

AR18

CODE: 18CSE464

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech II Semester Regular & Supplementary Examinations, March-2023

**HUMAN COMPUTER INTERACTION
(Computer Science and 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) What is Heuristic Evaluation? Why is it used? Outline the steps involved for expert review. 6M
b) Discuss about the benefits of good design. 6M
- (OR)**
2. a) Explain how organizational design supports usability. 6M
b) Describe about the principles of User Interface. 6M

UNIT-II

3. a) Discuss about the role played by design process in Human Interaction with Computer. 6M
b) What are the basic business functions .Explain. 6M
- (OR)**
4. a) Write about various human aspects that are important and must be considered in designing a good interface. 6M
b) What are the steps involved in the requirements analysis of Human Computer Interaction. 6M

UNIT-III

5. a) Discuss about system menus and their navigating schemes. 6M
b) Explain the techniques to accelerate the fast movement through menus. 6M
- (OR)**
6. a) What are the contents of menus? Explain their structures. 6M
b) What are small display units? What are its special characteristics? Discuss various factors that are to be considered in designing menus for small display units. 6M

UNIT-IV

7. a) Discuss how components of Windows are useful in presentation styles. 6M
b) Explain the design goals and content issues of Web page design. 6M
- (OR)**
8. a) What are the different kinds of Windows and how to manage them in a proper manner. 6M
b) What are the various operations of Windows. Discuss. 6M

UNIT-V

9. a) Explain how icons and images are useful to create meaningful Graphics. 6M
b) Discuss about the advantages and disadvantages of colors in graphics design. 6M
- (OR)**
10. a) Explain how proper colors will be selected for textual graphic screens. 6M
b) How modem is useful to design User Interface. Explain. 6M

AR18

CODE: 18ECE451

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech II Semester Regular & Supplementary Examinations, March-2023

DIGITAL IMAGE PROCESSING

(Electronics and Communication 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) Explain sampling process and quantization of digital images 8M
b) Explain about N4, N8 Neighbour 4M

(OR)

2. Explain the fundamental steps in digital image processing with neat diagram. 12M

UNIT-II

3. Compute 2D DFT and its inverse to the following input image $f(x,y)$ 12M

$$\begin{vmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{vmatrix}$$

(OR)

4. Define 2D DFT and prove the following properties 12M
a) Separability b) Translation, c) Periodicity d) Correlation e) Rotation.

UNIT-III

5. Breakdown the steps for histogram equalization and find the histogram equalization of sub image given below 12M

4	4	4	4	4
3	4	5	4	3
3	5	5	5	3
3	4	5	4	3
4	4	4	4	4

(OR)

6. a) Explain the following operations for image enhancement: 6M
i) Contrast stretching ii) Bit-plane slicing iii) Image negative.
b) Explain smoothing spatial domain filters for image enhancement. 6M

UNIT-IV

7. a) List out different noise probability density functions used in image restoration. 6M
b) Explain hue and saturation and how to convert RGB to HSI Color model. 6M

(OR)

8. Explain constraint least square filtering for image restoration. 12M

UNIT-V

9. a) Explain about image compression model with the help of a block diagram. 8M
b) Analyze all edge detectors available in image segmentation. 4M

(OR)

10. a) Write about detection of discontinuities. 6M
b) Calculate the efficiency of Huffman Coding for the given symbols. 6M

Symbol	a1	a2	a3	a4	a5	a6
Probability	0.1	0.4	0.06	0.1	0.04	0.3

What is the amount of compression achieved with Huffman coding?

AR18

CODE: 18ITE461

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech II Semester Regular & Supplementary Examinations, March-2023

**MOBILE COMPUTING
(Information Technology)**

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. Describe the mobile computing architecture with a neat diagram. 12M
- (OR)
2. a) Write down the limitations of mobile computing in brief. 6M
b) Briefly discuss the application of mobile computing. 6M

UNIT-II

3. Show with a diagram the steps involved in a mobile terminated call (a station calling a mobile station) in GSM 12M
- (OR)
4. a) Explain how GPRS networks replace circuit switch services on second-generation GSM communications. Explain its services and operations in detail. 6M
b) Give reasons for a handover in GSM and the problems associated with it. Discuss the typical steps for handover and what type of handover can occur. 6M

UNIT-III

5. a) Explain the following medium access control mechanisms. (i) For far and near terminals (ii) For hidden and Exposed terminals. 6M
b) Give the main reason for implementing specialized MAC in wireless networks. 6M
- (OR)
6. What are the motivations for a specialized MAC? Discuss in detail the multiple access with collision avoidance techniques 12M

UNIT-IV

7. a) What are the general problems of Mobile IP regarding security and quality of service? Explain. 6M
b) Write about the steps involved in IP packet delivery and agent discovery in mobile networks. 6M
- (OR)
8. a) What is MANET? What are the characteristics of MANETs? 6M
b) Write in brief about the working of Snooping TCP. 6M

UNIT-V

9. a) What is selective tuning and indexing? Explain different mechanisms of it. 6M
b) Write short notes on (i) J2ME (ii) Android (iii) Palm OS. 6M
- (OR)
10. a) What are the various types of mobile operating system. 12M

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) Describe thermo-ionic thermos-electric systems with suitable diagrams. 6M
- b) What is a distributed (Parabolic) collector system power plant? Mention the recent developments in solar power plants 6M

(OR)

2. a) Write a short note on various wind energy categories. 6M
- b) What are the factors affecting the selection of wind mill 6M

UNIT-II

3. a) What do you understand by a cooling tower? Explain the working of an indirect dry cooling tower where a direct contact spray type condenser is used? 6M
- b) Explain the working of any dust collector with a neat sketch. 6M

(OR)

4. a) Explain the steam and flue gas circuit in a modern steam power plant with a relevant sketch. 6M
- b) Name various draught systems. Describe the operation of a balanced draught system 6M

UNIT-III

5. a) With the help of a neat sketch explain the fuel system of diesel power plant 4M
- b) A 2-cylinder C.I engine with a compression ratio 13:1 and cylinder dimensions of 200mm x 250 mm works on a two stroke cycle and consumes 14 kg/h of fuel while running at 300 r.p.m. Assume the relative and mechanical efficiencies of engine are 65% and 76% respectively. The fuel injection is effected up to 5% of stroke. If the calorific value of the fuel is given as 41800 kJ/kg. Calculate the mean effective pressure developed. 8M

(OR)

6. a) Explain the working of a lubrication system of a gas turbine with the help of a neat sketch 6M
- b) Explain open cycle gas turbine with neat sketch. 6M

UNIT-IV

7. a) Explain different types of dams with neat sketch. 6M
- b) Explain clearly about the factors involved in the selection of site for a hydroelectric power plant 6M

(OR)

8. a) Explain the underground hydro-electric power station and over ground power stations. Discuss its advantages and disadvantages one over above. 6M
- b) What are the different methods available for disposal of nuclear wastes? Explain them briefly. 6M

UNIT-V

9. A power station has to supply load as follows: 12M

Time (hrs) 0-6 6-10 10-12 12-16 16-20 20-22 22-24

Load (Mw) 30 50 60 40 80 70 40

- i) Draw the load curve (ii) Determine the load factor of power Station (iii) What is the load factor stand by equipment of 20 MW capacity in it takes of all loads above 60MW. Also calculate use factor

(OR)

10. a) The yearly duration curve of a certain plant can be considered as a straight line from 120 MW to 240 MW. Power is supplied with one generating unit of 80 MW capacity and two units of 40MW capacity. Calculate 8M
(i) Installed capacity (ii) load factor (iii) plant factor
(iv) maximum demand
- b) Briefly discuss methods for controlling land pollution 4M

2 of 2

AR18

CODE: 18MEE462

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech II Semester Regular & Supplementary Examinations, March-2023

UNCONVENTIONAL MACHINING PROCESSES

(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) What is the need of Unconventional Machining Processes and Classify them 6M
b) Explain the mechanics of MRR in Ultrasonic Machining process 6M
- (OR)**
2. a) Explain the principle of Ultrasonic Machining process with neat sketch. 6M
b) Briefly discuss USM applications and limitations. 6M

UNIT-II

3. a) Explain principle of WJM Process with Neat sketch 8M
b) Discuss the applications and advantages of AJM Process 4M
- (OR)**
4. a) Write the advantages, limitations and applications of magnetic abrasive finishing 6M
Mention its MRR Parameters
b) Explain the principle of abrasive flow machining Machining process with neat sketch. 6M

UNIT-III

5. a) Explain the Working principle of Electro Chemical Machining with neat sketch. 8M
b) Mention the Process parameters of Electrochemical grinding process 4M
- (OR)**
6. a) Explain the Electrochemical Honing process with neat sketch. 6M
b) Explain the principle of Chemical Machining process 6M

UNIT-IV

7. a) Explain the working principle of WEDM with a neat sketch 6M
b) Outline the functionalities to be considered in the selection of Dielectric fluid and Tool Electrode. 6M
- (OR)**
8. a) Explain the working principle of Electric discharge grinding process with a neat sketch 6M
b) Explain the Mechanics of Metal removal Process of EDM 6M

UNIT-V

9. a) Explain the principle of EBM process with suitable sketch 6M
b) Distinguish between the Electron Beam Machining and Laser Beam Machining 6M
- (OR)**
10. a) Describe the principle of PAM process 6M
b) Explain the MRR mechanism and limitations of PAM process 6M

AR18

CODE: 18EEE461

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech II Semester Regular & Supplementary Examinations, March-2023

**DIGITAL 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. a) Draw the block diagram of DCS and explain the function of each block. 6M
b) List out various advantages and disadvantages of DCS 6M
- (OR)**
2. a) Derive the transfer function of ZOH (Zero Order Hold) device? 6M
b) State and explain sampling theorem in detail. 6M

UNIT-II

3. a) Discuss the mapping between the s-plane and Z-Plane. 6M
b) Determine the Z-transform of the following 6M
$$f(t) = 1 + 5t + 10t^2$$
- (OR)**
4. a) Find the inverse Z-Transform of the following 6M
$$F(Z) = Z / (Z - 0.5)(Z - 0.8)(Z - 1)$$

b) Prove that the PTF of ZOH = 1 6M

UNIT-III

5. a) Check the stability of the given system by using Jury stability technique $Z^4 + 3Z^3 + 2Z^2 + Z + 0.6 = 0$. 6M
b) Using the bilinear transformation, determine the stability of the system whose characteristic polynomial is given by $F(Z) = Z^4 - 1.2Z^3 + 0.07Z^2 + 0.3Z - 0.08 = 0$ 6M
- (OR)**
6. a) What is root locus? Write the steps to draw root locus for DCS? 6M

- b) Consider a plant defined by the following state variable model 6M
 $x(k+1) = Gx(k) + Hu(k)$ and $y(k) = Cx(k) + Du(k)$ where

$$G = \begin{bmatrix} 0.5 & 1 & 0 \\ -1 & 0.4 & 1 \\ 0 & 0 & 1 \end{bmatrix}; H = \begin{bmatrix} 5 \\ 1 \\ 2 \end{bmatrix}; C = [1 \quad 0 \quad 1]$$

Whether the system is Completely state controllable and Observable?

UNIT-IV

7. a) Find the state transition matrix G^k for the given system 6M

$$x(k+1) = \begin{bmatrix} 0.5 & 0 & 0 \\ 0 & 0.25 & 0 \\ 0 & 0 & 0.75 \end{bmatrix} x(k)$$

- b) Define state transition matrix and list its properties 6M

(OR)

8. a) A discrete time system is represented by state model $x(k+1)$ 6M
 $= \begin{bmatrix} 0 & 1 \\ -0.16 & -1 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 1 \end{bmatrix} r(k); y(k) = [1 \quad 0] x(k); x(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}.$
Determine the response of the system to unit alternating step sequence?

- b) Solve the following difference equation is 6M
 $y(k+3) + 5y(k+2) + 6y(k+1) + 2y(k) = 3u(k+2) + 2u(k+1) + 4u(k)$

UNIT-V

9. a) Obtain the pulse transfer function from state models 6M

$$G = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & 5 \\ -1 & 2 & 4 \end{bmatrix}; H = \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}; C = [1 \quad 0 \quad 1]; D = [0]$$

- b) List out the advantages of state space analysis. 6M

(OR)

10. a) A discrete time system is described by the difference equation 12M
 $y(k+3) + 5y(k+2) + 7y(k+1) + 3y(k) = r(k+1) + 2r(k).$ Obtain the state model of the system in controllable form.

AR18

CODE: 18ECE452

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech II Semester Regular & Supplementary Examinations, March-2023

SATELLITE COMMUNICATIONS

(Electronics and Communication 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) Explain conceptually the origin of satellite communication system. 6M
b) Write any two applications using satellite services. 6M
- (OR)**
2. a) Write the IEEE standard for radio frequency bands in satellite communications. 6M
b) List some satellites involved in different types of satellite services. 6M

UNIT-II

3. a) Discuss expandable launch vehicles in detail. 6M
b) Discuss any 4 orbital perturbations in detail. 6M
- (OR)**
4. a) Explain orbital elements in details and why are they required. 6M
b) Explain the terms 6M
1.subsatellite point 2.limits of visibility

UNIT-III

5. a) Explain attitude control system in detail? 6M
b) Discuss different sources of power to maintain a satellite? 6M
- (OR)**
6. a) Discuss two stabilization techniques to stabilize the communication satellite? 6M
b) What is frequency reuse. Explain how it is achieved in C-Band satellite transponder. 6M

UNIT-IV

7. a) Discuss different noise that has to be considered during uplink and downlink? 6M
b) Derive expression for overall C/N ratio? 6M
- (OR)**
8. a) Write procedure involved in designing one way satellite communication link? 6M
b) Discuss in brief about direct spread spectrum technique? 6M

UNIT-V

9. Discuss earth station technology in detail. 12M
- (OR)**
10. a) Explain why “C” band is allocated for mobile satellite services in LEO satellite system? 6M
b) Why tracking required for a satellite and explain different antennae tracking systems? 6M

AR18

CODE: 18CET420

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech II Semester Regular & Supplementary Examinations, March-2023

DISASTER MANAGEMENT

(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. a) Explain the Types of Disasters? 6M
b) Briefly about Hazard and Vulnerability Profile of India. 6M
- (OR)
2. a) Difference between Disaster, Hazard, Vulnerability, 6M
b) Discuss about Prevention and Mitigation of Disasters? 6M

UNIT-II

3. a) Explain the Causes, Distribution pattern and Consequences and Mitigation for- 6M
Floods,
b) Discuss about Manmade disasters? 6M
- (OR)
4. a) Write about Urban flooding? 6M
b) Explain the Causes, Distribution pattern and Consequences and Mitigation for- 6M
Tsunami?

UNIT-III

5. a) What are Disaster Mitigation Strategies? 6M
b) Write the impacts of Disasters for Environmental and Physical? 6M
- (OR)
6. a) Explain about Demographic aspects and Hazard locations? 6M
b) Write the impacts of Disasters for Social, and Ecological? 6M

UNIT-IV

7. a) Explain Roles and Responsibilities of Government and Non- 6M
Governmental Agencies?
b) Write about Prevention, Mitigation, Preparedness, Relief and Recovery for 6M
Structural measures.
- (OR)
8. a) Write about Post-disaster Environmental Response? 6M
b) Write Phases of Disaster Management Cycle? 6M

UNIT-V

9. a) Explain about Damage Assessment in detail? 6M
b) Explain the Role of Various Agencies in Recovery Measures, dealing with 6M
Victims Psychology.
- (OR)
10. a) Discuss about Monitoring and Evaluation of Rehabilitation work. 6M
b) Write about Long – term Counter Disaster Planning. 6M

AR16

CODE: 16EE4030

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech II Semester Supplementary Examinations, March-2023

DIGITAL CONTROL SYSTEMS

(Electrical and 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) What is sampling? What are the advantages of sampling 7M
- b) With emphasis on the limitations of zero order hold, elaborate the need for first order hold 7M

(OR)

2. a) Explain how signal reconstruction is done in discrete system analysis. 7M
- b) Summarize the functionality of fractional order hold ? 7M

UNIT-II

3. a) What are the advantages of Laplace transforms. 7M
- b) Find the laplace transform of $x(t)=e^{-100t}\tan 50t$ 7M

(OR)

4. a) Find the inverse z-transform of the following function. 7M
$$X(z) = \frac{z^2 + 1}{z^2 + 7z}$$
- b) What is pulse transfer function? How is it obtained? 7M

UNIT-III

5. a) Determine the stability of the system $F(z)=2z^4+5z^3+10z^2+2z+1=0$ 7M
- b) Define controllability and observability for discrete data systems. 7M

(OR)

6. Draw the root locus of the system with $GH(z)=K(z-0.4)/(z-0.5)(z-2)$ 14M

UNIT-IV

7. Find the state transition matrix G^k for the given system 14M
$$x(k+1) = \begin{bmatrix} 0.5 & 0 & 0 \\ 0 & 0.25 & 0 \\ 0 & 0 & 0.75 \end{bmatrix} x(k)$$

(OR)

8. a) Elaborate the properties of state transition matrix 7M
- b) What are the differences between difference equations and differential equations 7M

UNIT-V

9. a) Obtain the pulse transfer function from state models 7M
$$G = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & 5 \\ -1 & 2 & 4 \end{bmatrix}; H = \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}; C = [1 \quad 0 \quad 1]; D = [0]$$
- b) Write short notes on canonical forms 7M

(OR)

10. Explain sampled data control systems with the help of an example. 14M

CODE: 16CE4034 **SET-1**
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
IV B.Tech II Semester Regular/Supplementary Examinations, March,2023
AIR POLLUTION CONTROL
(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. a) What is Air Pollution? Explain about various types of pollutants in detail. 8M
b) Explain scope and significance of air pollution. 6M
- (OR)
2. a) Explain the sources for Dust as pollutant into the atmospheric environment? 8M
b) Distinguish between particulates and aerosols. 6M

UNIT-II

3. a) Explain the effects of air pollutants on vegetation. 6M
b) What is Global Warming? Describe Global effects of pollution? 8M
- (OR)
4. a) Explain the effects of air pollutants on materials with examples. 7M
b) Define Ozone Holes. Explain causes and effects of Ozone Holes. 7M

UNIT-III

5. a) Discuss the general methods for monitoring of NO₂ emissions 6M
b) What is meant by stack monitoring? Explain purpose and parameters of stack monitoring for SPM. 8M
- (OR)
6. a) Discuss the general methods for monitoring of CO emissions. 6M
b) What are the Guideline Emission Standards prescribed by WHO. 8M

UNIT-IV

7. a) What are various strategies to control of particulates? Explain Process Changes in detail. 6M
b) Explain the principle, construction and working of Gravity settling chamber with a neat sketch. 8M
- (OR)
8. a) With a neat sketch explain the functioning, merits and demerits of a Fabric filters. 8M
b) Explain about Centrifugal separators in detail with neat sketch. 6M

UNIT-V

9. a) Discuss the general methods for control of SO₂ emissions. 6M
b) Explain Absorption methods of control of gaseous pollutants. 8M
- (OR)
10. a) Method of control of gaseous contaminants by Biological oxidation to form nontoxic compounds. 7M
b) Explain dry methods of removal of SO₂ emissions. 7M

AR13

CODE: 13EE4030

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech II Semester Supplementary Examinations, March-2023

DIGITAL CONTROL SYSTEMS (Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) What is periodic sampling?
b) What is acquisition time?
c) Define Pulse Transfer Function?
d) What is asymptotic stability?
e) Mention the inference when any one of the row is zero in routh table?
f) Give the formulae to find the asymptotic path to reach infinite pole/zero?
g) Define observability?
h) What is resolvent matrix?
i) Mention the Advantages of Direct realisation?
j) List the different canonical representations?

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) Derive the transfer function of zero order hold (ZOH) device? 4
b) State and prove sampling theorem with relevant waveforms? 8
(OR)
3. a) With neat sketches explain the principle of sample and hold circuit? 6
b) Explain briefly about different hold devices? 6

UNIT-II

4. a) Discuss the mapping between the S-plane and Z-plane and show that the mapping is not unique? 6
b) Find the Z-transform of the transfer function $F(s) = \frac{1}{s(s+5)^2}$? 6
(OR)
5. a) List out the limitations of Z-Transforms? 4
b) Find the inverse Z-Transform of $F(Z) = \frac{1}{z^2(z-1)^2(z+1)}$? 8

UNIT-III

6. a) Explain the solution of Discrete LTI system using Z-transformation? 6
b) Find the state space representation for the discrete time system 6
 $y(k+3) + 6y(k+2) + 11y(k+1) = 8y(k) + 10u(k)$

(OR)

7. a) Find the state transition matrix G^k for the given system 6
$$x(k+1) = \begin{bmatrix} 0.5 & 0 & 0 \\ 0 & 0.25 & 0 \\ 0 & 0 & 0.75 \end{bmatrix} x(k)$$

b) A discrete time system is represented by the state model $x(k+1)$ 6
 $= \begin{bmatrix} 0 & 1 \\ -0.16 & 1 \end{bmatrix} x(k) + \begin{bmatrix} 1 \\ 1 \end{bmatrix} r(k); y(k) = [1 \quad 0] x(k); x(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}.$
Determine the discrete unit step response of the system?

UNIT-IV

8. a) Elaborate the properties of state transition matrix 6
b) Obtain the Controllable canonical form for the pulse transfer $G(z) = \frac{(z+1)(z+2)}{z(z+5)^2(z+4)}$? 6

(OR)

9. a) Given $F = \begin{bmatrix} 0 & 1 \\ -3 & 4 \end{bmatrix}$ Determine F^K ? 6
b) Obtain the pulse transfer function from state models? 6
$$G = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & 5 \\ -1 & 2 & 4 \end{bmatrix}; H = \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}; C = [1 \quad 0 \quad 1]; D = [0]$$

UNIT-V

10. a) Consider the characteristic polynomial $F(z) = z^4 - 0.9z^3 + 0.14z^2 + 0.216z + 0.032 = 0$. Determine the stability of the system using jury's stability test? 6
b) Consider the plant defined by the following state variable model 6
$$G = \begin{bmatrix} 0.5 & 1 & 0 \\ -1 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}; H = \begin{bmatrix} 1 & 4 \\ 0 & 0 \\ -3 & 2 \end{bmatrix}; C = [1 \quad 0 \quad 0]$$
 determine whether the system is completely Observable?
(OR)
11. a) Consider the characteristic polynomial $f(z) = z^3 - 1.1z^2 - 0.1z + 0.2 = 0$. Determine the stability of the system using Bilinear Transformation? 6
b) How the stability of the system is determined using root locus? 6