AR13 SET-1

Code: 13CE2008

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.TECH II SEM END EXAMINATIONS, JULY, 2015

STRUCTURAL ANALYSIS-I

(Civil Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

Answer all questions **[1 X 10 = 10M]**

1. a) Differentiate perfect frame and redundant frame.
   b) Explain normal thrust and radial shear of an arch.
   c) What is prop reaction for a cantilever beam subjected to uniformly distributed load throughout its span and a prop is placed at its free end?
   d) What is the degree of static indeterminacy of a fixed beam?
   e) Write the fixed end moments for a fixed beam subjected to point load at its center and also draw its bending moment diagram.
   f) Write the Clapeyron's theorem of three moment's equation.
   g) Draw the influence line diagram for shear force at a section E for the overhanging beam as shown in fig. 1

Fig. -1

   h) Calculate the maximum ordinate of the influence line diagram for bending moment at quarter point of a simply supported beam of 8 m span.
   i) Write the condition for a simply supported beam subjected to action of a set of moving loads, the bending moment at a given section is maximum.
   j) Differentiate beam action and arch action.

PART-B

Answer one question from each unit. **[5 X 12 = 60M]**

UNIT-I

2. Determine the forces developed in the members of truss shown in fig.2. Cross sectional area and young's modulus are same for all the members

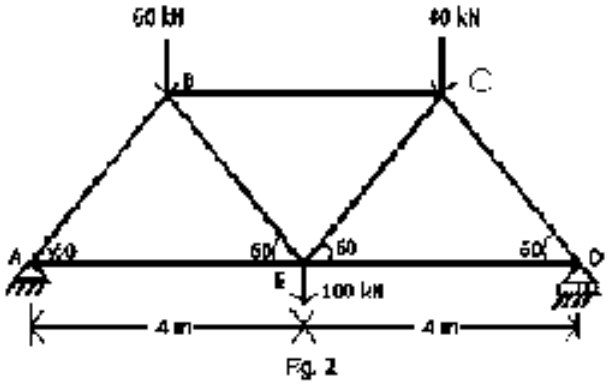

Fig. 2

Code: 13CE2008

(OR)

3. Analysis the truss shown in fig. 3. Find the forces in all the members.

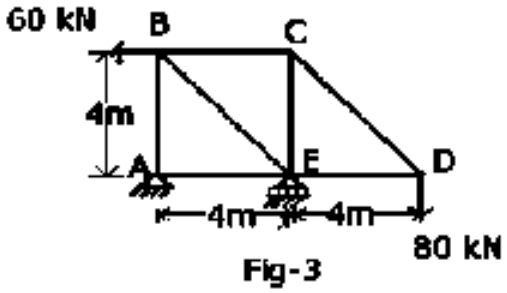

Fig-3

UNIT-II

4. A three hinged parabolic arch has a span of 150 m and rise of 20 m. It carries four vertical loads of 150 kN each equally spaced along the span. Determine horizontal thrust, normal thrust & radial shear and bending moment at the quarter span.

(OR)

5. A three hinged parabolic arch having supports at different levels shown in fig. 4 carries a uniformly distributed load of intensity 30 kN /m over the portion left of the crown. Determine the horizontal thrust developed. Find also the bending moment, normal thrust and radial shear developed at a section 15 m from the left support.

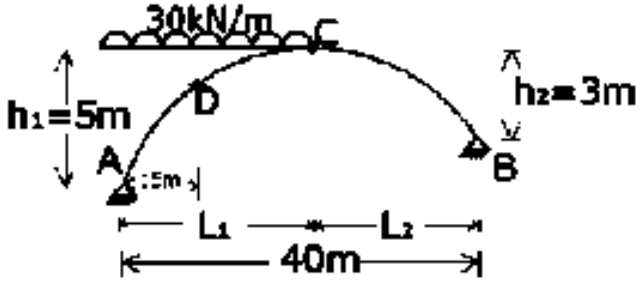

Fig-4

UNIT-III

6. Draw the bending moment diagram for the propped cantilever beam shown in fig. 5

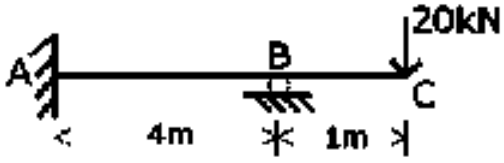

Fig-5

(OR)

7. Find the fixing moments at supports and draw the Shear force and bending moment diagram for the fixed beam shown in fig. 6. Take E = 200 kN/ mm^2 and I = 2.75 x 10^7 mm^4

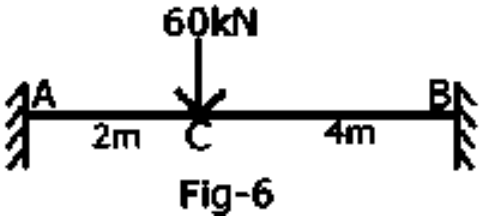

Fig-6

Code: 13CE2008

UNIT-IV

8. A continuous beam ABCD simply supported at A, B, C and D is loaded as shown in fig. 7. Find the support moments and draw shear force and bending moment diagram.

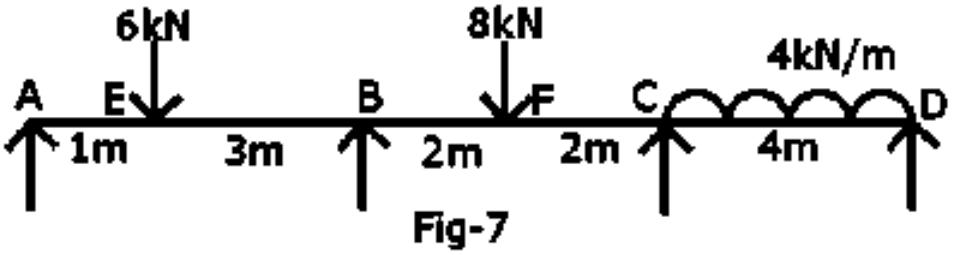

Fig-7

(OR)

9. Analysis the continuous beam shown in fig. 8. Using Clapeyron's theorem of three moments method. Draw shear force and bending moment diagrams.

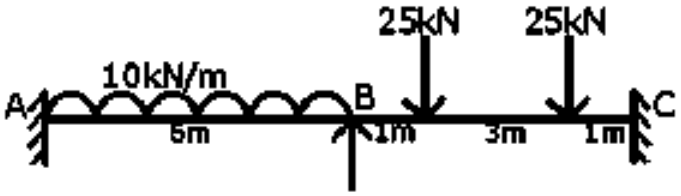

Fig-8

UNIT-V

10. The load system shown in fig. 9 crosses a plate girder bridge of span 3 m from left to right. Determine the maximum bending moment and shear force at section 6 m from left support. Also find the absolute maximum bending moment.

Fig-9

(OR)

11. Uniformly distributed load of 20 Kn/m run may occupy any position of the girder shown in fig. 10. Find the maximum positive and negative shear force in the beam and maximum bending moment at C.

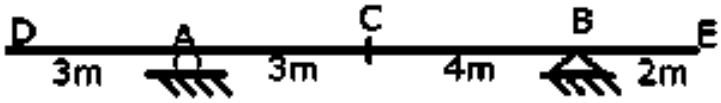

Fig-10

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AR13 SET-1

Code: 13EE2012

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.TECH II SEM END EXAMINATIONS, JULY, 2015

POWER SYSTEMS-I

(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

Answer all questions **[1 X 10 = 10 M]**

1. a) What are the properties of good quality coal?
   b) What is Thermal Efficiency?
   c) Write the Fissile materials used as a fuel in Nuclear Power Plants.
   d) Define the Utilization Factor
   e) What is the effect of the load factor on the cost of generation?
   f) Define spinning reserve?
   g) Why control rods are used in the Nuclear reactor?
   h) Why the radial distribution system is not generally used?
   i) What is meant by Tariff?
   j) How does the insulation resistance of a cable vary with the its length

PART-B

Answer one question from each unit **[5 X 12 =60M]**

UNIT-I

2. a) What are the factors affecting the selection of site for a thermal power stations [6M]
   b) Explain about the electrostatic precipitator [6M]

(OR)

3. a) Explain briefly about the Economizers and Condensers [6M]
   b) Explain hydro electric power station with neat sketch. [6M]

UNIT-II

4. Explain with the help of a neat diagram the working of a Pressurized Water Reactor used in a nuclear power plant [12M]

(OR)

5. a) Explain the Principle operation of Gas Power Generation with block diagram [8M]
   b) Explain about solar energy collector [4M]

UNIT-III

6. A distributor AB is fed from both the ends, as shown in Fig. 1. the loop resistance of the distributor is 0.5 Ohm/km. Calculate the minimum voltage and its location and currents in various sections if
   (a) Voltage at A and B are equal to 230V [6M]
   (b)Voltage at point A is 230V and at B it is 234V. [6M]

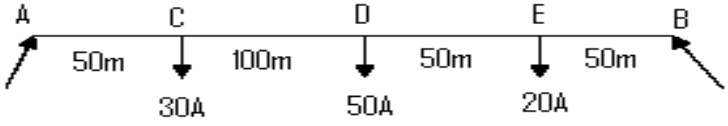

Fig. 1

Code: 13EE2012

(OR)

7. a) Write the advantage and disadvantages of Indoor and outdoor substations [6M]
   b) Draw the line diagram of 33/11kV substation [6M]

UNIT-IV

8. a) Explain the following tariff methods
   (i) Two part Tariff (ii) Three Part Tariff (iii)Power Factor Tariff [8M]
   b) Write the desirable characteristics of a Tariff [4M]

(OR)

9. Maximum demand of a generating station is 100MW; a load factor is 65%. The plant capacity factor and plant use factor are 50% and 80% respectively. Determine
   (i) The daily energy produced
   (ii) Installed capacity of plant
   (iii) The reserve capacity of plant
   (iv) The maximum energy that could be produced daily if the plant is running all the time
   (v) The maximum energy that could be produced daily if the plant is running at full load(according to the operating schedule) and
   (vi) Utilization factor [12M]

UNIT-V

10. A 2km long 3-core, three phase cable has capacitance 0.5μF/km between two conductors bunched with sheath and the third conductor. The capacitance between the conductors is also measured when bunched together and the sheath and found to the 0.75μF/km. Determine
    (i) Capacitance between phases
    (ii) Capacitance between conductor and sheath
    (iii) Effective per phase capacitance
    (iv) Capacitance between two conductors connecting a third conductor to the sheath
    (v) Charging current if the supply voltage is 11kV, 50Hz [12M]

(OR)

11. a) Write the advantages Gas Insulated Substations [4M]
    b) What is the use of intersheath? Explain the principle of Intersheath Grading of the Cable [8M]

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AR13 SET-1

Code: 13ME2011

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.TECH II SEM END EXAMINATIONS, JULY, 2015

THERMAL ENGINEERING - I

(Mechanical Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

Answer all questions **[1 X 10 = 10 M]**

1. a. What is meant by time loss factor in actual cycle analysis?
   b. List out the basic components of a simple Carburetor.
   c. What are the different types of fuel supply systems in CI engines?
   d. Name the factors affecting the flame speed in SI engines.
   e. What is meant by Cetane number rating?
   f. What is detonation and give the main reason for it in SI engines.
   g. List out the calculations made in the heat balance sheet.
   h. Mention the advantages of Multi stage compression in reciprocating Compressors.
   i. What is slip factor and pre-whirl applied to rotary compressors?
   j. Define degree of reaction?

PART-B

Answer one question from each unit **[5 X12=60M]**

UNIT-I

2. (a). Make a comparison between air standard and actual cycles. [6M]
   (b). Draw actual valve timing diagram for 4 stroke engines and briefly explain how the timings of inlet and exhaust valve affects volumetric efficiency. [6M]

(OR)

3. (a). Briefly explain the working of 2- stroke petrol engine with a neat sketch. [6M]
   (b). Make a comparison between Petrol and Diesel engines. [6M]

UNIT-II

4. (a). Briefly explain about (i) Pre-ignition and (ii) Detonation as applied to SI engines. [8M]
   (b). Write a short note on Octane number rating of SI engine fuels [4M]

(OR)

5. (a). Briefly discuss the variables affecting flame speed in SI engines [4M]
   (b). Explain the working of any two types of combustion chambers used in SI engines. [8M]

UNIT–III

6. (a). Briefly explain the normal combustion in CI engines. [6M]
   (b). What are the desirable qualities of CI engine fuels and what are the dopes added to the fuels to reduce detonation in CI engines? [6M]

Code: 13ME2011

(OR)

7. (a). What is Ignition delay period in CI engines and explain how it is responsible for detonation in CI engines. [6M]
   (b). Discuss the desirable characteristics of combustion chambers in CI engines and discuss the working of any one type of combustion chamber used in CI engines. [6M]

UNIT–IV

8. The following observations were made during a trial of a single cylinder, four stroke cycle gas engine having cylinder diameter of 18 cm and stroke 24 cm. Duration of trial = 30 min; Total number of revolutions = 9000; Total number of explosions = 4450; Mean effective pressure = 5 bar; Net load on the brake wheel = 40 kgf; Effective diameter of brake wheel =1m ; Total gas used at NTP = 2.4 m^3; Calorific value of gas at NTP = 19 MJ/m^3; Total air used = 36 m^3; Pressure of air = 720 mm Hg; Temperature of air = 17^0C; Density of air at NTP = 1.29 kg/m^3; Temperature of exhaust gas = 350^0C; Room temperature = 17^0C. Specific heat of exhaust gas = 1 kJ/kgK ; Cooling water circulated = 80 kg; Rise in temperature of cooling water = 30^0C. Draw of a heat balance sheet and estimate the mechanical and indicated thermal efficiencies of the engine. Take R = 287 J/kgK. [12M]

(OR)

9. A ten cylinder 4 stroke IC Engine is tested at 4000 rpm with dynamometer of arm 58 cm. The engine has a 10cm bore and 7cm stroke with a compression ratio equal to 8. The dynamometer scale reading was 46 kgf during 10 minutes test and the engine consumed 4.8 kg of fuel with calorific value of 46000 kJ/kg. Air at 27^0C and pressure 1.01325×10^5 N/m^2 was supplied to the carburetor at the rate of 7.77 kg/min. Find (a) Brake Power (b) BMEP (c) BSFC(d) BTE (e) Air Fuel ratio (f)Volumetric efficiency(g) Air standard efficiency [12M]

UNIT–V

10. (a). Show that the indicated work required to compress the air is unaltered by the clearance volume [6M]
    (b). A single cylinder reciprocating air compressor running at 150 rpm delivers to a receiver 5 m^3 of free air per minute, compressed to a pressure of 6 bar. The suction is at 1 bar and 300 K. Compression and expansion curves follow the law $PV^{1.3}$= C. Clearance is 5 % of the active stroke. Estimate (a) Temperature of air admitted to receiver (b) volumetric efficiency (c) volume of air taken per stroke (d) Dimensions of the cylinder if stroke equals 1.25 times diameter. (e) Power required for compressor. [6M]

(OR)

11. (a). Explain the working of Centrifugal compressor with a neat sketch [6M]
    (b). Show that for a 50 % degree of reaction compressor the blades are symmetrical. [6M]

AR13 SET-1

Code: 13EE2013

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.TECH II SEM END EXAMINATIONS, JULY, 2015

LINEAR CONTROL SYSTEMS

(Electronics and Communication Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A

Answer all questions **[1 X 10 = 10 M]**

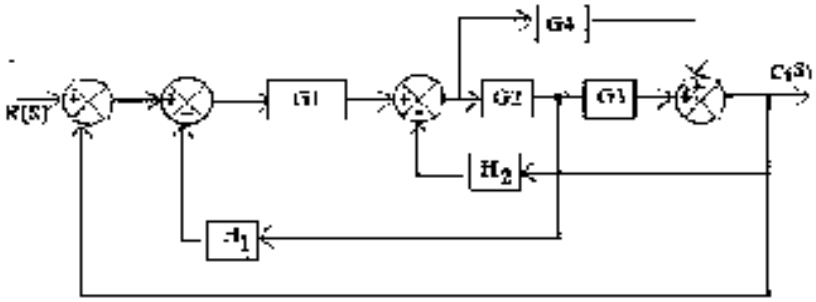
1 (a) Write two advantages of a closed loop system
(b) Give one practical example of open loop and closed loop systems
(c) Give one illustration when the summation point is moved after the block in block diagram
(d) What are dominant pair of poles?
(e) What is the difference between order of the system and type of the system?
(f) What do you understand by correlation between time domain specification and frequency domain specifications of second order system
(g) How do you find bandwidth from Bode Plot?
(h) What is the importance of critical point (-1+jo) in Nyquist plot?
(i) When do you use lead compensator?
(j) Define controllability of the system?

PART- B

Answer one question for each Unit **[5 X 12=60M]**

UNIT-I

2. Using block diagram reduction techniques, find the closed loop transfer function of the system whose block diagram is given below**.** [12 M]



(OR)

3. Draw signal flow graph for the above block diagram and find its closed loop transfer function using Mason's gain Formula. [12M]

UNIT-II

4. Explain the construction and principle of operation of synchropair Also explain how this pair is acting as error detector. [12M]

(OR)

5. Find the steady state error for unit step, Unit ramp and unit acceleration input for a unity feed back system whose G(s)= $\frac{1}{s(1+0.5s)(1+0.2s)}$
Also determine the damping ratio [12M]

AR13 SET-1

Code: 13EE2013

UNIT III

6. (a) The open loop transfer function of a unity feedback control system is given by G (s) = $\frac{k}{(s+2)(s+4)(s^2+6s+25)}$ By applying the Routh's criterion of stability discuss the stability of the closed loop system as a function of K Determine the values of K which will cause sustained oscillation of frequency? [8M]

(b) Write the necessary and sufficient condition for stability for Routh's criterion and concept of Stability. [4M]

(OR)

7. The characteristic equation of a feedback control system is $S^4 + 3S^3 + 12S^2 + (K-16)S + K = 0$ Sketch the root locus plot for $0 \leq K \leq \infty$ and show that the system is conditionally stable. Determine the range of gain K for which the system is stable. [12M]

UNIT-IV

8. (a) Draw Bode plots for the transfer function K=10, G(S) = $\frac{K}{S(1+0.5S)(1+0.1S)}$ [6M]

(b) Determine the value of K if phase margin is 40^0 [3M]

(c) Determine the value of K if gain margins 20db [3M]

(OR)

9. Sketch the Nyquist plot for the system whose open loop transfer function is G(S) H(S)= $\frac{1}{S(1+2S)(1+S)}$ and find stability using Nyquist criterion . [12M]

UNIT- V

10. A unity feedback system is characterised by the open loop transfer function G(S)= $\frac{4}{S(1+2S)}$ it is desired to obtain a phase margin of 40^0 with out sacrificing the k_v of the system. Design a suitable lag compensator. Use Bode plots. [12M]

(OR)

11(a) Obtain transition matrix for the system whose state space model is given by $\begin{bmatrix} \frac{dx_1}{dt} \\ \frac{dx_2}{dt} \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} U$ [6M]

(b) Construct the state model for a system characterized by the deferential equation Y + 5Y + 4Y = U and also check whether the system is completely controllable or not [6M]

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AR13 SET-2

Code: 13CS2009

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.TECH II SEM END EXAMINATIONS, JULY, 2015

FORMAL LANGUAGES AND AUTOMATA THEORY

(Common to CSE & IT)

Time: 3 Hours **Max Marks: 70**

PART-A

Answers ALL Questions **[10 X 1 = 10M]**

1. a) How many substring exist for a string having a length n?
   b) What is the symbol used to represent initial state in transition diagram of finite automata
   c) Write the transaction form of DFA grammar.
   d) Write two closure properties of Context free language
   e) Define ambiguous grammar.
   f) Five operation under which regular language is closed.
   g) Define post correspondence problem.
   h) Define PDA.
   i) What is the minimum number of states a DTM can have?
   j) Describe the transition function of DFA.

PART-B

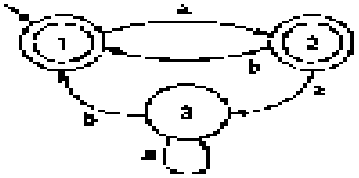
Answer one question from each unit **[5X12=60M]**

UNIT-I

2. a) Design Mealy machine for binary full adder. [5M]
   b) Draw a DFA for the language: [7M]
   L = {x ∈ {a, b, c}* : x contains at least one a and at least one b, but no c}
   Make your DFA use as few states as possible.

(OR)

3. a) Design FA for the regular expression: (ab)*aa*b*. [4M]
   b) Convert the following NFA into regular expression: [8M]



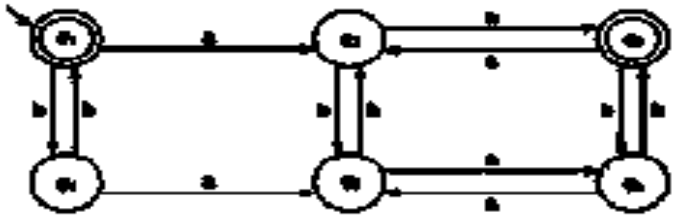
UNIT-II

4. Design *Finite state automata* and *regular expression* for the following language. [12M]
   L1={w: w does not contain the substring 110}
   L2={w: w contains an even number of 0's or exactly two 1's }

(OR)

Code: 13CS2009

5. a) Let M be the following DFA minimize it. [9M]



b) Define pumping lemma for regular set. [3M]

UNIT-III

6. a) Minimize the following CFG grammar [6M]
S → ASA | aB
A → B | S
B → b | Є

b) Define enumeration properties of CFL**.** [6M]

(OR)

7. a) Write the procedure for conversion of CFG into CNF [5M]

b) Convert the following grammar G into Greibach Normal Form (GNF). [7M]
S → XA|BB, B → b|SB, X → b, A → a

UNIT-IV

8. a) Write CFG for the given language [5M]
$\{a^n b^n\} U \{a^n b^{2n}\}$

b) Convert the following CFG to a PDA [7M]
S → aAA, A → aS|bS|a

(OR)

9. a) Explain with example: [5M]
i. Acceptance of PDA by empty stack
ii. Acceptance of PDA by final state

b) Design PDA for palindromes where ∑={a,b}. [7M]

UNIT-V

10. a) Define: [7M]
i. Recursive Enumerable languages
ii. P, NP complete and NP hard with example.

b) Find whether the post correspondence problem, P = {(11, 11), (100, 001) (111,11)} has a match. Give the solution [5M]

(OR)

11. Design a turing machine that accepts [12M]
L1 = $\{a^n |$ n is even n>=0$\}$
L2= $\{a^n b^n |$ n>=0$\}$