AR18

CODE: 18CET209   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Regular & Supplementary Examinations, September-2021
STRUCTURAL ANALYSIS-I

(Civil Engineering)

Time: 3 Hours   **Max Marks: 60**
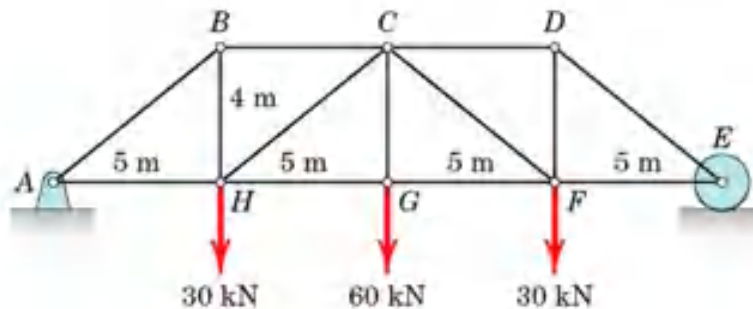
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. Determine the force in each member of the loaded truss by Method of Joints.   12 M

(OR)

2. a) Write the assumptions for finding the forces in members of the truss.   6 M

   b) Explain Static and Kinematic indeterminacy in beams.   6 M

UNIT-II

3. Find the prop reaction and draw the shear force and bending moment diagrams for   12 M
   propped cantilever beam AB. Fixed at A, prop at B. The point load 25kN is acting at
   1mts from the fixed support A. The length of the beam is 5mts.

(OR)

4. A fixed beam 8m span carries a point load of 40 kN acting at 4m of length starting from left end   12 M
   and a concentrated load of 80 kN at a distance of 7 m from the left end. Determine the Fixed end
   moments and Draw the SF and BM Diagrams.

UNIT-III

5. Analyze the continuous beam as shown in the below figure. Determine the support   12 M
   moments by using three moment equation. Take EI=Constant.
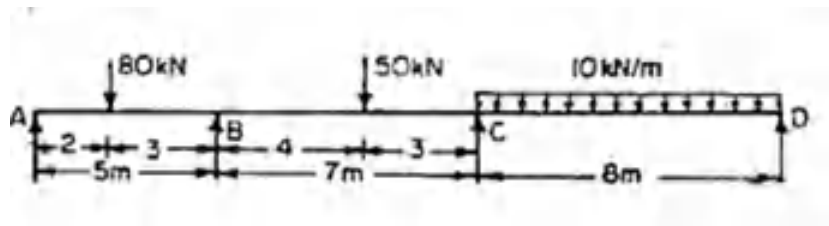

(OR)

6. Determine the support moments for the beam shown in below Fig by Clapeyron's theorem of three moments. Draw the shear force and bending moment diagrams. Assume EI is constant.　　12 M
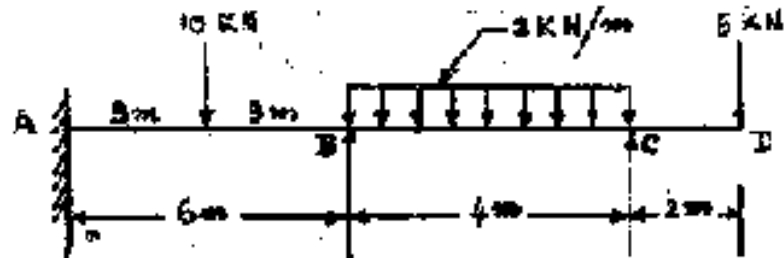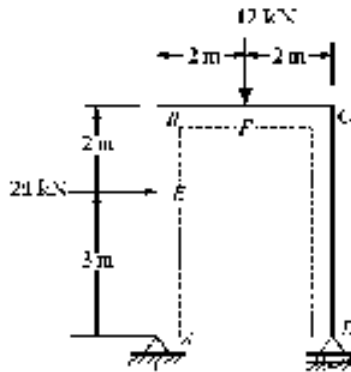
7. a) Explain the Castigliano's first and second theorems.　　6 M
   b) State and explain the Maxwell's theorem of reciprocal deflection　　6 M

(OR)

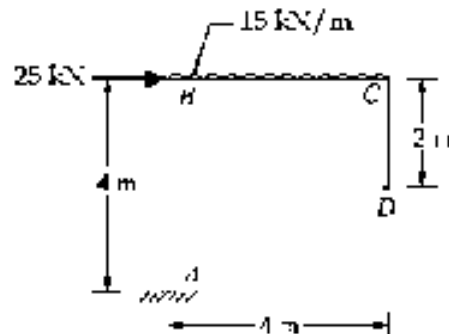8. Determine the deflection at point "C" of the beam shown in Figure below. Use Strain Energy Method.　　12 M
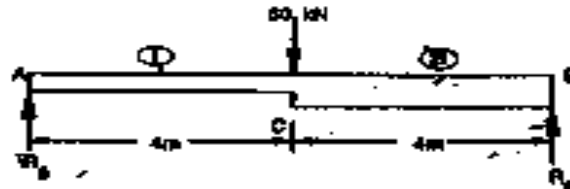
9. Determine the vertical and horizontal displacements and rotations at roller support in a frame. EI is constant throughout.　　12 M

(OR)

10. Determine the vertical and horizontal displacements at the free end D in the frame. Take EI = 12 x 10^{13}. Use Castigliano's theorem.　　12 M

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CODE: 18EET209   **SET-2**
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Regular & Supplementary Examinations, September-2021
CONTROL SYSTEMS
(Electrical and Electronics Engineering)
Time: 3 Hours   Max Marks: 60
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1   Obtain the transfer function for the signal flow graph given in figure below, using Mason's gain formula.   12M
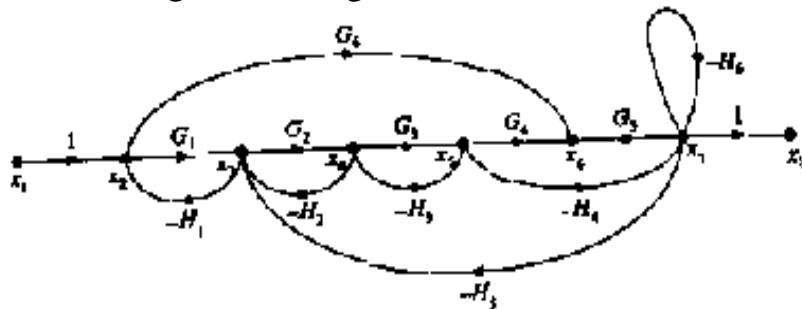
(OR)

2   Demonstrate the differential Equations governing the mechanical system shown in the fig. and determine the transfer function.   12M
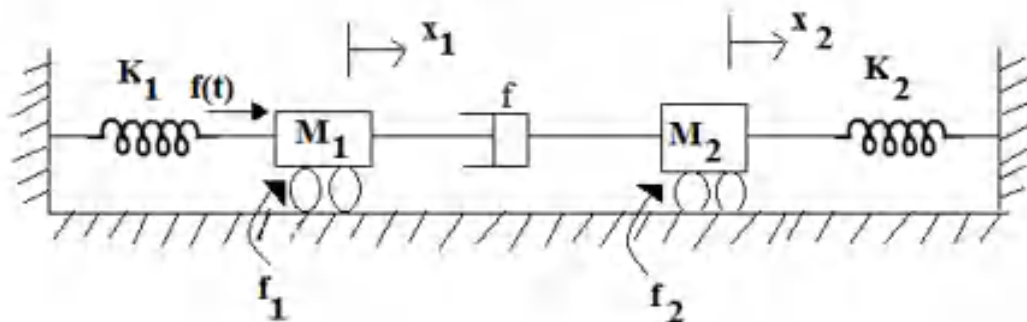
UNIT-II

3   Find the Kp, Kv, Ka and study state error for a system with open loop function as   12M
$G(s)H(s)=\dfrac{10(S+2)(S+3)}{S(S+1)(S+5)}$; Where input is $3+t+t^2$.

(OR)

4   Derive the expression for transfer function of field controlled DC servo motor?   12M

5. a) Calculate the angle of asymptotes and the centroid for the system having   6M

$$G(S)\,H(S)\;=\;\frac{K(S+3)}{S(S+2)(S+4)(S+5)}.$$

   b) The characteristic polynomial of a system is   6M
$s^7 + 9s^6 + 24s^5 + 24s^4 + 24s^3 + 23s^2 + 15s+6 = 0$.
Determine the location of roots on s-plane and hence the stability of the system.

(OR)

6. Draw the complete root locus for $G(S).H(S) = \dfrac{K}{S(S+2)(S+4)}$ 12M

7. Sketch the Bode plot and hence find Gain margin and Phase margin.   12M

$$G(S) = \frac{10(S+3)}{S(S+2)(S+10)}$$

(OR)

8. The open loop transfer function of a unity feedback control   12M
system is $G(S) = \dfrac{10}{S(S+1)(S+5)}$ Draw its polar plot and hence
determine its phase margin and gain margin.

9. a) Explain about different types of compensation techniques.   6M
   b) A system is represented by the state and output equations   6M
that follow. Find:
(i) The characteristic equation. (ii) The poles of the system

$$\dot{X} = \begin{bmatrix} 0 & 2 & 3 \\ 0 & 6 & 5 \\ 1 & 4 & 2 \end{bmatrix} X + \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} u \; ; \qquad Y = \begin{bmatrix} 1 & 2 & 0 \end{bmatrix} X$$

(OR)

10. a) A system is characterized by following state space   8M
equations. Find STM.

$$\dot{X} = \begin{bmatrix} -3 & 1 \\ -2 & 0 \end{bmatrix} X + \begin{bmatrix} 0 \\ 1 \end{bmatrix} U \qquad \text{and } Y = \begin{bmatrix} 1 & 0 \end{bmatrix} X$$

   b) List out the properties of STM.   4M

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Regular & Supplementary Examinations, September-2021
INSTRUMENTATION AND CONTROL
(Mechanical Engineering)

Time: 3 Hours   Max Marks: 60

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Define the following:
   i)Accuracy and Precision ii)Overshoot & Hysteresis   6M
   iii)Reproducibility & Repeatability

   b) Draw the block diagram of a generalized measurement system and   6M
   explain various elements
    along with an example.

(OR)

2. a) A Seismic Instrument has a natural frequency of 20Hz and
   damping ratio of 0.7; if the system is excited by a frequency of 15   6M
   Hz. determine the error due to the proximity of excited frequency
   with natural frequency of the Instrument.

   b) Explain displacement transducer using inductance principle   6M
   (LVDT) with a neat sketch.

UNIT-II

3. a) A Tensile strain of 0.002 has been applied to a strain gauge having
   gauge factor of 2.0 the gauge resistance and other three resistances
   comprising the limbs of a wheat stone bridge circuit have an initial   6M
   resistance of 110 Ω. determine

     i) change in the value of variable resistance R_2.

      ii) output voltage of bridge if supply voltage to bridge is 5V

   b) With suitable diagram, explain how optical torsion meter works.   6M

(OR)

4. a) With a neat sketch explain the working of strain gauge Load cell. 6M

   b) Explain briefly how a stroboscope is used to measure torque.   6M

UNIT-III

5. a) Explain with neat sketch the construction and working principle of lionization pressure gauge.   6M

   b) With a neat sketch explain the working of McLeod pressure Gauge   6M

(OR)

6. a) With a neat sketch explain the working of Thermocouple for temperature measurement.   6M

   b) What are RTDs? On what basic principle do they work? Explain with a neat sketch.   6M

UNIT-IV

7. a) With a neat sketch explain the working of sling psychrometer for Humidity measurement.   6M

   b) With the help of a neat sketch explain the principle of operation of Turbine flow meter.   6M

(OR)

8. a) With a neat sketch explain the working of Hotwire Anemometer for flow measurement.   6M

   b) With a neat sketch explain the working of absorption hygrometer.   6M

UNIT-V

9. a) Construct Routh array, determine stability and find the location of roots for the systems represented by the following characteristic equation.   6M

   $S^4+8S^3+18S^2+16S+5$.

   b) With a neat sketch explain the block diagram of open loop control system.   6M

(OR)

10. a) List out various requirements of a control system? Explain.   6M

    b) Construct the bode plot for a system having $G(s)H(s)=$ 6M

    $$\frac{100}{s(s+1)(s+2)}$$

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AR18

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Regular & Supplementary Examinations, September-2021

DESIGN & ANALYSIS OF ALGORITHMS
(Common to CSE AND IT)

Time: 3 Hours   Max Marks: 60

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.   Write the pseudo code conventions for expressing algorithms   12M

(OR)

2. a) What is Amortized analysis and explain with an example.   6M
    b) Explain Omega and Theta Notations.   6M

UNIT-II

3. a) Find optimal solution to the knapsack problem instance n=6,   8M
        m=15,   (p1…p6) = (10,5,15,7,6,18), (w1…w6) =
        (2,3,5,7,1,4)
    b) What are the four distinct areas of study of algorithm?   4M

(OR)

4. a) Apply greedy algorithm to generate single-source shortest path   7M
        with an example graph. Mention its time complexity.
    b) Explain the working of merge sort with an example.   5M

UNIT-III

5. a) Solve the following instance of the 0/1 knapsack problem   12M
        given the knapsack capacity in W = 11 using dynamic
        programming and explain it.
        (W1,...W5) = (1,2,5,6,7) and (V1 ..... V5) = (1,6,18,22,28)

(OR)

6. a) Compute lengths of shortest paths between all pairs of nodes   6M
        for the given graph.
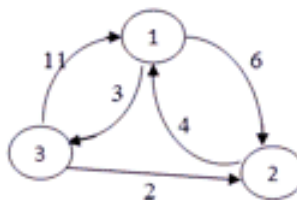
    b) Let the dimensions of A,B,C,D respectively be 10X5, 5X15,   6M
        15X8, 8X20 generate matrix product chains that produces
        minimum number of matrix multiplications using dynamic
        programming.

UNIT-IV

7. a) Draw the portion of state space tree generated by recursive backtracking algorithm for sum of subsets problem with an example. 6M

   b) Explain in detail about the search strategies in Branch and Bound algorithm. 6M

(OR)

8. a) Describe the algorithm for Hamiltonian cycles and Determine the order of magnitude of the worst-case computing time for the backtracking procedure that finds all Hamiltonian cycles. 8M

   b) What is graph coloring problem and list out its applications? 4M

UNIT-V

9. a) Give the formulation of knapsack problem using branch and bound and compute the optimal solution using LC Branch and Bound (LCBB) with $n=4$, $m=15$, $(p_1...p_4) = (15,15,17,23)$, $(w_1...w_4) = (3,5,6,9)$ 8M

   b) What is bounding function? Give example. 4M

(OR)

10. Apply Branch and Bound algorithm to solve the Travelling Salesman problem for the given table. 12M

	1	2	3	4
1	X	4	9	5
2	6	X	4	8
3	9	4	X	9
4	5	8	9	X

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AR16

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, September-2021
STRUCTURAL ANALYSIS-I
(Civil Engineering)

Time: 3 Hours   **Max Marks: 70**
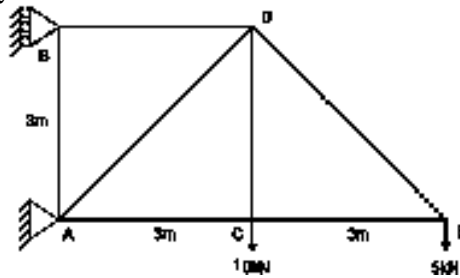
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. Determine forces in members for the given truss using method of sections. Assume   14M
   constant Axial rigidity

(OR)

2. Find the forces in all the members of the frame shown in fig, if the member BC is   14M
   short in length by 10mm and is forced into position. Take $E = 2.0 \times 10^5$ N/mm2. All
   the members have same area of cross section of 1000mm^2. Horizontal load
   indicated at Joint B is 20kN. Use Method of Joints.
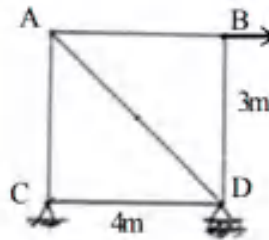
UNIT-II

3. A beam AB of uniform cross section if fixed at both ends and is loaded as shown   14M
   in Fig. Determine fixing moments and reactions at A & B. Also draw SF and BM
   diagrams. $E = 2 \times 10^5$ N/mm^2 and $I = 5 \times 10^8$ mm^4.
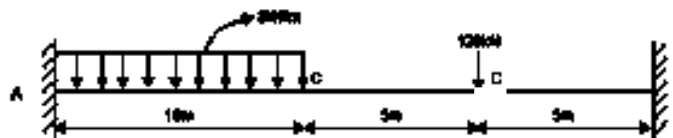
(OR)

4. Analyze the propped cantilever shown below by using method of consistent   14M
   deformations and draw SFD and BMD. Also Find the maximum sagging bending
   moment and point of contraflexure.
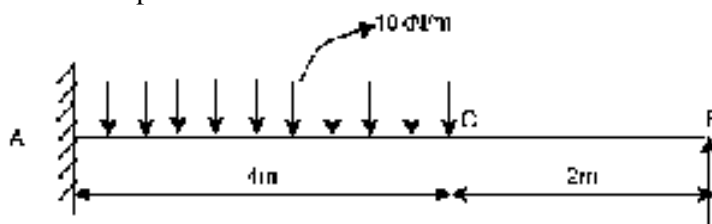
UNIT-III

5.   Analyze the continuous beam loaded as shown in fig using three moment theorem.   14M
Draw the bending moment and shear force diagrams

(OR)

6.   Analyze the continuous beam loaded as shown in fig using three moment theorem.   14M
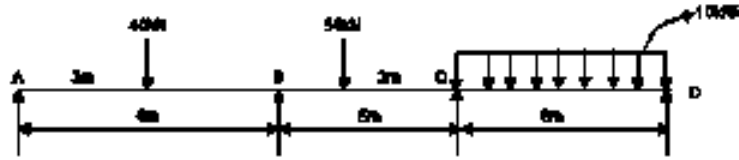Draw the bending moment and shear force diagrams.
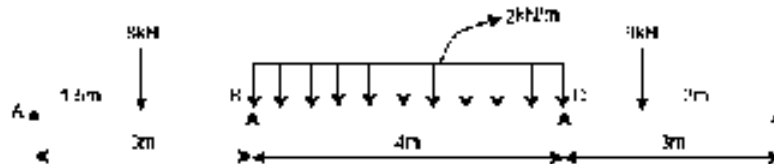
UNIT-IV

7.   Analyze a continuous beam ABC simply supported at A and C. The span AB is 6m   14M
and BC is 8m. The span AB is carrying an UDL of 30kN/m and span BC carries a
load of 40kN at a distance of 3m from B. Use Slope Deflection Method. Draw the
B.M.D

(OR)

8.   Analyze the continuous beam shown in fig. by the slope deflection method. Draw   14M
shear force diagram, bending moment diagram and deflected shape
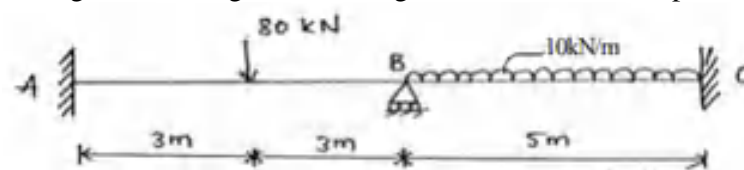
UNIT-V

9.   Analyze the continuous beam loaded as shown in fig.(6), using strain energy   14M
method. Draw the bending moment and shear force diagrams.
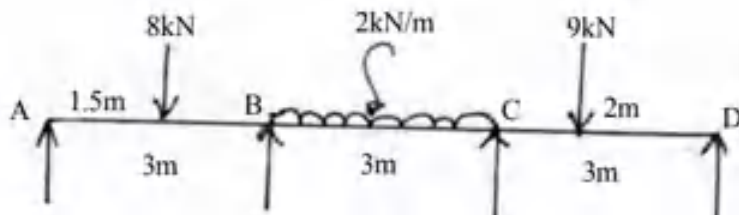
(OR)

10. a)   Explain the Castiglianos theorem-II   5M
     b)   Find the vertical deflection at the free end of a cantilever beam of length 4m and a   9M
point load 20 kN acting at free end .Assume $I=25 \times 10^{-4}$ m^4 and $E = 2 \times 10^{11}$ N/m^2

CODE: 16EE2013   **SET-2**
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, September-2021
CONTROL SYSTEMS
(Electrical & Electronics Engineering)
Time: 3 Hours   **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place
UNIT-I

1. a) Define open loop and closed loop systems and give its comparisons.   7M
   b) Explain the effects of feedback on system gain, stability, sensitivity, and noise with necessary derivations.   7M

(OR)

2.   Find the Transfer function for the given electrical circuit   14 M
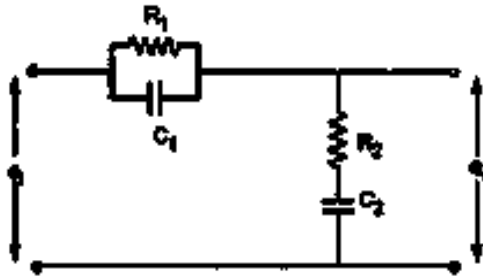
UNIT-II

3.   Derive an expression for the transfer function of an armature controlled DC Servo motor.   14M

(OR)

4   Derive the time response of second order under damped system with unit step input .   14M

UNIT-III

5.   For the system having characteristic equation   14M
     $S^4 + 22S^3 + 10S^2 + S + K = 0$, Find the marginal value of K and sustained oscillations

(OR)

6.   Sketch the complete root locus for the given system, whose open loop transfer function is $G(s) = \frac{K}{S(S+2)(S+4)}$.   14M

UNIT-IV

7   Draw the Bode plot for the transfer function   14M

$G(s) = \dfrac{50}{S(1+0.25S)(1+0.1S)}$ Determine i) Gain cross over frequency

ii) Phase cross over frequency iii) G.M and P.M iv)Stability of the system.

(OR)

8. a) The open loop transfer function of a unity feedback system is   10M

given by $G(S) = \dfrac{1}{S(1+S)(1+2S)}$,Sketch the polar plot and

determine the gain margin and phase margin

b) Explain the correlation between time and frequency response.   4M

UNIT-V

9. a) Explain the design procedure of lead compensator.   10M

    b) List the properties of State transition matrix.   4M

(OR)

10.   The state space representation of a linear time invariant system   14M
is given below

$$\begin{bmatrix} \dot{X}1 \\ \dot{X}2 \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} X1 \\ X2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

$$Y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} X1 \\ X2 \end{bmatrix}$$

Determine State transition matrix

CODE: 16ME2012   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, September-2021
ENGINEERING METALLURGY
(Mechanical Engineering)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Explain in detail types of bonds in solids?	7M
	b)	What is the difference between low angle and high angle grain boundaries?	7M

(OR)

2.		What are grain boundaries in metals? What is the effect of grain boundaries on strength of metals?	14M

UNIT-II

3.	a)	What is an alloy? What are the types and advantages of alloys.	6M
	b)	What is phase diagram in alloy system? Explain the types of phase diagrams with neat sketches.	8M

(OR)

4.	a)	Describe Hume-Ruthers for solid solution formation?	7M
	b)	Explain the difference between alloy and alloy system?	7M

UNIT-III

5.	a)	Explain lever rule principle and its uses?	6M
	b)	Describe the construction of the phase diagram for two metals completely soluble in liquid state and insoluble in solid state	8M

(OR)

6.		Describe the Iron-Iron carbide equilibrium diagram with neat sketch and explain all the phases in it. Write various reactions and equation for it.	14M

UNIT-IV

7.		Briefly explain the structure, properties and advantages of a) White cast iron, b) Malleable cast iron, c) Grey cast iron, d) spherical graphite cast iron, e) alloy cast iron	14M

(OR)

8.	a)	Explain the composition and applications of plain carbon steels.	8M
	b)	Explain the properties of Low alloy steels?	6M

UNIT-V

9.	a)	What is annealing? Explain various types of annealing processes?	6M
	b)	What is surface hardening? Why it is required? Explain any one Technique?	8M

(OR)

10.	a)	What are the characteristics of metal powders? Write the applications of powder metallurgy.	7M
	b)	Mention various powder manufacture processes and explain any one process with neat sketch.	7M

AR16

CODE: 16EC2009   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, September-2021
ELECTRONIC CIRCUITS – II
(Electronics and Communication Engineering)

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

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Derive the expression for frequency of Oscillation in a Colpitts Oscillator. 7M
    b) Derive the expression for frequency of oscillation and condition for sustained oscillation of a Crystal oscillator 7M

(OR)

2. a) Explain what is Barkhausen criterion and condition for oscillations. 7M
    b) What are the differences between RC phase shift oscillator and wein bridge oscillator. 7M

UNIT-II

3. a) Compute the overall lower cut-off frequency of an identical two stage cascade of amplifiers with individual lower cut-off frequency given as 412 Hz. 2M
    b) With the help of a neat circuit diagram describe the working of a cascode amplifier? 12M

(OR)

4. a) Draw the Darlington circuit and derive the expressions for the overall current gain. 7M
    b) With the help of a neat circuit diagram describe the working of Re-Coupled. 7M

UNIT-III

5. a) Draw the hybrid-Π model of common emitter configuration and describe each component in the Π-model. 8M
    b) Derive the equation for voltage gain bandwidth product for CE amplifier. 6M

(OR)

6. a) Derive various Resistive parameters of Hybrid π model of a transistor in terms of h parameters. 7M
    b) In Hybrid π model of a transistor at high frequencies, show that g_m is proportional to the collector current. 7M

UNIT-IV

7. a) Define conversion efficiency. Determine the maximum value of conversion efficiency for a series - fed class A power amplifier. 7M
    b) Describe the operation of Class B Push pull amplifier . 7M

(OR)

8. a) Briefly explain the distortion in power-amplifier and Thermal stability. 7M
    b) A push pull amplifier utilizes a transformer whose primary has a total of 160 turns and whose secondary has 40 turns. It must be capable of delivering 40W to an 8 Ω load under maximum power conditions. What is the minimum possible value of V_{cc}? 7M

UNIT-V

9. a) Derive the expressions for Bandwidth and Q-factor of single tuned, capacitive coupled amplifiers. 7M
    b) What is a stagger tuned amplifier? Explain its advantages and disadvantages. 7M

(OR)

10. a) Draw a neat circuit diagram of a shunt regulator and explain its working. 7M
    b) Distinguish transistor based series and shunt voltage regulator. How shunt voltage regulator is advantage when compared with series regulator. 7M

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AR16

CODE: 16CS2010   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech II Semester Supplementary Examinations, September-2021
PRINCIPLES OF PROGRAMMING LANGUAGES
(Common to CSE & IT)

Time: 3 Hours   Max Marks: 70

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Write the differences between Compilation and Interpretation	7 M
	b)	What is ambiguous grammar? Explain with an example.	7 M
		(OR)	
2.	a)	Explain the Art of Language Design along with the categories of Programming Language	7 M
	b)	Explain the Derivation of parse trees	7 M

UNIT-II

3.	a)	List out the Scope Rules. Explain the procedure for implementing Scope.	7 M
	b)	What is Attribute Grammar? Give an example. Explain Evaluation of attributes by a example.	7 M
		(OR)	
4.	a)	Explain in detail about Evaluating Attributes about Action Routines	7 M
	b)	What is macro? Explain in detail about macro expansion.	7 M

UNIT-III

5.	a)	Explain in detail about Structured and Unstructured Flow	7 M
	b)	Explain in detail about Equality Testing and Assignment	7 M
		(OR)	
6.	a)	Define an array .Write the syntax for declaring an array ,string with examples	7 M
	b)	How to declare Pointers, Recursive Types, Lists. Write notations with an example	7 M

UNIT-IV

7.	Explain in detail about parameter passing in detail with suitable examples.	14 M
	(OR)	
8.	Explain in detail about Review of stack Layout, Calling Sequences	14 M

UNIT-V

9.	a)	What is Object Oriented Programming. List out all the OOP features .	7 M
	b)	What is sub-type polymorphism? Explain with suitable example	7 M
		(OR)	
10.	a)	Explain about Dynamic Method Binding with example.	7 M
	b)	What is Encapsulation. Explain in detail with an example.	7 M