AR16

CODE: 16MPE1005 **SET- 1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech. I Semester Regular/Supplementary Examinations, December-2018

MODERN CONTROL THEORY
Power Electronics And Drives

Time: 3 Hours Max Marks: 60

Answer any FIVE questions
All questions carry EQUAL marks

1. a) What is a state diagram? Also explain the terms: state space, state trajectory. [4M]
b) Construct at least 3 state models for a system characterized by the differential equation given below. [8M]

$$\dddot{Y}+9\ddot{Y}+26\dot{Y}+24Y=\dddot{U}+8\ddot{U}+17\dot{U}+U$$

2. Consider a system in state variable form as [12M]

$$\dot{X}=\begin{bmatrix}0 & 1\\ -3 & -2\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}0\\ 10\end{bmatrix}u, \text{ and } y=\begin{bmatrix}1 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}0\end{bmatrix}u.$$

Evaluate the response of this system to a unit step input under zero initial conditions.

3. a) Define controllability and observability. [4M]
b) Find the State Transition matrix and also check whether the system is state controllable or not. [8M]

$$\dot{X}=\begin{bmatrix}0 & 6\\ -1 & -5\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}3 & 6\\ -1 & -2\end{bmatrix}U$$

4 a) What is a jump phenomenon? Explain with suitable figure. [6M]
b) Derive the describing function for an element with dead zone non linearity. [6M]

5 a) What is a limit cycle? How is it used in determining the stability of a non linear system? [4M]
b) Comment on the stability of the system described by

$$\begin{bmatrix}\dot{X}_1\\ \dot{X}_2\end{bmatrix}=\begin{bmatrix}0 & 1\\ -1 & -1\end{bmatrix}\begin{bmatrix}X_1\\ X_2\end{bmatrix}$$

using Liapunov's method. [8M]

6 a) Define the singularities and how they can be classified. [6M]
b) Plot the phase trajectory of the system described by the equation [6M]

$$\ddot{y}+5\dot{y}+6y=6, \quad with \quad y(0)=1 \; and \; \dot{y}(0)=1.$$

7 a) State and prove the Liapunov 's theorem on asympototic stability. [6M]
b) Write the procedural steps to find the Liapunov's stability using variable gradient method. [6M]

8 a) Explain the phase plane analysis in detail. . [6M]
b) Formation of Liapunov's function. [6M]

AR16

Code No: 16MCS1005 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech. I Semester Regular/Supplementary Examinations, December-2018

OBJECT ORIENTED PROGRAMMING
(Computer Science and Engineering)

Time: 3 hours **Max Marks: 60**

Answer any FIVE questions
All questions carry equal marks

1.	a)	What is overloading? What are the various ways of overloading, explain with example.	6M
	b)	Write a simple Java program to represent the concept of nested classes.	6M
2.	a)	When do we declare a method or class as final or when do we declare a method or class as abstract? Explain.	6M
	b)	What is inheritance? Explain the use of inheritance in Java. What are different forms of inheritance?	6M
3.	a)	Explain package and interface by giving examples.	6M
	b)	What is the significance of main thread in multithreading. Explain with example how to control main thread.	6M
4.	a)	What is the role of sleep class in multi threading?	6M
	b)	What are the various types of exceptions used in Java.	6M
5.	a)	Write a program to create an interface containing a static inner class.	6M
	b)	Explain in detail about the event classes: i) key event ii) item event.	6M
6.	a)	Explain how multithreading is supported in Java using runnable interface.	6M
	b)	Explain about life cycle of an applet.	6M
7.	a)	Write a simple applet program to read and write a file using applet?	6M
	b)	What is string handling in Java? Explain.	6M
8.		Define the terms client and server. Use socket programming to design a client /server application that takes file as input, checks whether the file exists and display its content if exists.	12M

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AR16 SET 1

Code No: 16MTE1007

ADITYA INSTITUE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech. I Semester Regular/Supplementary Examinations, December-2018
SOLAR ENERGY TECHNOLOGY
(Thermal Engineering)

Time: 3 hours **Max. Marks: 60**

Answer any FIVE questions
All questions carry equal marks

1. a) What is payback period and how it is calculated?
   b) A solar hot water system having an array of flat-plate collectors with an area of 30 m^2 is installed in a factory. It costs Rs 150000 and is setup with an initial down payment of 20 per cent of the investment, the balance 80 per cent being taken as loan to be repaid in equal annual instalments over a 10 year period at an interest rate of 16 per cent. The cost of conventional fuel saved in the first year is 21000 and this cost increases at the rate of 4 per cent every year.

   The annual expenditure required by way of maintenance, electrical energy for running subsidiary equipments, local taxes, insurance, etc. Is Rs 6600 in the first year and the company income tax rate is 55 per cent.

   Assuming that the market discount rate is 10 per cent, calculate the payback period, with and without discounting.

2. What are the instruments used for measuring solar radiation? Explain in detail how to measure diffuse and beam radiation.

3. a) Explain why solar energy is considered as an alternate option and give its potential in context to India
   b) Calculate the monthly average hourly radiation falling on a flat-plate collector facing south with a slope of 15^o given the following data

Location	----------	Chennai (13^o 00'N)
Month	----------	October
Time	----------	1100 – 1200 h (LAT)
Monthly average hourly global radiation	-----	2408 kJ/m^2-h
Monthly average hourly diffuse radiation	----	1073 kJ/m^2-h

   Assume ground reflectivity to be 0.2. The calculations will be done for the representative day in October, viz. October 15.

4. Explain about orientation and tracking modes of a cylindrical parabolic collector.

5. a) Explain the conversion process of incident solar radiation into electricity in a solar cell.
   b) Draw and explain the electrical equivalent circuit of a solar cell.

6. a) Explain about any one sensible heat storage system in detail.
   b) Explain about any one latent heat storage system in detail.

7. With the help of a schematic explain the operation of a solar pond and mention its advantages and applications.

8. With the help of a neat diagram explain operation of a central receiver tower power plant and explain about losses between heliostat field and central receiver.

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AR16

CODE: 16MSE1007 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech. I Semester Regular/Supplementary Examinations, December-2018

OPTIMIZATION IN STRUCTURAL DESIGN
(Structural Engineering)

Time: 3 Hours Max Marks:60

Answer any FIVE questions
All questions carry EQUAL marks

1. (a) Explain the following with suitable examples.
   (i) Objective function
   (ii) Constraint function
   (b) Formulate structural optimization for a standard three-bar truss problem

2. (a) Classify different optimization problems and explain them briefly.
   (b) Explain briefly about fully stressed design and optimality criterion based algorithms.

3. Minimize $f = x_1^2 + 2x_2^2 + 3x_3^2$, subjected to $g_1 = x_1 - x_2 - 2x_3 \le 12$;
   $g_2 = x_1 + 2x_2 - 3x_3 \le 8$; Use Kuhn Tucker condition to solve this problem.

4. (a) Explain the difference between constrained and unconstrained nonlinear problems with example.
   (b) Write step-by-step procedure for quadratic interpolation method for nonlinear unconstrained problems

5. Minimize f(x) = 5x, subjected to constraint $g_i(x) = 4 - x \le 0$, using exterior and interior penalty function method

6. (a) Explain the Lagrange multiplier method with two variables and one constraint
   (b) Determine the maximum and minimum values of the function,
   $f(x) = 12x^5 - 45x^4 + 40x^3 + 5$

7. Maximize $F = x_1 + 2x_2 + x_3$ subjected to
   $2x_1 + x_2 - x_3 \le 2$
   $-2x_1 + x_2 - 5x_3 \ge -6$
   $4x_1 + x_2 + x_3 \le 6$
   $x_i \succ 0, i = 1,2,3$ Using simplex algorithm

8. (a) Explain the minimum weight of four bar truss problem formulation using dynamic programming
   (b) Explain the solution of a constrained Geometric Programming problem in structural Engineering.

AR16

CODE: 16MVL1006 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech. I Semester Supplementary Examinations, December-2018

SEMICONDUCTOR DEVICES MODELING
(Digital Electronics and Communication Systems)

Time: 3 Hours Max Marks:60

Answer any FIVE questions
All questions carry EQUAL marks

1. (a) What are degenerative states in silicon?
   (b) Derive the expression for carrier concentration as a function of electrostatic potential?

2. (a) Derive the expression for average time taken by carriers to traverse a narrow base?
   (b) Derive the expression for diffusion capacitance of a junction?

3. (a) Draw and explain the low frequency C-V characteristics of a MOS capacitor?
   (b) What is the effect of poly silicon doping concentration on C-V characteristics?

4. (a) Derive the expression for base current of BJT?
   (b) Draw the ideal I_C- V_{CE} characteristics of a BJT and explain ?

5. (a) What is drain induced barrier lowering?
   (b) What is channel length modulation?

6. (a) Describe meyer model and also mention its limitations?
   (b) What are the small signal parameters in the dynamic model of the MOSFET?

7. (a) What is band bending?
   (b) What is the effect of oxide charge on surface potential?

8. (a) What are the contributions of drift and diffusion components to the total current?
   (b) What is body effect?

AR13

Code No: 13MSE1006 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I M.Tech. I Semester Supplementary Examinations, December-2018

FOUNDATION ENGINEERING

(Structural Engineering)

Time : 3 hours **Max Marks : 60**

Answer any FIVE questions
All questions carry equal marks

1. (a) Explain the various factors that help decide the number and depth of bore holes required for subsoil investigation [6M]
   (b) Explain any two boring methods used in soil exploration [6M]

2. (a) What do you understand by disturbed and undisturbed samples? How would you obtain undisturbed samples? [6M]
   (b) What are the factors that effect the sample disturbance? How can they be minimized? [6M]

3. (a) Define the terms Net safe bearing capacity, Gross Bearing Capacity and Allowable soil pressure [6M]
   (b) Determine the allowable gross load and the net allowable load for a square footing of 2m side and with a depth of 1m. Use Terazaghi's theory and assume local shear failure. Take a factor of safety of 3. The soil in the site has unit weight of 18 kN/m^3, $c' = 15kN/m^2$ and $\varphi' = 25^{\circ}$. [6M]

4. A square footing 1.5m x 1.5m, is located at a depth of 1.0m. The footing is subjected to an eccentric load of 400kN with an eccentricity of 0.2m along one of the symmetric axes. Determine the factor of safety against bearing failure. Use Vesic's equation. Take unit weight of soil =21 kN/m^3, $c = 100\ kN/m^2$, $\varphi = 0$. [12M]

5. (a) Explain the types of shallow foundations with neat sketches [6M]
   (b) Discuss how would you fix the depth of foundation [6M]

AR13

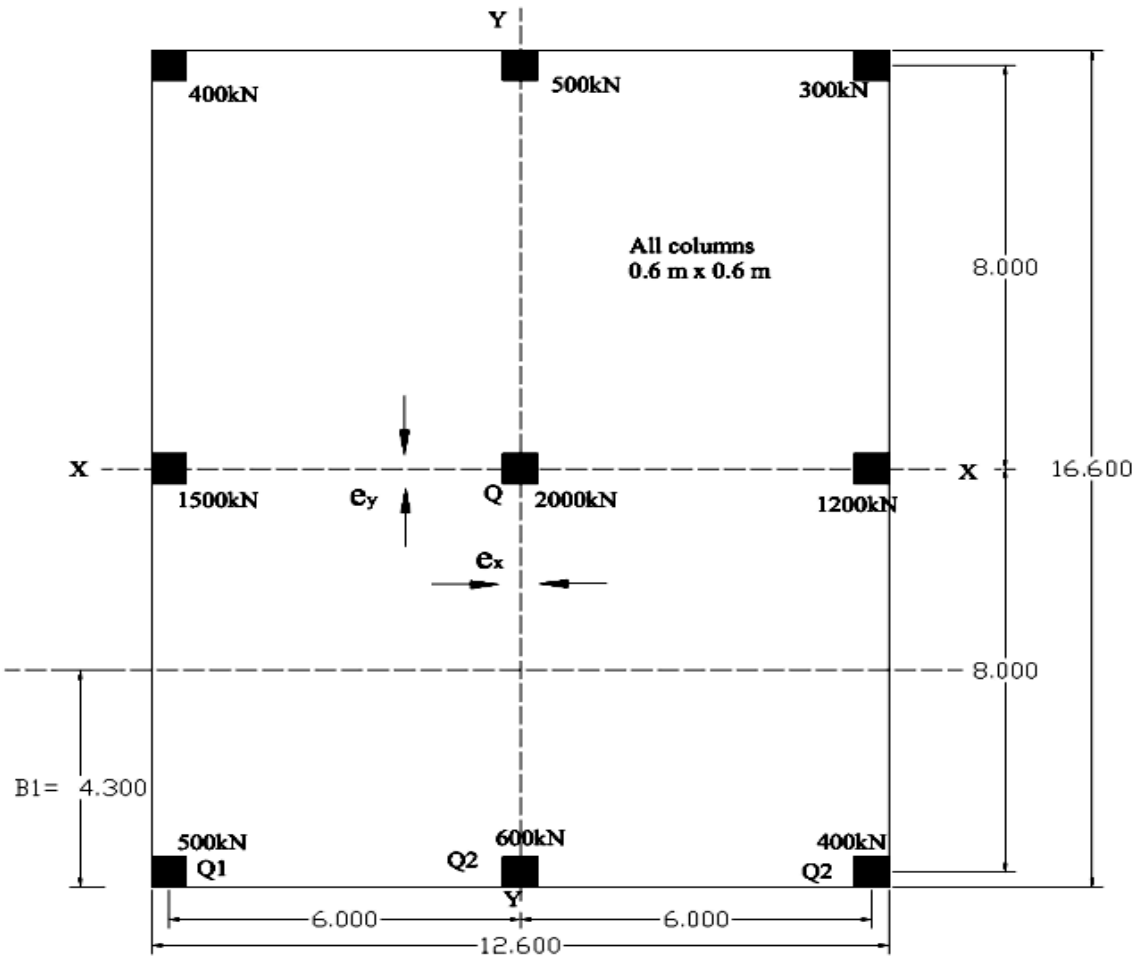
Code No: 13MSE1006 **SET-2**

6. (a) Discuss the various types of pile foundations [6M]

   (b) Discuss various dynamic pile formulae and their limitations [6M]

7. A concrete pile, 40 cm diameter and 9m long is driven through a 6m thick layer of silty sand ($\varphi = 20^{\circ}$, $\gamma = 17$ kN/m^3) overlying a dense layer of sand ($\varphi = 35^{\circ}$, $\gamma = 19.5$ kN/m^3). If the water table is at the ground surface, estimate the safe load. F.S= 3; K = 1.0 and $\delta = 0.75\varphi$. [12M]

8. The plan of a mat foundation with 9 columns is shown. Assuming that the mat is rigid, determine the soil pressure distribution. All the columns are of the size 0.6m x 0.6m**.** [12M]



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