Code No. 101 / S

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) I-Semester (Supplementary) Examination, May / June 2018

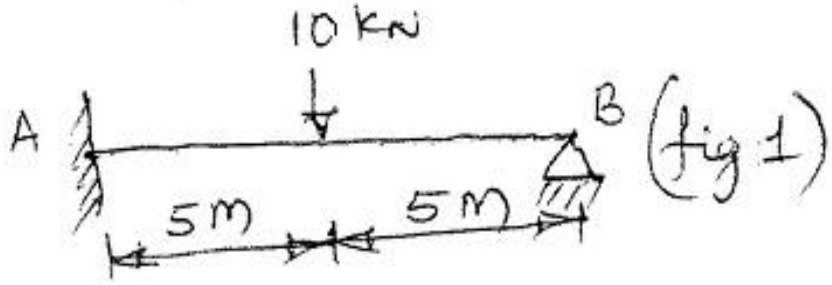
Subject : Theory of Structures – I

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

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

PART – A (25 Marks)

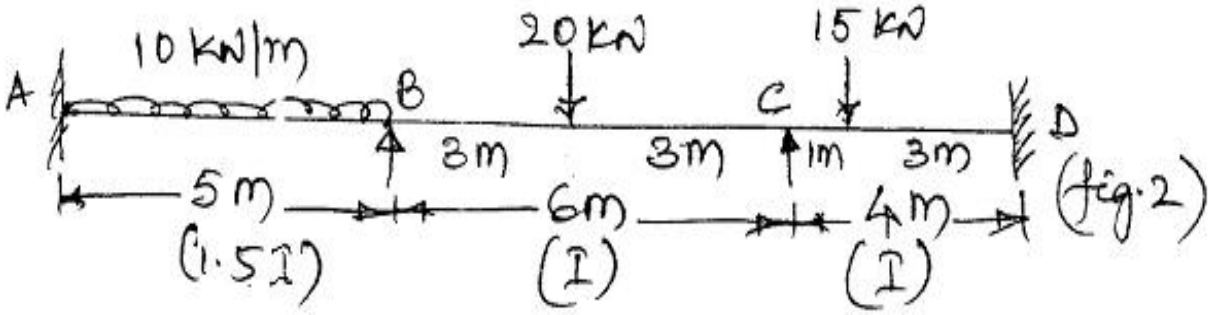
1 Write two assumptions made in the analysis of structure using slope deflection method. 2
2 Write the expression for absolute stiffness when the far end is hinged. 2
3 Write the horizontal shear equation for a rigid frame. 2
4 What is the difference between three hinged parabolic arch and two hinged parabolic arch? 2
5 Define virtual force and virtual deflection. 2
6 Derive the expression for absolute stiffness when the far end is fixed increase of unit rotation at near end. 3
7 Compute slope at B of the beam shown in fig. 1 slope deflection method. 3



8 Write the advantages of Kam's method over moment distribution method. 3
9 Write Castigliano's theorem –II 3
10 Clearly write eddy's theorem and shown with a neat sketch. 3

PART – B (5 x 10 = 50 Marks)

11 Analyse the continuous beam shown in fig.2 using slope deflection method. Draw BMD. 10



..2

12 Analyse the frame shown in fig.3 using moment distribution method. Draw BMD. 10

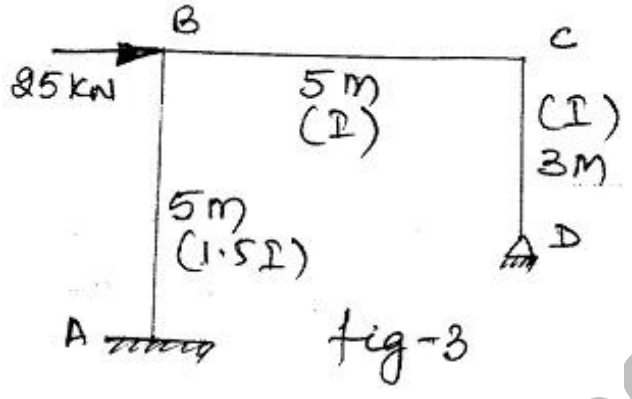
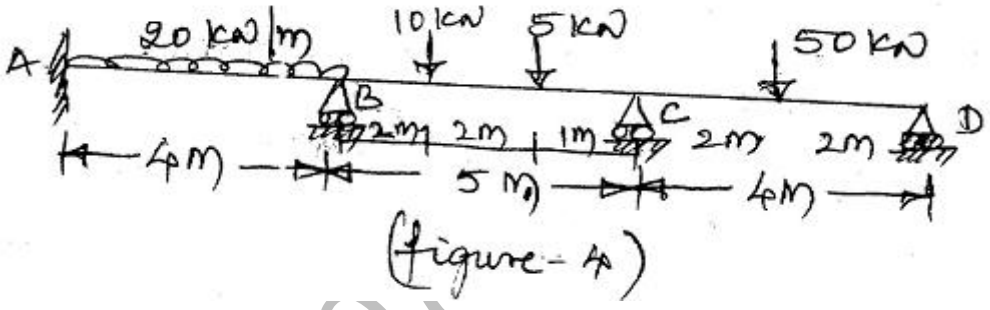


fig-3

13 Analyse the continuous beam shown in fig-4 using Kani's method. Draw BMD. EI is constant support B sinks by 10mm. E = 2 x 105 MPa, I = 8000 cm^4. 10



(figure-4)

14 a) Write Castigliano's theorem –II. 2

b) Compute deflection at C in the beam shown in figure 5. 8

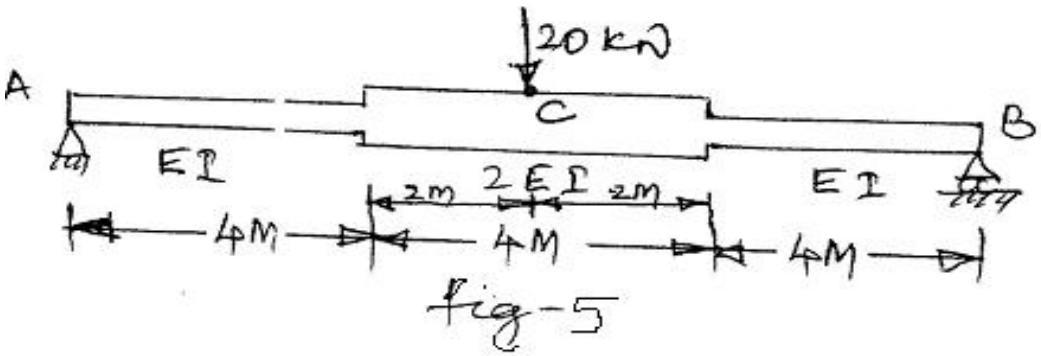


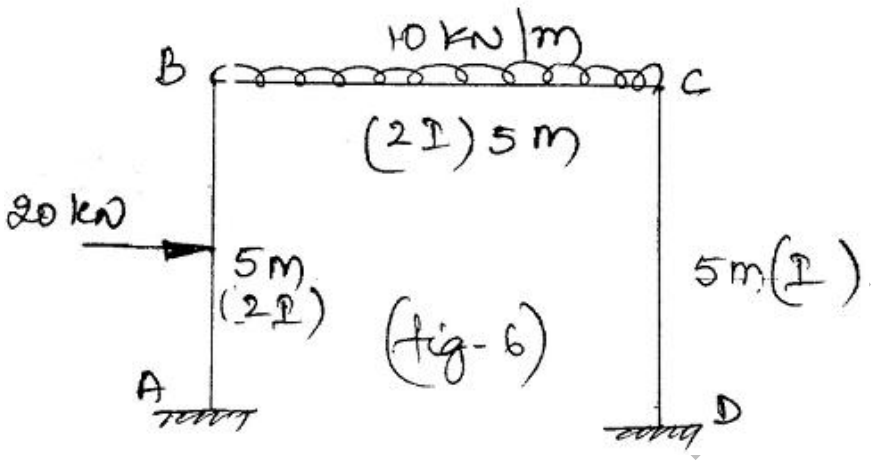
fig-5

15 a) What is an arch? How is it different from a beam. 2

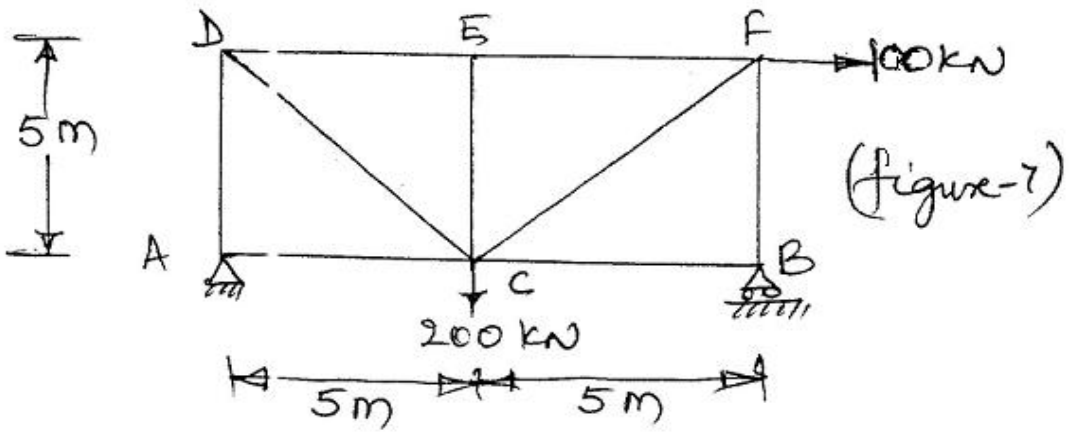
b) A three hinged arch of span 50m and rise 8m carries a single concentrated load at 1Bm from the left abutment. Compute reactions at supports. Draw BMD of the arch. Compute radial shear force and normal thrust at 10m from left support of the arch. 8

..3

16 Analyse the frame shown in figure 6 using slope deflection method and draw BMD. 10



17 Determine the deflection (vertical) at centric of the determinate frame shown in figure 7. 10



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Code No. 109 / S

FACULTY OF ENGINEERING

B.E. 3/4 (EEE / EIE) I – Semester (Supple.) Examination, May / June 2018

Subject: Power Electronics

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

Note: Answer all questions from Part A & any five questions from Part B.

PART – A (25 Marks)

1	Draw the characteristics of power diodes.	2
2	Explain secondary break down problem of BJT.	3
3	Draw the structure and V-I characteristics of SCR.	3
4	List out forced commutation circuits.	2
5	Calculate the average d.c. output voltage for a 230 V supply and firing angle of 30^oC. Assume 1-Φ converter with R-load.	3
6	Draw the output wave forms for 3-Φ converter with R-load. Assume $\alpha = 45^o$.	2
7	Explain working of 1-Φ voltage controllers.	3
8	What is the working principle of choppers?	2
9	Derive the average output voltage of a step down chopper.	3
10	List out voltage control methods of inverters.	2

PART – B (5x10 = 50 Marks)

11	a)	Describe R and RC triggering methods of a thyristor.	5
	b)	Explain the switching characteristics of MOSFET with necessary diagrams.	5
12	a)	Draw and explain switching characteristics of IGBT.	5
	b)	Explain working principle of UJT.	5
13	a)	Calculate the load current in a 1-phase FCC supplying RLE load. Assume constant load current. Supply rms voltage = 220 V, load resistance = 10 ohm, $\alpha = 30^o$, E = 150 V.	5
	b)	Explain the effect of source inductance on output voltage of converter.	5

14 A simple chopper is operating at a frequency of 2 kHz from a 100 V DC source to supply a load resistance of 10Ω. The load time constant is 5 ms. If the average load voltage is 59 V. Find
- i) The Ton period of the chopper
- ii) The average load current
- iii) The magnitude of the ripple current and its RMS value. 10

..2

15 Explain in detail working of 3-phase voltage source inverter. Also draw output and input wave forms for 180^{o} modes of operation. 10

16 a) Explain the operation of 1-Φ voltage controller with RL-load. 5

b) Explain the working of a Boost regulator. 5

17 Write a short note on: 10

a) Voltage control methods of inverter

b) Phase angle control of SCR.

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Code No. 118 / S

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) I – Semester (Suppl.) Examination, May / June 2018

Subject: Digital System Design with Verilog HDL

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

Note: Answer all questions from Part – A & any five questions from Part – B.

PART – A (25 Marks)

1 Compare a Hardware Description Language with C programming language. (2)

2 Write a Verilog module to describe 2 bit comparator in data flow modeling (3)

3 What is gate level netlist in verilog coding? (2)

4 Write a Verilog program for 2 to 4 decoder in behavioral modeling. (2)

5 Differentiate between Flip flop and Latch. (3)

6 Describe steps involved in synthesis process of asynchronous sequential circuit. (2)

7 Explain hazards in combinational logic circuits (3)

8 Draw ASM chart for Moore machine with example. (2)

9 Classify different semiconductor memory devices based on their operation (3)

10 Realize the given functions F1=∑m(1,2,4,7) and F2=∑m(3,5,6,7) using suitable size PROM. (3)

PART – B (50 Marks)

11 a) Explain different data types used in Verilog HDL. (5)

b) Write a Verilog code for 16:1 multiplexer using 4:1 multiplexer in data flow Modeling and verify its functionality using test bench. (5)

12 a) Differentiate sequential and parallel block in verilog with example. (6)

b) Write Verilog code in switch level modeling for logic AND gate. (4)

13 a) Write verilog code for four bit up/down counter in behavioural modeling. (5)

b) Design synchronous sequential circuit for state table as shown in table 1 using D flip flop. Use state assignment as A=00, B=10 and C=11. (5)

Table 1: State table

PS	NS,z	
	x=0	x=1
A	B,0	A,1
B	C,0	A,1
C	A,1	B,0

14 a) Design vending machine controller and implement its Verilog code. (5)

b) Explain race conditions in asynchronous sequential circuits. (5)

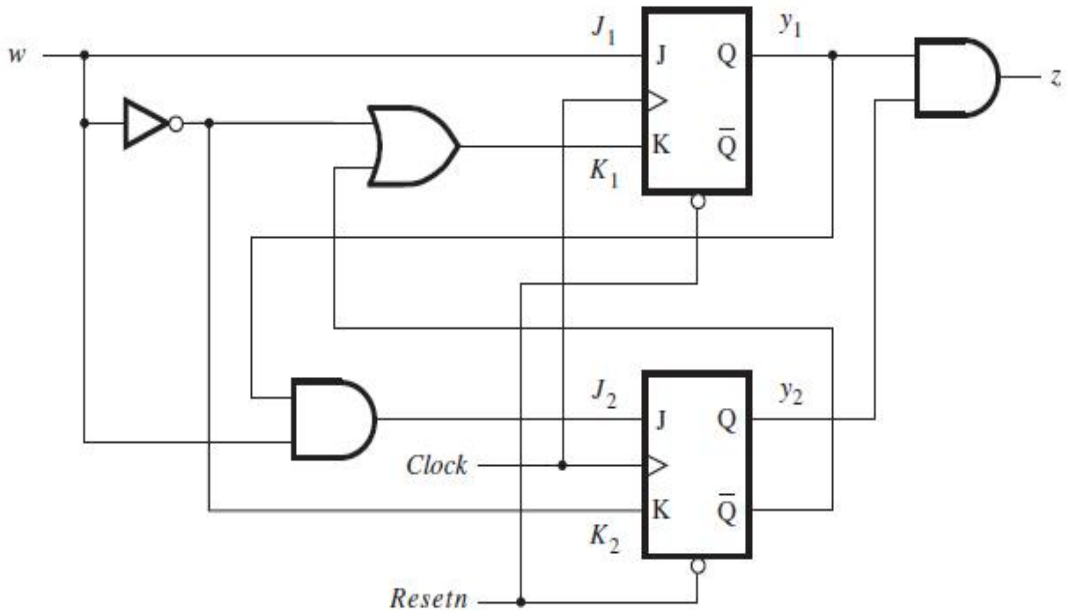
..2

15 a) Explain read and write operations of 6T static RAM cell. (5)

b) Find a hazard-free minimum-cost implementation of the function and write it's Verilog code.
$F(x_1, x_2, x_3, x_4) = \sum m\ (0, 4, 11, 13, 15) + D\ (2, 3, 5, 10)$ (5)

16 a) Differentiate CPLD and FPGA architectures. (5)

b) Analyze and obtain the state table for the sequential circuit given below. (5)



17 a) Explain Register Transfer level (RTL) code using a suitable example. (5)

b) Design a BCD to Excess 3 code converter using a suitable size PAL. (5)

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Code No. 121 / S

FACULTY OF ENGINEERING

B.E. 3/4 (M/P) I-Semester (Supplementary) Examination, May / June 2018

Subject : Design of Machine 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 Which material property is used to measure the following :
a) Stress b) Indentation c) Shock resistance 3
2 Under what conditions Goodman and Soderberg methods are preferred for design of components subjected to fatigue failure? 3
3 Under what conditions, the following keys are preferred 3
a) Sunk taper key b) Feather key
4 What are the advantages of chain drives? 3
5 What are the stresses induced in a welded joint under eccentric loading? 3
6 What is distortion energy in distortion energy theory of failure? 2
7 Name some methods to prevent fatigue failure of machine parts. 2
8 Among a solid shaft and a hollow shaft of same material and same outer diameter, which shaft is preferred under bending and why? 2
9 Under what conditions, a Knuckle joint is preferred over a cotter joint. 2
10 What are the thread profiles used for power screws? 2

PART – B (50 Marks)

11 A shaft made of steel of yield strength 700 Mpa is subjected to static loads consisting of bending moment 10 KN-m and a torsional moment 30 KN-m. Determine the diameter of the shaft using a) Max principal stress theory and b) Max shear stress theory. Take E = 210 Gpa and Poisson's ratio = 0.25.

12 A rotating beam specimen made of steel 45C8 (Sut = 600MPa) is subjected to a completely reversed bending stress. Calculate the endurance limit σ^e of the specimen for a life of 10^5 cycles.

13 A shaft made of mild steel is required to transmit 100KW at 300 rpm. The supported length of the shaft is 3 meters. It carries two pulleys each weighing 1500 N supported at a distance of 1 meter from the ends respectively. Assuming safe values of stress, determine the diameter of the shaft.

14 Design a C.I. flange coupling (protective type) to connect two shafts 100 mm diameter running at 300 rpm for transmitting 5000 N-n torque. Assume permissible shear stress for shaft, bolt and key is 50 MPa, crushing stress for the bolt and key is 150 MPa and shear stress for flange is 8 MPa.

15 Sketch neatly the Gib and Cotter joint (indicating all dimensions) for connecting square rods and design the joint to carry a maximum load of 35 kN. Assume that the gib and cotter are of same material and having the permissible stresses as 20 MPa, 15MPa and 50 MPa in tension, shear and crushing respectively.

..2

16 A double threaded power screw is used to raise a load of 5 kN. The nominal diameter is 60mm and pitch is 9mm and the threads are ACME type ($2\theta = 29^0$) and coefficient of friction at the screw threads is 0.15. Neglecting collar friction, calculate,

i) torque required to raise the load
ii) torque required to lower the load
iii) the efficiency of the screw for lifting the load

17 A rectangular steel plate is welded as a cantilever to a vertical column and supports a single concentrated load P, as shown in fig. Determine the weld size if shear stress in the same is not to exceed 140MPa

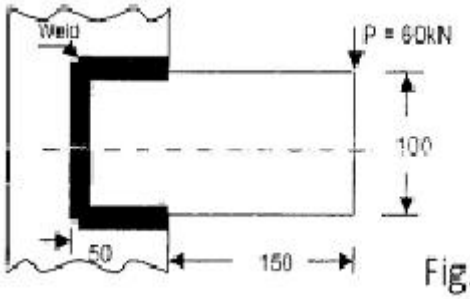

Fig.

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Code No. 131 / S

FACULTY OF ENGINEERING

B.E. 3/4 (AE) I-Semester (Supplementary) Examination, May 2018

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 (25 Marks)

1	Why are preferred numbers used in machine design?	2
2	Discuss the factors to be considered in the selection of materials for the design of machine members.	2
3	Discuss the stress-concentration with neat diagram.	3
4	Briefly discuss the effect of key way cut into the shaft.	3
5	How can you classify the shaft couplings?	3
6	Differentiate screw, bolt, stud and nut in their structures.	3
7	How is a screw thread designated?	2
8	What is the difference between chain riveting and zig-zag riveting?	3
9	In what way clutches are different from flange couplings?	2
10	List the importance factors upon which the capacity of brake depends.	2

PART – B (10 x 5 = 50 Marks)

11 A bolt consists of an axial pull of 10 kN together with a shear force of 5 kN. Determine the diameter of bolt required according to
   a) Maximum principal stress theory b) Maximum shear stress theory
   c) Maximum principal strain theory d) Maximum distortion energy theory
   Take permissible tensile stress at elastic limit = 100 N/mm^2 and Poisson's ratio = 0.3

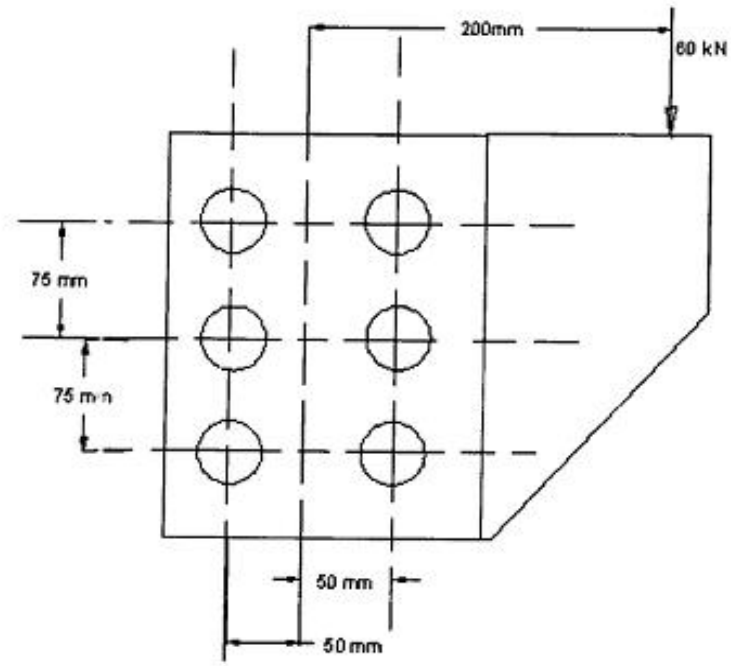
12 A steel rod of circular cross section is subjected to alternating tensile forces varying from a minimum of 200 kN to a maximum of 500 kN. It is to be manufactured with an ultimate tensile strength of 900 N/mm^2 and an endurance limit of 700 N/mm^2. Find the diameter of rod. Use Goodman's straight line as basis for design.
   Take, factor of safety related to ultimate tensile strength = 3.5
   Factor of safety related endurance limit = 4
   Stress concentration factor for fatigue load = 1.65.

13 A solid circular shaft of 40 mm diameter and supported in bearings 500 mm apart transmits 30 kW power at 710 rpm. Determine,
   a) Stress due to bending if the shaft weighs 10,000 N concentrated at the centre acting vertically.
   b) Stress due to torsion
   c) Equivalent shear stress and tensile stress due to bending moment and torque

14 Design and draw a socket and spigot cotter joint to transmit a load of 50kN. Assume σ_t = 60 N/mm^2 τ = 45N/mm^2 σ_c = 100 N/mm^2

15 A plate 100 mm wide and 12.5 mm thick is to be welded to another plate by means of parallel fillet welds. The plates are subjected to an axial load of 40kN. Find the length of the weld so that the maximum stress does not exceed 54 kN/mm^2, if the joint is under a) Static loading b) Fatigue loading.

16 A steel bracket is riveted to a plate by 6 rivets of equal size as shown below. It carries a load of 60 kN at a distance of 200mm from the centre of the plate. If the maximum shear stress in the rivet is limited to 150 N/mm^2, calculate the size of the rivet.



17 A multi disc clutch has three discs on the driving shaft and two on the driven shaft. The inside diameter of the contact surface is 120 mm. The maximum pressure between the surfaces is limited to 0.1 N/mm^2. Design the clutch for transmitting 25 kW at 1575 r.p.m. Assume uniform wear condition and coefficient of friction as 0.3.

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Code No. 134/S

FACULTY OF ENGINEERING

B.E. 3/4 (CSE) I– Semester(Supple.) Examination, June 2018

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. Construct a DFA that accepts all strings of a's and b's where each string starts with 'a' and ends with 'ab' over $\sum = \{a, b\}$ [3]
2. Define the term 'Automata' with an example [2]
3. State pumping lemma for Regular languages [2]
4. Compare Right Linear Grammar with left Linear Grammar [3]
5. Give 2 applications of CFG's [2]
6. Mention Universal Turing Machine. [2]
7. Define MyHill Nerode Theorem [2]
8. What are the reasons for a TM not accepting input. [3]
9. Define PCP and MPCP [3]
10. Mention closure properties and CFL's. [2]

PART – B (10x5 = 50 Marks)

11.a) Differentiate between NFA and DFA [4]

b) Construct a R.E. for all strings over $\sum = \{0,1\}$ starting and ending with different symbols. [3]

C) Construct an $\in -$NFA for $(a+b)^* ab(a^* + b^*)$ [3]

12. a) Obtain a CFG for generating all integers. [5]

b) Is the following grammar ambiguous. jusify $S \to AB, A \to aA|\in, B \to ab|bB \ |\in$ [5]

13. Consider the grammar with the following productions $S \to iCtS|iCtSeS|a, C \to b$

a) Generate the string 'ibtibtaea' using left most derivation and construct a derivation tree for it. [5]

b) Derive an equivalent CNF for the above grammar. [5]

14 a) Design a PDA recognizing the set L of all palindromes over {a,b} [5]

b) Use pumping lemma to prove that the language L = $\{ww|w \in \{0,1\}^*\}$ is not a CFL [5]

contd…2…

15. a) Design a TM to recognize all bit strings ending in 101 [5]

    b) Design a TM to accept $a^n b^n a^n | n \geq 1$ [5]

16. a) Explain undecidability with an example [5]

    b) State and explain the properties of Recursively Enumerable Languages [5]

17. Give short notes on

    a) LBA (Linear bounded Automata) [5]

    b) Chomsky Hierarchy [5]

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Code No: 141/O

FACULTY OF INFORMATICS

BE 3/4 (IT) I - Semester (Old) Examination, May /June 2018

Subject : Digital Signal Processing

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

Note: **Answer all questions from Part-A & Any Five questions From Part-B.**

Part - A (25 Marks)

1. What is the difference between DFT and FFT? 3
2. Define In place computation 2
3. What conditions are to be satisfied by the impulse response of an FIR system in order to have a linear phase? 2
4. Define phase delay and group delay 3
5. What are the different design techniques available for IIR filters? 3
6. Why frequency transformation is needed? 3
7. What are the special addressing modes in DSPs? 2
8. What is the role of a Barrel shifter in DSP? 3
9. List the applications of DSP processors? 2
10. How interrupts are handled by C54xDSP processor? 2

PART-B (50 Marks)

11. a) Find linear convolution of x [n] = {1, 2, 3} and h(n) = {2,-1} using DFT and IDFT 6

    b) State and prove any two properties of DFT. 4

12. a) Explain Gibb's phenomenon 4

    b) Design a band pass filter which approximates the ideal filter with cut-off frequencies at 0.2 rad/sec and 0.3 rad/sec. The filter order is N=7. Use the Hamming window function. 6

13. a) Explain S-plane to Z-plane mapping 4

    b) Design a Butterworth low-pass filter using Impulse Invariance concept for the following specifications: 6

$$0.9 \le \left|H(e^{jw})\right| \le 1, \quad 0 \le |\mu| \le 0.2®$$

$$\left|H(e^{jw})\right| \le 0.18, \quad 0.3® \le |\mu| \le ®$$

Assume T_d=1. Also, assume additional data if required.

13. a) What are the architectural features of 54xx processor? Explain with a block diagram 5

    b) Assume that the current contents of AR3 to be 400 h, what will be its contents after each of the following TMS 320 C 54 xx addressing mode is used? Assume that the contents of AR0 are 40 h.1) * AR3+0; 2)*AR3+; 3) * AR3+OB 5

..2

15. (a) Obtain the FIR linear phase and cascade realization of the system function 6

$$H(z) = \left(1+\frac{1}{2}\ z^{-1}\ +\ z^{-2}\right)\left(1+\frac{1}{4}z^{-1}+Z^{-2}\right)$$

b) Compare Direct and indirect methods of filter realization 4

16. a) Obtain H (Z) of H (s) when T=1 sec. and H (s) = S3 / {(s+1) (s^2 + s+1)} 4

b) With a neat block diagram explain the functions of address generation unit of DSP architecture. 6

17. Write short notes on 5

a) JPEG Algorithm 5

b) Encoding and Decoding using TMS320C54xx processor

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Code No. 141 / S

FACULTY OF INFORMATICS

B.E. 3/4 (IT) I-Semester (Supplementary) Examination, May / June 2018

Subject : Design & Analysis of Algorithms

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	List the methods used to find amortized complexity.	3
2	What are the properties of an algorithm?	2
3	When do you apply divide and conquer technique? Give a scenario.	3
4	Give the time complexity of merge sort and quick sort for best and worst cases.	2
5	What is an optimal binary search tree? Give an example.	2
6	Write the recurrence relation to solve traveling salesman problem. Using dynamic programming.	3
7	Define Hamiltonian cycle. Give example.	2
8	How 0/1 knapsack problem solution method differs in branch and bound from dynamic programming method.	3
9	Differentiate NP-hard and NP-complete problems.	3
10	Explain the hard code generation problem in short.	2

PART – B (50 Marks)

11	a)	How UNION and FIND operations are solved using set representations?	5
	b)	What is min heap and max heap? Describe the procedure for building heap and sorting elements.	5
12		What is single source shortest path problem? Explain the method using an example along with the algorithm applied.	10
13	a)	How reliability design problem solved? Illustrate the method in detail.	5
	b)	Find the solution for the following 0/1 Knapsack problem n = 3, m = 6 $(P_1\ P_2\ P_3) = (15, 18, 20)$, $(W_1\ W_2\ W_3) = (2, 5, 4)$.	5
14	a)	Write a back tracking program for solving the knapsack optimization problem.	6
	b)	Describe about LC branch and bound concept.	4
15	a)	Explain the classes of NP-hard and NP-complete.	5
	b)	Explain the satisfiability problem.	5
16	a)	Explain Binary search algorithm and find the time complexity in best average and worst cases by using binary decision tree.	6
	b)	Write the algorithm to find minimum spanning tree using Kruskal's algorithm. Find its time complexity.	4
17		Answer any two of the following :	
	a)	Describe all pairs shortest path problem and write procedure to compute lengths of shortest paths.	5
	b)	4 queens problem	5
	c)	Non deterministic algorithm for sorting	5

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