

Code No: **R42024**

R10

Set No. 1

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015

SPECIAL ELECTRICAL MACHINES

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) List the main advantages of switched reluctance motors. [8]
b) Draw and explain the speed torque characteristics of a switched reluctance motor. [7]
- 2 a) Define and explain holding torque and detent torque of a stepper motor. [6]
b) What are permanent magnet stepper motors? Explain its construction and operation. [9]
- 3 What is a BLDC motor? What are its advantages? Give the mathematical modeling of a BLDC motor. [15]
- 4 a) List and discuss different types of linear motors. [8]
b) Explain the operation of a linear induction motor. [7]
- 5 a) Discuss the advantages and disadvantages of permanent magnet motors. [7]
b) Draw and explain the equivalent circuit of a permanent magnet DC motor. [8]
- 6 What is a closed-loop control? What are its advantages? Compare open-loop and closed-loop systems. [15]
- 7 a) What is the need for position sensor in the control of switched reluctance motor? Explain. [7]
b) Explain the switching pattern of asymmetric bridge converter used for the control of a four-phase 8/6 switched reluctance motor. [8]
- 8 a) List and compare different types of motors employed in traction. [8]
b) Explain the application of linear motors for traction drives. [7]



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R10

Set No. 2

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015

SPECIAL ELECTRICAL MACHINES

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Discuss the physical principle of a switched reluctance motor. [7]
- b) Derive the general expression for torque of a switched reluctance motor. [8]
- 2 a) With a neat diagram, explain the constructional details of an eight stator pole, six rotor pole stepper motor. Also discuss its operation. [10]
- b) List different applications of stepper motors. [5]
- 3 a) Compare between PMBLDC motors and PMSM motors. [7]
- b) List the advantages and applications of BLDC motors. [8]
- 4 What are linear motors? What are its applications? Explain the constructional details of a linear induction motor. [15]
- 5 a) Draw and explain the hysteresis loop. [8]
- b) Discuss different applications of Permanent Magnet DC Motors. [7]
- 6 With a neat block diagram, explain the closed loop-control of stepper motors. [15]
- 7 With a neat block diagram, explain the closed loop speed control of a switched reluctance motor. Also explain different controllers used in it. [15]
- 8 What are linear induction motors? Explain the use of single sided linear induction motor for traction drives. [15]



Code No: R42024

R10

Set No. 3

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015

SPECIAL ELECTRICAL MACHINES

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) What is the need for position feedback in the operation of switched reluctance motor? Explain. [8]
b) List and discuss different applications of switched reluctance motors. [7]
- 2 a) Explain the construction and operation of a variable reluctance stepper motors. [9]
b) What is a step angle? Explain. [3]
c) Define stepping rate of a stepper motor. [3]
- 3 a) Draw and explain the back emf waveforms of a three-phase BLDC motor. [7]
b) Explain the commutation process in BLDC machines. [8]
- 4 a) Explain the principle of operation of a linear induction motor. [8]
b) Explain different applications of linear motors. [7]
- 5 a) Why energy is lost during magnetization and demagnetization of materials? Explain with the help of hysteresis loop. [9]
b) List the advantages and disadvantages of permanent magnet machines. [6]
- 6 a) Explain the open-loop control of stepper motors. [10]
b) List different applications of stepper motors. [5]
- 7 With a neat schematic diagram, explain the speed control of a BLDC motor drive. [15]
- 8 a) Discuss different AC motors suitable for traction systems. [8]
b) Compare between AC and DC traction systems. [7]



Code No: **R42024**

R10

Set No. 4

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015

SPECIAL ELECTRICAL MACHINES

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Discuss the operating principle of switched reluctance motor. [7]
b) With a neat circuit diagram, explain the asymmetric bridge converter for a four-phase 8/6 switched reluctance motor. [8]
- 2 a) What are hybrid stepper motors? Explain its construction and operation. [9]
b) Discuss different applications of a stepper motor. [6]
- 3 a) Explain the constructional details of a PMSM motor. [9]
b) Prove that the PM BLDC machines have 15% more power density than the PMSM. [6]
- 4 a) Compare between linear induction motors and rotary induction motors. [7]
b) Discuss the application of linear induction motors for electric traction. [8]
- 5 a) What is electrically commutated DC Motor? Explain its operation. [8]
b) Explain the advantages and applications of Permanent Magnet DC Motors. [7]
- 6 What is the need for closed loop control of electrical machines? With a neat diagram, explain the closed loop control of a stepper motor. [15]
- 7 Draw the back emf waveforms and explain the switching logic for a three phase BLDC motors. [15]
- 8 a) Discuss the main characteristics of traction drives. [7]
b) Discuss the suitability of linear induction motors for traction drives. [8]



Code No: **R42043**

R10

Set No. 1

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015

SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) Explain the various applications of satellite communications. [8]
b) Describe the future trends of satellite communications. [7]
- 2 a) List and explain the different orbital effects in satellite communication system performance. [8]
b) A satellite is in an elliptical orbit with a perigee of 1000km and an apogee of 4000km. find the period of the orbit and eccentricity of the orbit. [7]
- 3 a) Draw the block diagram of a typical attitude control system for a spinner satellite and explain its operation. [8]
b) Write short notes on equipment reliability in a satellite system. [7]
- 4 a) Derive the expression for system noise temperature in a satellite receiver. [8]
b) A 12GHz earth station receiving system has an antenna with a noise temperature of 50K, a LNA with a noise temperature of 100K and a gain of 40dB, and a mixer with a noise temperature of 1000K. Find the system noise temperature. [7]
- 5 a) Explain the spreading and de-spreading process in CDMA with an example. [8]
b) Describe the basic principle of DAMA. [7]
- 6 a) With the help of a neat block diagram describe the various functions of an earth station receiver. [8]
b) List the different types of high power amplifiers used at earth station? Explain any one. [7]
- 7 a) What are the various types of low earth orbit satellites? Explain. [8]
b) Compare LEO and GEO satellites. [7]
- 8 a) Explain the principle of a differential GPS with a neat diagram. [8]
b) Compare GPS and differential GPS. [7]



Code No: **R42043**

R10

Set No. 2

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015

SATELLITE COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Explain the brief history of Satellite communications. [8]
b) List and explain the various frequency band allocations used for satellite services. [7]
- 2 a) Define elevation angle and derive the expression for it. [8]
b) Write short notes on orbital perturbations. [7]
- 3 a) With the help of a neat diagram, explain the functions of TTC&M system. [8]
b) Explain how housekeeping is maintained in a satellite system in the orbit. [7]
- 4 a) Derive the expression for G/T ratio of a satellite link. [8]
b) The path length from an earth station to the GEO satellite is 38500km. calculate the path loss in dB for the following uplink frequencies:
i) 1.6GHz ii) 6.2GHz iii) 14.2GHz iv) 30GHz [7]
- 5 a) What is intermodulation in FDMA? Describe the calculation of C/N ratio with intermodulation. [8]
b) The uplink and downlink C/N of a satellite system is 30dB and 28dB respectively. If the transponder introduces intermodulation products with C/N of 24dB. Determine the overall C/N ratio. [7]
- 6 a) With the help of a neat block diagram explain the functions of earth station transmitter. [8]
b) Describe the various functions of earth station tracking system. [7]
- 7 a) Explain the delay and throughput considerations of MEO satellites. [8]
b) Compare GEO and MEO satellites. [7]
- 8 a) Explain the generation of GPS signals with a neat sketch. [8]
b) Describe the applications of GPS. [7]



Code No: R42043

R10

Set No. 3

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015

SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) Explain the basic principle of satellite communication system with a neat diagram. [8]
b) List and explain the various applications of satellite communications. [7]
- 2 a) What are the various forces acting on the satellite in the orbit? Explain with necessary expressions. [8]
b) A LEO satellite orbits at an altitude of 250km above the earth surface. Calculate the period of the satellite orbit, if the orbit is circular. [7]
- 3 a) Explain how orbit control is obtained in spinner and 3-axis stabilized satellites systems. [8]
b) Write short notes on satellite antennas. [7]
- 4 a) Derive the expression for C/N ratio of a satellite link. [8]
b) A satellite in GEO orbit is at a distance of 39000km from the earth station. The required flux density at the satellite to saturate one transponder at a frequency of 14.3GHz is -90dBW/m^2 . The earth station has a transmitting antenna with a gain of 52 dB. Find the power of the earth station transponder. [7]
- 5 a) Explain the basic principle of FDMA and write its applications. [8]
b) Draw the frame structure of TDMA and describe each field. [7]
- 6 a) What are the various types of antennas used at earth station? Explain anyone with a neat diagram. [8]
b) Describe the different functions of antenna feed system at the earth station. [7]
- 7 a) What are the various NGSO constellation designs? Explain any two. [8]
b) Describe the system design considerations of GEO satellites. [7]
- 8 a) What are the different segments in GPS configuration? Explain. [8]
b) Describe the various sources of errors of a GPS signal. [7]



Code No: **R42043**

R10

Set No. 4

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015

SATELLITE COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Explain the functions of space segment and ground segment of a satellite system. [8]
b) What are the different frequencies used for satellite communications? Explain. [7]
- 2 a) Define azimuth angle and explain how it is evaluated? [8]
b) What are the different launch vehicle selection factors? Explain. [7]
- 3 a) Explain the operation of a 14/11 GHz transponder with a neat diagram. [8]
b) Write short notes on space qualification in a satellite system. [7]
- 4 a) Derive the expression for link equation. [8]
b) LEO satellites use mainly L band, with ranges varying from 1000km to 2500km. calculate the maximum and minimum path loss from earth to the satellite, in dB, for the uplink frequency of 1.6GHz and the downlink frequency of 1.5GHz. [7]
- 5 a) Explain the basic principle, advantages and applications of CDMA. [8]
b) Compare FDMA and TDMA. [7]
- 6 a) With a neat diagram explain the various functions of earth station tracking system. [8]
b) What are the different primary power test methods at the earth station? Explain. [7]
- 7 a) Explain the coverage and frequency considerations of GEO satellites. [8]
b) Compare LEO and MEO satellites. [7]
- 8 a) Explain the operation of a GPS receiver with a neat block diagram. [8]
b) Write short notes on GPS codes. [7]



Code No: **R42052**

R10

Set No. 1

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015

HUMAN COMPUTER INTERACTION

(Common to Computer Science & Engineering and Information Technology)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Discuss the brief history of screen design. [8]
b) What is meant by good user interface? Discuss its importance. [7]
- 2 a) Write in brief the concept of direct manipulation. [7]
b) Discuss about the Web user–interface popularity. [8]
- 3 a) Discuss about interaction of people with computers. [8]
b) Write in brief about the human interaction speeds. [7]
- 4 a) Briefly describe the information retrieval on web. [7]
b) What are the design goals in the screen design? Explain. [8]
- 5 a) Explain about window characteristics. [7]
b) How to select the proper device-based controls? Explain. [8]
- 6 a) Describe choosing colors for statistical graphical screens. [8]
b) How the content and text is arranged for web pages? Explain. [7]
- 7 a) Explain in detail the main criteria for selecting the right tool. [8]
b) Write short notes on CASE environments. [7]
- 8 a) Explain about display technology and scanners. [8]
b) Write short notes on continuous speech recognition [7]



Code No: R42052

R10

Set No. 2

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015
HUMAN COMPUTER INTERACTION
(Common to Computer Science & Engineering and Information Technology)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) Explain the importance of good design. [8]
b) Why do we produce systems that are inefficient? [7]
- 2 a) Discuss about graphical systems. [8]
b) Describe briefly the principles of user interface. [7]
- 3 a) How to determine the basic business functions? Explain. [7]
b) Explain in detail the human action cycle. [8]
- 4 a) Explain various types of statistical graphics. [8]
b) Discuss about common information ordering screen. [7]
- 5 a) Write short notes on tool bars. [7]
b) Discuss the goals of website navigation. [8]
- 6 a) What is an Icon? Explain different icons in detail. [8]
b) Discuss about components of Multimedia. [7]
- 7 a) Discuss briefly about specification methods. [7]
b) Write the software architecture of interface building tools. [8]
- 8 a) Give a brief note about the following
i) Keyboard ii) Function keys [8]
b) Discuss briefly about direct control pointing [7]



Code No: **R42052**

R10

Set No. 3

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015

HUMAN COMPUTER INTERACTION

(Common to Computer Science & Engineering and Information Technology)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Explain the benefits of good design. [8]
b) Discuss the impact of inefficient screen design. [7]
- 2 a) Write in brief the concept of direct manipulation. [7]
b) Discuss in detail various advantages and disadvantages of graphical systems. [8]
- 3 a) How the human interact with computer? Explain. [8]
b) Discuss about users tasks and needs which are important in user interface Design [7]
- 4 a) Explain about screen navigation and flow. [8]
b) How to organize the screen elements? Explain. [7]
- 5 a) How to select the screen-based controls? Explain. [8]
b) Explain about the components of a Window. [7]
- 6 a) What are the issues to be considered in designing title bar and message box. [7]
b) Explain the following with respect to Icons:
i) Types ii) Characteristics iii) Usability iv) Choosing [8]
- 7 a) How to manage the issues in interface building tools? Explain. [8]
b) Discuss briefly about specification methods. [7]
- 8 a) Explain the Indirect pointing devices and drivers. [8]
b) Discuss briefly about digital video. [7]



Code No: **R42052**

R10

Set No. 4

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015
HUMAN COMPUTER INTERACTION
(Common to Computer Science & Engineering and Information Technology)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) Explain the importance of user interface. [8]
b) Discuss the brief history of screen design. [7]
- 2 a) What are the characteristics that differ in web interface and GUI? Explain. [8]
b) Discuss about the popularity of graphics. [7]
- 3 a) Explain any five human characteristics in design. [8]
b) What are design standards? Explain. [7]
- 4 a) Discuss the technological considerations in interface design. [8]
b) Write in detail about visually pleasing composition. [7]
- 5 a) Explain various window operations. [5]
b) Define the following with respect to window
i) Tool bar ii) Split box iii) Command area iv) Work area v) Menu bar [10]
- 6 a) Discuss about various types of messages [7]
b) How to choose the colors for textual graphic screens? Explain. [8]
- 7 a) Give a brief note about the features of user – interface building tools. [8]
b) Write short notes on CASE environments. [7]
- 8 a) Explain the speech and auditory interfaces. [8]
b) Write in brief the advantages and disadvantages of touch screen. [7]



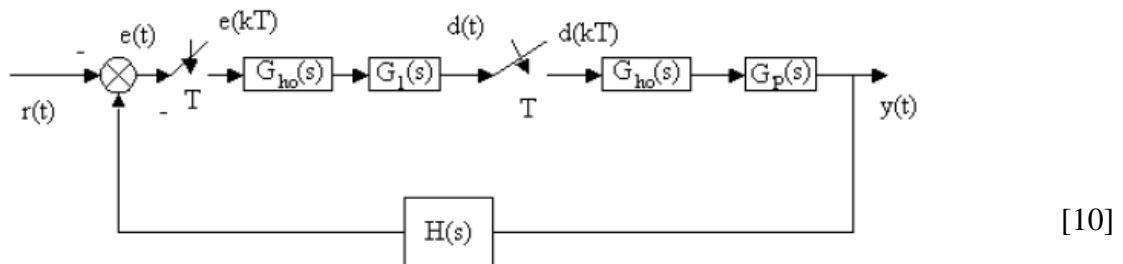
IV B.Tech II Semester Supplementary Examinations, April - 2015
DIGITAL CONTROL SYSTEMS
 (Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

- 1 a) With neat schematic, explain the basic elements of a discrete data control system? [10]
 b) List out the disadvantages of discrete data control system? [6]
- 2 a) Find the z transform of (i) $f(t) = te^{-at}$ (ii) $\cos \omega t$ [8]
 b) Discuss the applications and limitations of z transforms? [8]
- 3 a) Solve the following difference equation
 $y(k+2) + 0.4y(k+1) + 0.1y(k) = -(0.5)^{k+1}$ The initial conditions are $y(0)=0$ and $y(1)=0$. [6]
 b) Find $Y(z)/R(z)$ for the following sample-data closed-loop systems shown in Figure 1.

**Figure.1**

- 4 a) Obtain a state space presentation of the following system:

$$\frac{Y(z)}{U(z)} = \frac{z^{-1} + 2z^{-2}}{1 + 0.7z^{-1} + 0.12z^{-2}}$$
 [8]
 b) State and prove the properties of the state transition matrix of discrete time system. [8]



- 5 Investigate the controllability and observability of the following system

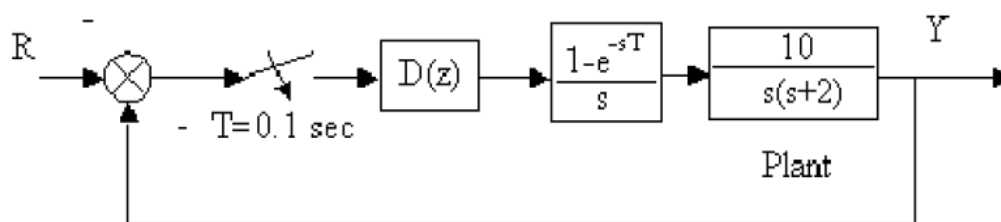
$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \end{bmatrix} = \begin{bmatrix} 1 & -2 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix} + \begin{bmatrix} 1 & -1 \\ 0 & 0 \end{bmatrix} u(k)$$

$$\begin{bmatrix} y_1(k) \\ y_2(k) \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix}$$

[16]

- 6 a) Construct the Jury stability table for the following characteristic equation
 $P(z) = a_0z^4 + a_1z^3 + a_2z^2 + a_3z + a_4$; Where $a > 0$. Write the stability conditions? [10]
- b) How do you map constant frequency loci from s-plane to z-plane? [6]

- 7 A block diagram of a digital control system is shown in Figure 2. Design a compensator $D(z)$ to meet the following specifications:
 (a) Velocity error constant, $K_v \geq 4$ Sec.,
 (b) Phase margin $\geq 40^\circ$ and
 (c) band width = 1.5 rad./sec.

**Figure.2**

[16]

- 8 A regulator system has the plant characterized by

$$X(k+1) = AX(k) + Bu(k)$$

$$Y(k) = CX(k)$$

$$\text{with } A = \begin{pmatrix} 0 & 0 & -6 \\ 1 & 0 & -11 \\ 0 & 1 & -6 \end{pmatrix}, B = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, C = (0 \ 0 \ 1)$$

Compute K so that the control law $u(k) = -KX$ places the closed loop poles at $-2+j3.464$, $-2-j3.464$, -5 .

[16]

IV B.Tech II Semester Supplementary Examinations, April - 2015**DIGITAL CONTROL SYSTEMS****(Electrical and Electronics Engineering)****Time: 3 hours****Max. Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) Illustrate the following examples of discrete data control systems
 i) A step motor control system ii) A digital controller for a turbine and generator [10]
 b) State the advantages of discrete data control system? [6]
- 2 a) Find the inverse z transform of $x(z) = \frac{z^{-1}(1-z^{-2})}{(1+z^{-2})^2}$ using direct division method. [8]
 b) What is meant by z-transform? Explain the important theorems of z-transforms? [8]
- 3 a) Solve the following difference equation [8]
 $x(k+2) - x(k+1) + 0.25x(k) = u(k+2)$ Where $x(0)=1$ and $x(1)=2$. The input function $u(k)$ is given by $u(k)=1, k=0,1,2,..$
 b) Obtain the pulse transfer function of the system is given by $G(s) = \frac{1}{s^2(s+a)}$ [8]
- 4 Consider the discrete control system represented by the following transfer function $G(z) = \frac{1+0.8z^{-1}}{1-z^{-1}+0.5z^{-2}}$. Obtain the state representation of the system in the observable canonical form. Also find its state transition matrix. [16]
- 5 a) Discuss the test for controllability and observability? [8]
 b) State and prove the duality between the controllability and observability? [8]
- 6 Examine the stability of the following characteristic equation
 (i) $P(z) = z^4 - 1.2z^3 + 0.07z^2 + 0.3z - 0.08 = 0$
 (ii) $P(z) = z^3 - 1.1z^2 - 0.1z + 0.2 = 0$
 (iii) $P(z) = z^3 - 1.3z^2 - 0.08z + 0.24 = 0$ [16]
- 7 The closed loop transfer function for the digital control system is given as
 $\frac{C(z)}{R(z)} = \frac{z+0.5}{3(z^2-z+0.5)}$
 Find the steady state errors and error constants due to step input. [16]
- 8 Consider the digital control system $X[(k+1)T] = AX(kT) + Bu(kT)$
 where $A = \begin{bmatrix} 0 & 1 \\ -1 & -1 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$. The state feedback control is described by $u(kT) = -KX(kT)$, where $K = [K_1 \ K_2]$. Find the values K_1 and K_2 so that the roots of the characteristic equation of the closed loop system are at 0.5 and 0.7. [16]



Code No: K0223

R07

Set No. 3

IV B.Tech II Semester Supplementary Examinations, April - 2015

DIGITAL CONTROL SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) What are the different types of analog to digital converter? Explain with neat sketch of successive approximation? [10]
b) Discuss the errors in A/D converters? [6]

- 2 a) By using the inversion integral method, obtain the inverse z transform of
$$X(z) = \frac{1 + 6z^{-2} + z^{-3}}{(1 - z^{-1})(1 - 0.2z^{-1})}$$
 [8]
b) Find the z transform of [8]
(i) $f(t) = \sin \omega t$ (ii) $f(t) = e^{-at}$, where a is a real constant

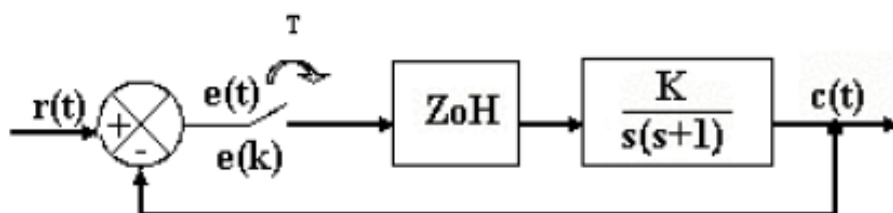
- 3 a) Obtain the pulse transfer function of the system is given by $G(s) = \frac{1 - e^{-Ts}}{s} \frac{1}{s(s+1)}$ [8]
b) Consider the difference equation system $y(k+2) + y(k) = x(k)$ where $y(k) = 0$ for $k < 0$. Obtain the response $y(k)$ when the input $x(k)$ is a unit step sequence. [8]

- 4 a) Explain the concept of state space method? Define (i) state and (ii) state variable [8]
b) Obtain the Jordan canonical form realization for the following transfer function
$$G(z) = \frac{3z^2 - 4z + 6}{(z - \frac{1}{3})^3}$$
 [8]

- 5 a) Discuss the controllability and observability conditions for pulse transfer functions? [8]
b) Consider a discrete linear discrete - data control system, whose input - output relation is described by the difference equation $y(k+2) + 3y(k+1) + 2y(k) = 5u(k+1) + 3u(k)$. Test for system is controllable or not. [8]



- 6 Investigate the stability of the following system and calculate the range of K , over which the system is stable. Select the sampling period $T = 0.4$ sec (figure.1)



[16]

Figure.1

- 7 a) Explain the design procedure of digital controller through bilinear transformation. [8]
b) Explain the digital PID controllers. [8]
- 8 a) Write short note on pole placement design by state feedback. [8]
b) Discuss the dynamics of reduced order observer? [8]



IV B.Tech II Semester Supplementary Examinations, April - 2015**DIGITAL CONTROL SYSTEMS****Electrical and Electronics Engineering)****Time: 3 hours****Max. Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) Explain how the reconstructing the input signal by hold circuits? [8]
 b) Describe with block diagram representation of the S/H devices? [8]
- 2 a) Obtain the z transform of the following $x(k)$
 $x(k) = 9k(2^{k-1}) - 2^k + 3, k = 0,1,2, \dots$
 Assume that $x(k)=0$ for $k<0$. [8]
 b) Find the z transform of $x(k) = \sum_{n=0}^k a^n$, where a is a constant. [8]
- 3 a) Consider the system described by
 $y(k) - y(k-1) + 0.24y(k-2) = x(k) + x(k-1)$ where $x(k)$ is the input
 and $y(k)$ is the output of the system. Determine the weighting sequence of the
 system. Assuming that $y(k)=0$ for $k<0$, determine the response $y(k)$ when the
 input $x(k)$ is a unit step sequence. [10]
 b) Explain how do you map the primary and complementary strips from s-plane
 and z-plane. [6]
- 4 a) What are the different methods for computation of state transition matrix?
 Explain any one method? [10]
 b) Obtain controllable canonical form for the following difference equation is
 $y(k+3) + 5y(k+2) + 7y(k+1) + 3y(k) = u(k)$ [6]
- 5 a) Explain the concept of controllability and observability of discrete time control
 system? [6]
 b) Examine whether the discrete data system
 $X(k+1) = AX(k) + Bu(k)$
 $C(k) = DX(k)$
 where $A = \begin{pmatrix} 0 & 1 \\ -2 & -2 \end{pmatrix}, B = \begin{pmatrix} 1 \\ -1 \end{pmatrix}, D = (1 \ 0)$ is i) State controllable [10]
 ii) Output controllable and iii). Observable
- 6 a) Explain the stability analysis by using bilinear transformation? [6]
 b) Consider the discrete time unity feedback control system (with sampling period
 $T=1$ sec) whose open loop pulse transfer function is given by
 $G(z) = \frac{K(0.3679z+0.2642)}{(z-0.3679)(z-1)}$
 Determine the range of gain K for stability by use of the Jury stability test? [10]
- 7 a) Write short note on design procedure in the w-plane? [8]
 b) Derive the pulse transfer function of digital PID controller. [8]
- 8 a) What do you mean by observer? Where it is used in real time applications? [6]
 b) With the help of block diagram, explain the full order observer. [10]

**IV B.Tech II Semester Supplementary Examinations, April 2015
EMBEDDED AND REAL TIME SYSTEMS
(ECE & EIE)**

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. What are various hardware functional blocks required to build a typical Embedded System? Briefly explain their features and functionality. [16]
2. (a) Explain about the role of Control Unit in microprocessor?
(b) Explain about the bus system related to the microprocessor and various memories?
(c) Write notes on ALU and Registers. [4+8+4]
3. (a) Describe the Elevator Controller using PSM.
(b) Explain pseudo-code for concurrent process.
(c) Write notes on Message Passing between two processes. [6+5+5]
4. (a) Which are the devices that can be connected through IEEE 1394 Bus? Explain its limitations.
(b) Explain about Ethernet LAN Protocol Architecture and give brief description about each protocol. [6+10]
5. With suitable examples explain how do you:
(a) Resume a Task
(b) Change priority of a Task
(c) Query a Task. [5+5+6]
6. With respect to embedded RTOS compare among the following :
(a) Mailbox
(b) Message queue
(c) Event Register
(d) Pipes. [4+4+4+4]
7. With suitable examples explain the importance of the Timers in the Embedded RTOS. [16]
8. (a) Draw and explain Design cycles in the development phase for an embedded system
(b) Describe complete specifications and system requirements of an embedded system. [10+6]

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1. Define the three main characteristics of Embedded Systems that distinguish them from other Computing Systems. [16]
2. (a) Write and explain assembly program for following C program.
int total = 0;
for (int i=10; i!=0; i-)
total += i;
// next instructions
(b) Write notes on opcode and operands. [10+6]
3. (a) Explain about Concurrent Processes.
(b) Explain briefly about embedded system example for Set-top Box system. [8+8]
4. Explain about Ethernet LAN Protocol Architecture and give brief description about each protocol. [16]
5. (a) Briefly explain different Task management calls
(b) Explain the following with respect to real time operating systems.
 - i. Interrupt latency
 - ii. Interrupt Response Time
 - iii. Interrupt Recovery Time. [8+8]
6. (a) Explain the importance of Signals in embedded RTOS.
(b) With suitable examples explain how to
 - i. Install a signal handler
 - ii. Remove a signal handler. [8+8]
7. List the various Open source embedded operating systems and explain their features. [16]
8. With examples explain the Two-level and multi-level logic minimization With respect to synthesis process. [16]

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1. (a) What is the function of clock in processor?
(b) Explain about various ROM and RAM memories. [4+12]
2. (a) Explain briefly how to test and debug an Embedded System.
(b) Compare two different vendor microprocessors of your choice and explain all aspects related to them with neat diagram? [8+8]
3. (a) Explain about HCFSM and the Statecharts Language.
(b) Write and explain general template for capturing a state machine in a sequential programming language. [8+8]
4. Explain about Ethernet LAN Protocol Architecture and give brief description about each protocol. [16]
5. (a) Explain different states of tasks [8+8]
(b) Explain about the following scheduling algorithms
 - i. Primitive multitasking
 - ii. Shortest-job first.
6. With suitable examples explain how to:
 - (a) Close a Pipe
 - (b) Read a Message from the pipe
 - (c) Write to the Pipe. [5+5+6]
7. (a) Discuss any two real-time operating systems and their differences.
(b) Discuss any two handheld operating systems and their differences. [8+8]
8. Define and explain the following with respect to design technology.
 - (a) Behavioral description
 - (b) Structural description
 - (c) Physical description. [5+6+5]

IV B.Tech II Semester Supplementary Examinations, April 2015
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Answer any FIVE Questions
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1. Write Truth Table for the following types of gates and give one example for each type of gate where it can be used. [4+4+4+4]
 - (a) 3 - Input NAND gate
 - (b) 2 - Input XOR gate
 - (c) 2 - Input NOR gate
 - (d) NOT gate.

2. (a) How an Embedded System designer develops environment in designing Embedded System?
(b) Explain about software development process in Embedded Systems. [8+8]

3. (a) How to achieve synchronization among concurrently executing processes?
(b) How numerous operations permitted by the concurrent process model are implemented using single or general-purpose processors? [8+8]

4. (a) Explain briefly about the Communication between nodes in Wireless LAN.
(b) Explain about the CSMA/CA protocol. [8+8]

5. (a) Explain Task scheduling and give some examples
(b) Explain about the following scheduling algorithms
(i) First-in-First-out. (ii) Round-Robin with priority. [8+8]

6. With suitable examples explain how to:
 - (a) Close a Pipe
 - (b) Read a Message from the pipe
 - (c) Write to the Pipe. [5+5+6]

7. (a) Explain the Basic features of Real Time Operating System.
(b) Explain any four VxWorks functionalities. [8+8]

8. (a) Give the standard definition of synthesis and explain about the synthesis process.
(b) Explain how a behavioral synthesis process is different from structural Synthesis process. [8+8]
