FACULTY OF ENGINEERING

B.E. 3/4 (Civil) I - Semester (Main) Examination, December 2015

Subject : Theory of Structures – I

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 What is the difference between absolute stiffness and relative stiffness?   (3)
2 Write two basic assumption is Slope-Deflection method.   (3)
3 What are the limitations of Moment Distribution method?   (3)
4 List three differences between Moment Distribution method and Kani's method.   (3)
5 Explain unsymmetrical bending.   (3)
6 Write the formulae for determining degree of static indeterminacy in case of pin pointed
   frame and rigid jointed frame.   (2)
7 Draw simply supported beam and indicate kinematic indeterminacies.   (2)
8 What is shear centre?   (2)
9 Write Castigliano's theorem – II.   (2)
10 What is Lack of fit?   (2)

PART – B (50 Marks)

11 A continuous beam ABC fixed at the end A and simply supported at C is subjected to
   the load system shown in figure 1. Determine the support moments and draw BMD and
   SFD, if the support B sinks by 10 mm. The EI values of two spans of the beam are
   given in figure 1. Analyse by Slope-Deflection method. EI=500 kN-m^2.
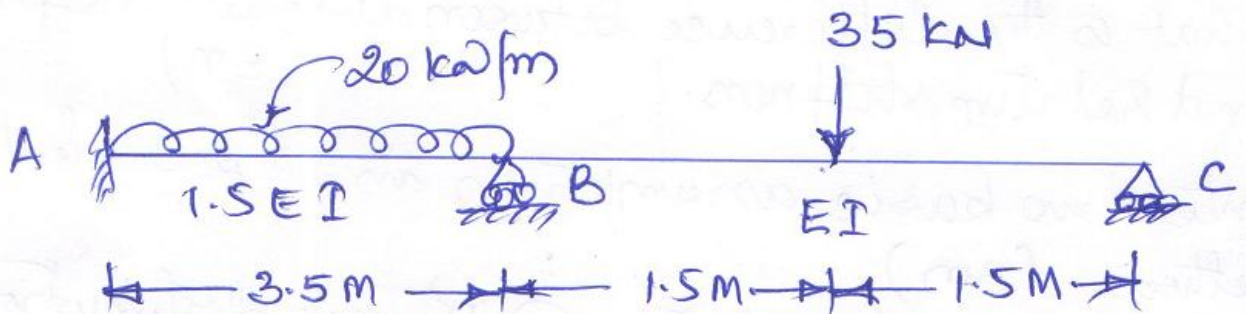

Figure 1

12 Analyse the portal frame shown in figure 2 by Moment Distribution method. Draw BMD
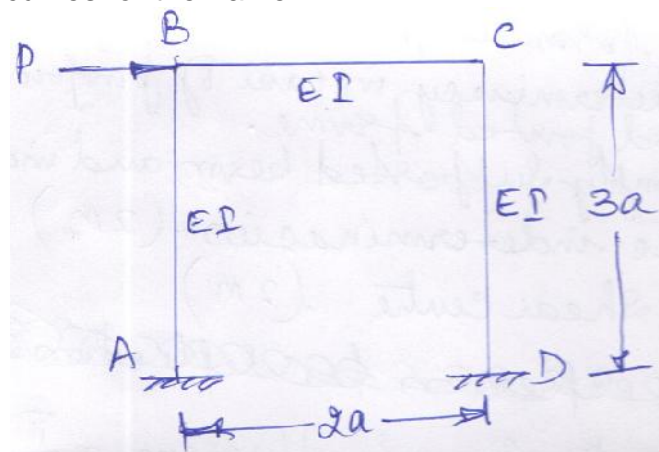   and sketch elastic curves for the frame.

Figure 2

..2

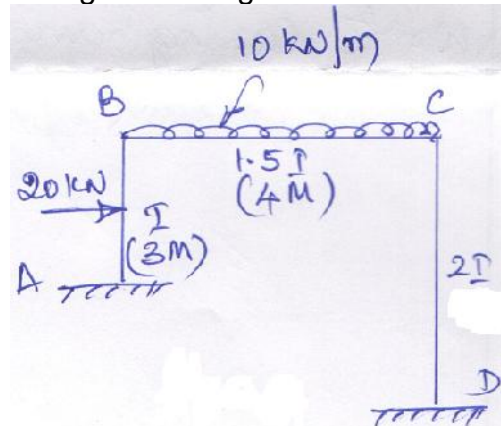13 Analyse the frame shown in figure 3 using Kani's method. Draw BMD.

Figure 3

14 Derive the expressions for MI about Neutral Axis and Bending Stresses in case of a member subjected to unsymmetrical bending.

15 (a) Define Castigliano's theorem I &II.
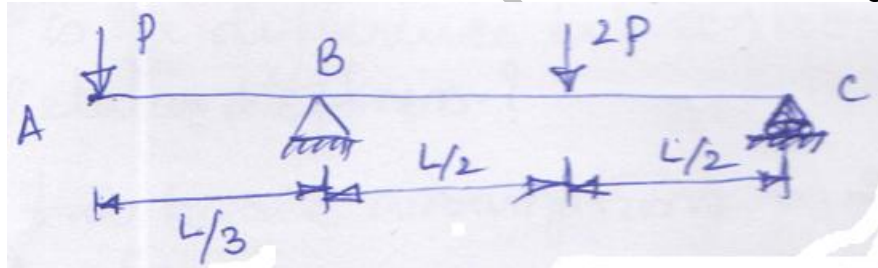   (b) Determine deflection at free and A of the beam loaded as shown in figure 4.

Figure 4

16 A braced cantilever is loaded as shown in figure 5 All the members are of the same cross-sectional area and Young Modulus. Find the axial force in the member BC.
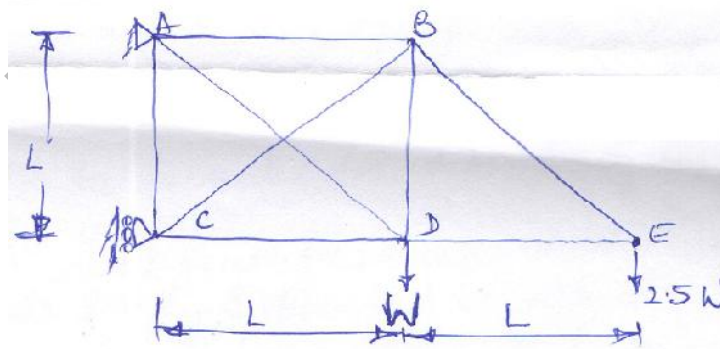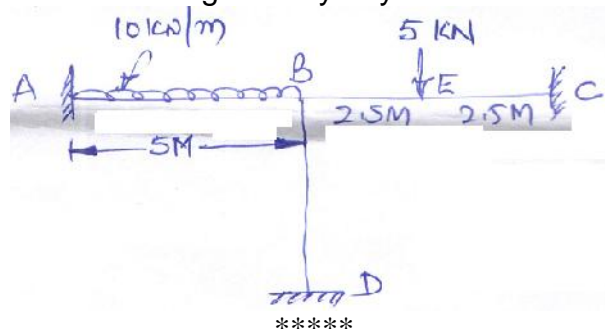

Figure 5

17 Analyse the rigid frame shown in figure 6 by any method. Draw BMD and SFD.

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FACULTY OF ENGINEERING

B.E. 3/4 (EEE / Inst.) I – Semester (Main) Examination, December 2015

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	Explain different types of power diodes.	3
2	What are punch through and non punch through IGBT's?	2
3	Define commutation and give complete picture of all commutation techniques.	3
4	Name the applications of GTO.	2
5	Find out the average d.c output voltage for a 230 V rms supply and firing angle of 30^oC.	3
6	Give the complete classification of $1w$ controlled rectifiers.	2
7	Define chopper.	2
8	Derive the average output voltage of a step down chopper.	3
9	What is sinusoidal pulse width modulation?	3
10	What is the advantage of multilevel inverter over normal inverter?	2

PART – B (50 Marks)

11	a)	Explain the operation of IGBT along with its VI and transfer characteristics.	5
	b)	What is load line of a BJT, and its significance?	5
12	a)	Explain static IV characteristics of GTO.	5
	b)	Explain resistance firing circuit for SCR.	5
13	a)	Derive average load voltage and average load current of 1ϕ half wave rectifier with RL load and freewheeling diode.	5
	b)	Why commutation overlap occurs in phase controlled converters. Explain its effects.	5
14	a)	Describe the various types of chopper configuration with appropriate diagrams.	5
	b)	A 1ϕ full wave a.c. voltage controller feeds a load of R=20Ω with an input voltage of 230 V, 50 Hz. Firing angle for both the thyristors is 30°. Calculate (i) rms value of output voltage (ii) input P.F. and (iii) load power.	5
15	a)	1ϕ full bridge inverter is operated from a 50V DC supply, to feed 10Ω resistive load. Determine (i) Fundamental O/P voltage (ii) output r.m.s. power and (iii) O/P rms voltage.	5
	b)	Briefly explain all pulse width modulation techniques.	5
16		Explain the dual converter operation with its equivalent circuit.	10
17	a)	What are the two different operating modes of MOSFET?	5
	b)	Explain the operation of SCR with two transistor analogy and derive anode current.	5

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FACULTY OF ENGINEERING

B.E. 3/4 (ECE) I - Semester (Main) Examination, December 2015

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. Missing data, if any may be suitably assumed.

PART – A (25 Marks)

1 What is the purpose of instruction queue in 8086? (2)
2 Draw the Read cycle timing diagram for 8086 minimum mode operation. (3)
3 Explain the function of the following instructions in 8086
   (a) XLAT   (b) LDS   (c) DAA (3)
4 List out the techniques used for passing parameters to procedures. (2)
5 What is meant by Handshaking mode in 8255 PPI? (2)
6 Draw the functional block diagram of 8254 programmable interval timer. (2)
7 Describe the functions of the following pins of 8051:
   (a) $\overline{EA}$ (b) RST   (c) $\overline{PSEN}$ (3)
8 How do you program 8051 timer in mode 1 to generate a delay of 5 msec on P2.1. (3)
9 Give the function of each bit in SCON register. (2)
10 Interface a Stepper motor to 8051 and write a programme to rotate it four times in the anti-clockwise direction. (3)

PART – B (50 Marks)

11 (a) Explain the concept of segmented memory? What are its advantages? (5)
   (b) Draw and discuss interrupt structure of 8086 in detail. (5)

12 (a) Draw and discuss a typical maximum mode 8086 system. What is the role of a bus controller in maximum mode operation. (5)
   (b) Write an ALP for 8086 to produce a packed BCD from two ASCII digits. (5)

13 (a) Interface the following memory ICs with 8086. (6)
       (i) Two 4KB EPROMs ending at FFFFFH
       (ii) Two 4 KB SRAMs starting from 00000H
   (b) Discuss the function of DMA controller in a typical microcontroller system with a neat sketch. (4)

14 Explain the Architecture of 8051 microcontroller with a neat block diagram. (10)

15 (a) Write an ALP for 8051 to store a constant onto (30H – 34H) of RAM using stack operations. (4)
   (b) Mention the interrupts of 8051. How are they are enabled and disabled? Show the IVT of 8051. (6)

16 (a) What do you mean by 'framing' in asynchronous serial data communication? Illustrate with an example. (6)
   (b) Write a program using interrupts that continuously get 8 bit data from P0 and sends it to P1 while simultaneously creating a square wave of 200 μs period on P2.1. (4)

17 Write short notes on any **two** of the following: (10)
   (a) 8086 program development tools
   (b) LCD interfacing with 8051
   (c) Addressing modes of 8051

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FACULTY OF ENGINEERING

B.E. 3/4 (M/P/AE) I-Semester (Main) Examination, December 2015

Subject : Design of Machine Elements

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 List four important mechanical properties of materials used in design and define them.   (3)
2 Define the term 'Factor of Safety ' and specify why it is required in design.   (3)
3 How do you estimate endurance limit for actual components (which is not a standard specimen)?   (3)
4 Define finite and infinite life with reference to engineering materials subjected to cyclic loads.   (3)
5 Differentiate between rigid coupling and a flexible coupling.   (3)
6 What factors are to be considered for design of shafts using ASME code? What are the values of those factors for different types of load?   (2)
7 What are bolts of uniform strength?   (2)
8 Where do you use cotter joints?   (2)
9 How do you calculate efficiency of a riveted joint?   (2)
10 What are the steps in design of a welded joint subjected to eccentric load?   (2)

PART – B (50 Marks)

11 A machine member of 50mm and 250 mm long is supported at one end as a cantilever. The arrangement of load on the member is shown in figure 1. Determine the tensile, compressive and shear stresses at a point A.   (10)
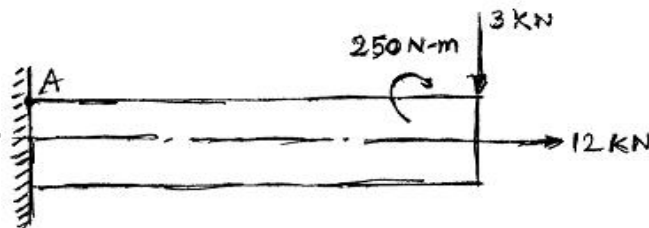

Figure 1

12 The load on a bolt consists of an axial pull of 10 KN together with a transverse shear force of 5 KN. Find the diameter of the bolt required according to   (10)
   (a) Maximum principal stress theory
   (b) Maximum shear stress theory
   (c) Distortion energy theory
   Given, yield stress S_{yt} = 100 MPa, μ= 0.3 from bolt matl.

13 A steel rod is subjected to a reversed axial load of 280 KN. Find the diameter of the rod for a Factor of Safety = 2. Neglect column σ_{ut} = 1070 MPa, σ_{yt}= 910 MPa.
   In reversed bending, σ_e =(0.5) σ_{ut}
   Other factor : K_a = 0.7, K_{sur} = 0.8, K_{sz} = 0.85, K_f =1.0   (10)

14 Design a sleeve and cotter joint to resist a tensile load of 60 KN. All parts of the joint are made of the same material with the following allowable stresses.
σ_t=60 MPa, τ=70 MPa and σ_c=125 MPa   (10)

15 Design a bushed pin type flexible coupling to connect two shafts of diameter 50mm. Power transmitted is 20 kW at 1000 rpm. Allowable bearing pressure on rubber bushes is 0.35 MPa. Thw working stress in teh materail of the pins is 20 MPa.

16 Design a Zig-Zag double riveted lap joint to fasten two plates, each of thickness 9mm. Take the allowable stresses as 80 MPa, 50 MPa and 140 MPa in tension, shear and crushing respectively.   (10)

17. Write short notes the following: (10)
    (a) S-N diagram for ferrous materials
    (b) Cumulative fatigue
    (c) Differential and compound screws

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FACULTY OF ENGINEERING

B.E. 3/4 (CSE) I - Semester (Main) Examination, December 2015

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 the term 'Automata' with an example.	3
2 What are regular expressions?	2
3 Compare right-linear grammar with left-linear grammar.	3
4 What do you mean by inherently ambiguous language?	2
5 State the general form of transition function for NPDA.	2
6 State the pumping lemma for CFG.	3
7 What are the reasons for a TM not accepting its input?	3
8 What are the types of Turing machines?	2
9 What do you mean by Post's correspondence problem?	3
10 What do you mean by Recursively enumerable languages?	2

PART – B (50 Marks)

11 a) Determine the DFA that accepts the language L(ab(a+ab*(a+aa)).   5

b) Construct a finite-state machine that delays an input string two bits, given 00 as the first two bits of output.   5

12 a) Given grammar G with productions S→aB|bA,A→a|aS|bAA,B→b|bs|aBB. For the string aaabbabbba, find a rightmost derivation, leftmost derivation and parse tree.   5

b) Obtain a CFG for generating all integers.   5

13 a) Construct a PDA equivalent to the CFG.   5

S→0BB, B→0S, B→1S, B→0

b) Using pumping lemma prove that the language L = {ww|w∈{0,1}∗ is not a CFL   5

14 a) Design a TM that recognizes the set of all bit strings that contain an even number of 1s.   5

b) Construct a Turing machine which computer the function f(n) = n mod.   5

15 a) Find a regular expression for the language of the set of all strings of 0's and 1's whose number of 0's is divisible by 5 and whose number of 1's is even.   5

b) Compute ∈–NFA for the following, regular expression : 1(1+10)* + 10(0+01)*.   5

16 a) Show that the CFG with following production is Unambiguous.   5

S   S(S)|∈

b) Is the following grammar ambiguous. Justify   5

S   AB, A   aA|∈, B   ab|bB|∈.

17 a) Explain undecidability with an example.   5

b) Explain the classes of P, NP and explain the terms NP-completed and NP-hard.   5

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FACULTY OF INFORMATICS

B.E. 3/4 (IT) I – Semester (Main) Examination, December 2015

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   What is the condition for an LTI system to be casual?   2
2   What are the advantages of DSP?   2
3   Give the differences and similarities between DIT-FFT and DIF-FFT algorithms.   3
4   Define limit cycle oscillations.   3
5   Explain warping effect.   2
6   Distinguish between voiced and unvoiced sounds.   2
7   What are the DSP Computational Building Blocks? Explain.   3
8   What are the different types of structures available for IIR filters?   3
9   What is the condition for FIR filters to have both constant phase delay and group delay. 2
10 Discuss ideal filter characteristics.   3

PART – B (50 Marks)

11 a) Determine whether the following systems are linear or non-linear.   5

   i) $y(n) = x(n) + \dfrac{1}{x(n-1)}$

   ii) $y(n) = x^2(n)$

   b) Consider $n_1(n) = \{1, 2, 3, 1\}$ $n_2(n) = \{4, 3, 2, 2\}$ 5
   Find $x_3(n)$ such that $X_3(k) = X_1(k).X_2(k)$

12 Design a chebyshev analog low pass filter for the specifications as attenuation in pass band is 3dB, attenuation in stop band 16 dB and frequency in pass band and stop band is 1 KHz, 2KHz respectively.   10

13 Design an ideal high pass filter with a frequency response
       $Hd(e^{jw}) = 1$ for $f/4 \le |w| \le f$
                   $= 0$ for $|w| < f/4$
   Find h(n) for N=11 using Hamming window.   10

14 Explain about bus architecture and memory for programmable DSP devices.   10

15 a) Find H(z) using impulse invariant method for the analog transfer function

   $H(s) = \dfrac{(s+1)}{(s+2)(s+4)}$ T = 1 sec.   5

   b) Briefly explain DSP based biotelemetry receiver (TM).   5

16 Draw the flow graph of 16 point DIT-FFT. Explain procedure in detail.   10

17 Write short notes on: 10
   a) Relationship of DFT with other transforms.
   b) Filtering of long duration sequences.
   c) Frequency transformation in digital domain.

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