60 MPa in shear and 150 MPa in compression.

16 A plate of 75 mm wide and 12.5 mm thick is joined with another plate by a single transverse weld and a double parallel fillet weld as shown in Figure. The maximum tensile and shear stresses are 70 MPa and 56 MPa respectively. Find the length of each parallel fillet weld, if the joint is subjected to both static and fatigue loading.




17 Write short notes on the following:

a) Design of material elements subjected to Impact Loading
b) Goodman's criteria
c) Caukling and fullering in Riveted Joints.

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**Code No. 3430 / N /S**

# FACULTY OF ENGINEERING

## B.E. 3/4 (AE) I-Semester (New) (Main) Examination, May / June 2017

## Subject : Design of Machine Components

**Time : 3 hours** **Max. Marks : 75**

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

**PART – A** (10 x 2.5 = 25 Marks)

1 Define the terms i) Ductility ii) Malleability iii) Hardness
2 Write the percentage composition of the following steels
i) 55C8 ii) 17Mn1cr95
3 What is Miner's rule?
4 Write short note on S-N-diagram.
5 Why Gib head is provided to a key?
6 Define "equivalent bending moment" and "equivalent twisting moment".
7 Briefly describe bolt of uniform strength.
8 Name the factors to be considered in the design of gasket joint.
9 Explain the terms caulking and fullering.
10 Explain why square threads are preferred, compared to v-threads, for v-threads, for power transmission.

**PART – B** (50 Marks)

11 A bolt is subjected to an axial face of 10kN with transverse shear force of 5kw. Find the dia of bolt required according to i) max normal stress theory (ii) Tresca theory (iii) Distortion energy theory. It is assumed that the permissible tensile stress at elastic limit = 100 $N/mm^2$ and Poisson's ratio = 0.3,

12 A leaf spring in an automobile with rectangular cross section with b = 80mm t = 10mm subjected to maximum bending of 400 N-m and minimum of -200 N-m. Estimate under What factor of safety the spring is working by Goodman's and Soderberg considerations? Ultimate strength of material is 300MPa, yield strength of material is 200MPa and endurance timit is 150MPa.

13 Determine the required standard diameter of a uniform circular shaft carrying 2 pulleys of weight 2kN each. The shaft 750mm long is supported at the ends and carries 2 pulleys at 250mm and 500mm from the left end. Pull on right pulley is 10kN vertically downwards. The shaft transmits a torque 3kN-m between the pulleys. Assume $K_b = k_t = 1.5$ and allowable shear stress of 70 $N/mm^2$.

14 Design a flange coupling to transmit 60KW power at 350rpm. Assume suitable data and write its specifications.

..2

15 Design a Knuckle joint to transmit a load of 6kN. Take allowable shear stress as 30 $N/mm^2$ and allowable tensile stress as 70 $N/mm^2$.

16 A triple riveted butt zig-zag riveting joint is used to connect two plates of 60mm thickness. Design the joint and show how it fail. Take $\sigma_t$ = 120MPa, $\zeta_\lambda$ =100MPa, $\sigma_c$= 150 MPa.

17 Explain the terms briefly :

a) Differential and compound screw 4
b) Stress concentration and notch sensitivity 4
c) Bolt of uniform strength 2

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**Code No. 3140 / O /S**

# FACULTY OF ENGINEERING

## B.E. 3/4 (M/P/AE) I-Semester (Old) Examination, May / June 2017

## Subject : Design of Machine of Elements

**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 What are the general design considerations of Machine elements?
2 What are the different types of materials used in machine elements?
3 What are preferred numbers?
4 Define stress concentration, what are the different methods used for reducing stress concentration.
5 Draw the different types of keys used in design.
6 State the different types of couplings.
7 Shafts are subjected to what kind of deformation.
8 What are fluctuating stresses?
9 What are the different types of locking devices?
10 Differentiate between differential and compound screw.

**PART – B** (10 x 5 = 50 Marks)

11 A cylindrical shaft made of steel of yield strength of 700 MPa is subjected to static loads of bending moment of 10 kN-M and a torsional moment of 30 kN-M. Determine the diameter of the shaft using different theories of failure, assuming factor of safety = 2, E = 210 GPa and Poission's ratio = 0.25.

12 A circular bar of 500mm length is supported freely at its two ends. It is acted upon by a central concentrated cyclic load having a minimum value of 50 kN. Determine the diameter of the bar by taking the factor of safety = 1.5, size effect of 0.85, surface finish factor = 0.9. The material properties are given by ultimate strength of 650 MPa, yield strength of 500 MPa and endurance strength of 350 MPa.

13 A mild steel shaft transmits 23 kN at 200 rpm. It carries a central load of 900N and is simply supported between the bearings 2.5 meters apart. Determine the size of the shaft if allowable shear stress is 42 MPa and the maximum tensile or compressive stress is not to exceed 56 MPa. What is the size of the shaft required if it is subjected to gradually applied loads.

14 Design and draw a rigid flange coupling to transmit a torque of 250 N-M between two co-axial shafts. The shaft is made of alloy steel flanges out of cost iron and bolts of steel. For bolts are used to couple flanges. The shafts are keyed to the flange hub. The permissible stresses are given below shear stress on keys = 100 MPa, bearing stress on keep = 250 Mpa shearing stress of CI = 200 Mpa, shear stress on bolts = 100 MPa.

..2

15 Design a knuckle joint to transmit 150 kN. The design stress may be taken as 75 MPa in tension and 60 MPa in shear and 150 MPa in compression.

16 A double rivetted lap joint with zig-zag rivetting is to be designed for 13mm thick plates. Assume tensile stress = 80 MPa, shead stress = 60 MPa, crushing stress = 120 MPa. State how the joint will fail and find the efficiency of the joint.

17 Write short notes on the following :
   a) Codes and standards used in design
   b) Bolts of uniform strength
   c) S-N diagram

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Code No. 3433 / N/S

# FACULTY OF ENGINEERING

**B.E. 3/4 (CSE) I – Semester (New) (Suppl.) Examination, May/June 2017**

**Subject: Automata Languages and 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 Define deterministic finite automata. 2

2 Design a finite automaton that accepts all the strings starting with '0' and ending with '11' over the alphabet Σ = {0, 1}. 3

3 Mention the decision properties of regular languages. 2

4 Define context free grammar. 3

5 Differentiate between FA and PDA. 2

6 Define Greibach Normal Form with an example. 3

7 Define TM. 3

8 Mention the Extensions to the Turing Machine. 3

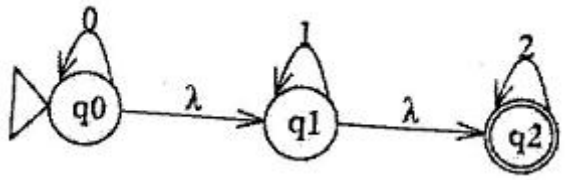
9 Define Post-Corresponding problem. 2

10 What is meant by Restricted Satisfiability Problem? 2

## PART – B (5x10 = 50 Marks)

11 a) Construct DFA for the language L = {W | W does not contain the substring 110}. 5

b) Convert the following automata to regular expression. 5




12 a) Using Pumping lemma prove whether the following language is regular or not?

C = {w | w has an equal number of 0's and 1's}. 5

b) Given a CFG. 5

$E \rightarrow E + T / T$
$T \rightarrow T X F / F$
$F \rightarrow (E) / a$
Give parse Tree and derivation (both LMD and RMD) for a data. Verify whether grammar is ambiguous / not.

13 a) Construct PDA that recognize the language $\{0^n1^n \mid n \geq 0\}$. 5

b) Reduce the following grammar to CNF. 5

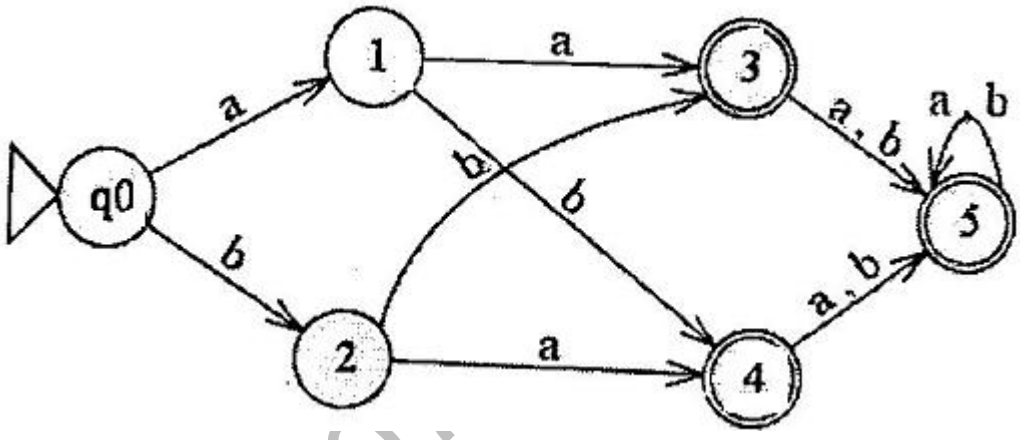
$S \rightarrow aB / ab$
$A \rightarrow aAB / a$
$B \rightarrow ABb / b$

14 a) What are the various programming techniques for Turing Machine. 5
b) Construct a TM for multiplication of two numbers M X N. 5

15 a) Distinguish between Recursive and Recursively Enumerable language. Give an example for each. 5
b) Write short note on the universal Turing Machine. 5

16 Give the DFA accepting the set of strings over alphabet Σ = {0, 1} such that in each string number of 0's is divisible by five and number of 1's is divisible by 3. Justify it with an example. 10

17 a) Minimize the following DFA and draw the minimized DFA. 6




b) Explain Chomsky classification of languages. 4

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Code No. 3152 / O/S

# FACULTY OF ENGINEERING

## B.E. 3/4 (CSE) I - Semester (Old) Examination, May / June 2017

**Subject : Automata Languages and Computation**

**Time : 3 Hours** **Max. Marks: 75**

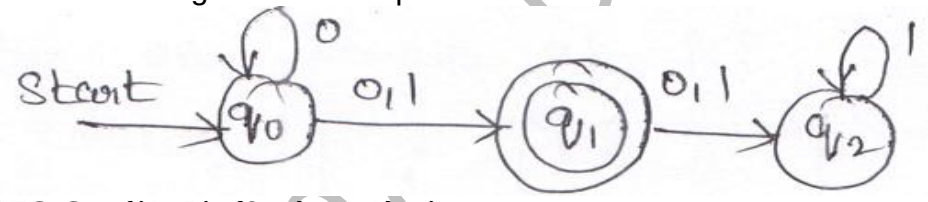
***Note: Answer all questions from Part-A and answer any five questions from Part-B.***

### PART – A (25 Marks)

1 Define Finite Automata. (2)
2 Determine DFA accepting all strings over {0, 1} which begins with and ends with 01. (3)
3 Write down the applications of Pumping lemma of RL. (3)
4 Define Ambiguous grammar. (2)
5 Define 'δ' function of push down Automata. (3)
6 Define context free grammar. (2)
7 What do you mean by Undecidability? (2)
8 What is Restricted satisfiabiltiy problem? (3)
9 Mention the programming techniques for TM's. (2)
10 Define Turing machine. (3)

### PART – B (50 Marks)

11 (a) Distinguish between DFA and NFA. (4)
(b) Convert the following NFA to its equivalent DFA. (6)




12 (a) Give CFG G = {(A, B), {0, 1}, P, A} where (5)
P consists of
$A \rightarrow oBA / 0$
$B \rightarrow A1B / AA / 10$
Give the RMD, LMD and parse tree for the string "001100".
(b) Obtain context free grammar to generate string consisting of any number of a's and b's with atleast one a. (5)

13 Obtain a PDA to accept the language $L = \{a^n b^n / n \geq, 1\}$ by a final state. (10)

14 (a) Describe briefly about problems that computers cannot solve. (5)
(b) Explain about Extensions to the Turing machines. (5)

15 Obtain a TM to accept a palindrome consisting of a's and b's of any length. (10)

16 (a) Define Chomsky hierarchy. (3)
(b) What are recursively enumerable languages? Give example. (3)
(c) Explain undecidability. (4)

17 (a) Write about Post correspondence problem. (5)
(b) Give an Instance of PCP, show that this instance has no solution. (5)

| i | List A | List B |
|---|---|---|
| 1 | 011 | 101 |
| 2 | 11 | 011 |
| 3 | 1101 | 110 |

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**Code No. 3156/O / S**

# FACULTY OF INFORMATICS

## B.E. 3/4 (I.T.) I-Semester (Old) Examination, May/June 2017

## Subject : Digital Signal Processing

**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 | Explain different types of discrete time systems. | 3 |
| 2 | State sampling theorem. | 2 |
| 3 | What is Gibbs phenomenon? Explain how to reduce this phenomenon. | 3 |
| 4 | What are the characteristics of linear phase FIR filters? | 2 |
| 5 | Differentiate FIR and HR filters. | 3 |
| 6 | Compare digital and analog filter. | 2 |
| 7 | Write about MAC unit. | 3 |
| 8 | What is pipelining? | 2 |
| 9 | Write about bio-telemetry receiver. | 3 |
| 10 | Write the applications of programmable DSP devices. | 2 |

### PART – B (50 Marks)

11 a) Find the linearity, invariance and causality of the following systems :
i) $y[n] = -ax[n-1]+x[n]$
ii) $y[n]=x[n^2]+x[-n]$ 5

b) If a system is represented by the following difference equation :
$y[n] = 3y^2[n-1]-n\,x[n] + 4x[n-1] - x[n+1]$ ; $n > 0$
Find linearity, invariance, causality. 5

12 a) An 8-point sequence is given by x[n] = {2, 2, 2, 2, 1, 1, 1, 1}. Compute 8-point DFT of x[n] by Radix-2 DIT FFT algorithm. 7

b) Perform circular convolution of the following sequence x1[n] = {1, 2, 1, 2} and $x_2[n]$ = {4, 3, 2, 1}. 3

13 a) A filter is to be designed with the following desired frequency response. 7

$$H_d\left(e^{jw}\right)=\begin{cases} 0, & \frac{-®}{2} \le w \le \frac{®}{2} \\ e^{-j2w}, & \frac{®}{2} < w \le ® \end{cases}$$

Determine the filter coefficients h(n), if the window function is defined as

$$W(n) = \begin{cases} 1, & 0 \le n \le 4 \\ 0, & \text{otherwise} \end{cases}$$ 7

b) Realize the filter transfer function given by the expression below using the direct form. 3

$$H(z) = (1-z^{-1})\,(1+2z^{-1} - 3z^{-2})$$

..2

14 a) Realize the following systems with minimum number of multipliers. 7

i) $H(z) = \frac{1}{3} + \frac{1}{5}z^{-1} + \frac{2}{3}z^{-2} + \frac{1}{5}z^{-3} + \frac{1}{3}z^{-4}$

ii) $H(z) = \frac{1}{2} + \frac{1}{4}z^{-1} + \frac{1}{4}z^{-2} + \frac{1}{2}z^{-3}$

iii) $H(z) = \left(1 + \frac{1}{3}z^{-1} + z^{-2}\right)\left(1 + \frac{1}{5}z^{-1} + z^{-2}\right)$

b) Explain different methods of realization of FIR systems. 3

15 a) Design a low pass butterworth filter using the bilinear transformation for satisfying the following constraints :

Passband : 0-400Hz, Stopband : 2.1-4 Khz, Passband ripple : 2 dB, stopband attenuation : 20dB.

Sampling frequency : 10 kHz. 8

b) What are the requirements for an analog filter to be causal and stable? 2

16 a) Write about addressing modes of TMX320C54XX. 7
b) Write about DSP computational building blocks. 3

17 a) Explain speech processing system. 7
b) Write the significance of discrete cosine transform. 3

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Code No. 3436 / N / S

# FACULTY OF INFORMATICS

**B.E. 3/4 (IT) I – Semester (New) (Suppl.) Examination, May / June 2017**

**Subject: Design & 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 Define time and space complexity. 2

2 Define heap. Give example for max-heap. 2

3 Write the control abstraction of Divide and Conquer approach. 3

4 Define the principle of optimality. 3

5 State all pairs shortest path problem with example. 3

6 Define articulation point. 2

7 Differentiate between implicit and explicit constraints. 3

8 State the 0/I knapsack problem. 2

9 State Cook's theorem. 2

10 State Node Covering decision problem. 3

## PART – B (5x10 = 50 Marks)

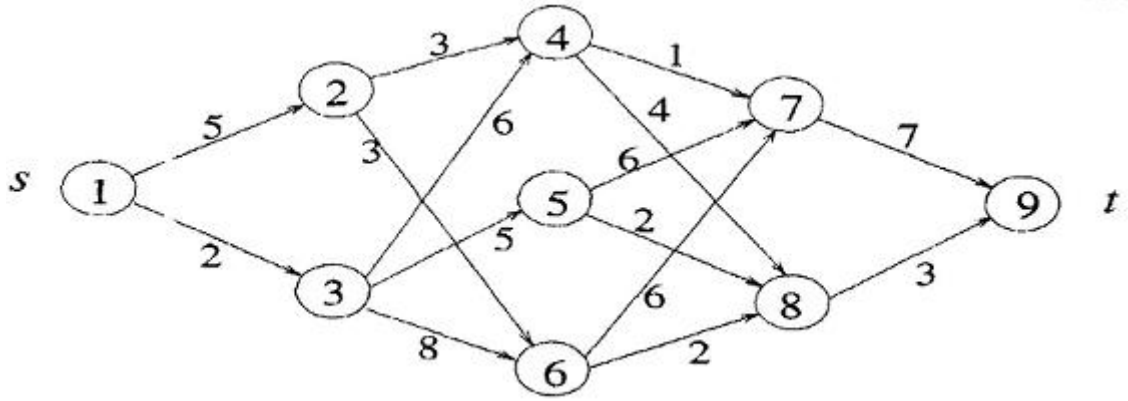
11 a) Explain weighted union with an example. 5

b) Write master's theorem and solve (Tn) = 2T(n/4)+1 using master's theorem.. 5

12 a) Solve the Knapsack problem using Greedy approach where n=3, m=20, $(p_1, p_2, p_3) = (25, 24, 15)$ and $(w_1, w_2, w_3) = (18, 15, 10)$. 5

b) Write an algorithm to search an element using binary search technique. Analyze the time complexity. 5

13 Find a minimum cost path from s to t for the following graph using forward approach. 10



14 a) State ‘n’ Queen’s problem and write an algorithm for n queen’s. 7

b) Explain Hamiltonian cycle with an example. 3

15 a) Explain NP Hard and NP Complete problem. 5

b) Explain non-deterministic algorithm for traveling salesman problem. 5

16 a) Solve the O/I Knap Sack problem: n = 5, $(P_1, P_2, P_3, P_4, P_5) = (10, 15, 6, 8, 4)$, $(W_1, W_2, W_3, W_4, W_5) = (4, 6, 3, 4, 2)$, m = 12 using LCBB. 7

b) Construct a Graph (G) with 8-vertices and 12 edges. Obtain the DFS and BFS for Graph (G). 3

17 Write about:

a) Optimal Binary search tree. 5

b) Graph colouring algorithm. 5

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