G 5069

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electrical and Electronics Engineering

MICROPROCESSORS AND APPLICATIONS (E)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. What are the various flags in 8085 ? Explain their functions.
2. Define instruction cycle, machine cycle and T-state and give their significance.
3. Specify the contents of the accumulator and the status of the CY flag when the following instructions are executed :

   MVI A, B7 H

   ORA A

   RLC
4. Discuss the advantages of register indirect addressing. Give examples.
5. List all the hardware interrupts in 8085 according to their priority and briefly explain the significance of each one.
6. How the interrupts will be enabled, disabled and marked ?
7. Write the command word register format of 8255 and explain the function of each bit field.
8. If an input and output port can have the same address, how does the 8085 differentiate them ?
9. Explain the differences between programmed data transfer and interrupt driven data transfer.
10. What is key debounce ? What is the need for the key debounce circuit in 8279 ?

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. (a) Neatly draw the timing diagram to execute the instruction MVI A, data in 8085 ? (6 marks)

Turn over

(b) Describe how the address and data multiplexing is done. Is it possible to multiplex the data with the higher order byte of the address ? Why ?

(6 marks)

Or

12. Sketch the basic timing diagram for M_1 (fetch cycle), M_2 (read cycle) showing IO/$\overline{M}$, S_0, S_1, ALE, $\overline{RD}$ and AD0 to AD7, A8 to A15 signal waveforms with respect to the clock of the system.

MODULE 2

13. Write an 8085 ALP to count from 0 to 20 H with a delay of 100 mS between each count. After the count 20 H, the counter should reset itself and repeat the sequence. Use register pair DE as a delay register. Draw a flow chart and show your calculations to set up the 100 mS delay.

Or

14. Write an ALP to arrange 100 integers stored from 2010 H onwards and store the result starting from 3010 H onwards. Explain the procedure used in detail.

MODULE 3

15. Explain software and hardware polling. Discuss a scheme for recognising multiple interrupts using priority encoder.

Or

16. Explain with a flow diagram, the sequence of events that take place when an interrupt occurs in a 8085 microprocessor based system. State the uses of RIM, SIM, EI and DI instructions of 8085 with reference to interrupts.

MODULE 4

17. Generate the chip select for RAM area from 2000-2FFF and ROM area from 4000-4FFF. Draw the interface circuit diagram with the necessary control signals.

Or

18. Explain the functional block diagram of 8212. Show how it is used in producing the 8085 interrupt.

MODULE 5

19. Draw the circuit diagram to interface 0800 DAC to 8085. Write a program to limit the output voltage from 0 to 7.5 V.

Or

20. (a) List and explain in the different control signals used by 8275. (6 marks)

(b) How is memory segmentation done in 8086 ? What are its advantages ? (6 marks)

[5 × 12 = 60 marks]

G 5079

(Pages : 2)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electrical and Electronics Engineering

COMPUTER ORGANISATION (E)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. Give and explain the sequence of operations of fetching a word from memory.
2. Distinguish between microprogrammed control and hardwired control.
3. Explain signed division operation with example.
4. Explain the construction of 1 bit ALU.
5. State two techniques to reduce cache miss penalty.
6. Explain the read and write operations in a dynamic RAM.
7. How cache memory enables high operating speed ?
8. Explain memory hierarchy in a computer ? What are its advantages ?
9. Distinguish between synchronous and asynchronous bus system.
10. With a neat diagram, explain asynchronous handshaking protocol to read a word from memory and receive it in an I/O device.

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. Clearly explain five different steps in breaking instruction execution into clock cycles.

Or

12. (a) With a neat diagram which shows the separation of decoding and encoding functions, explain the hardwired control. (6 marks)

    (b) Explain the microinstruction sequencing with next address field. (6 marks)

Turn over

MODULE 2

13. Draw and explain fast adder. Write the number of gate delays required to perform n-bit addition using ripple carry adder and fast adder.

Or

14. Construct a one-stage ALU and explain the same ALU which performs AND, OR and addition on a and b, and a and $\bar{b}$.

MODULE 3

15. (a) With a neat block diagram, explain the operation of a 1M × 1 dynamic memory chip. (6 marks)

(b) With neat diagram, describe FPLA architecture. (6 marks)

Or

16. (a) With a neat circuit diagram, show how read and write operations take place in 1K × 1 memory chip. (8 marks)

(b) Describe the working principle of E^2 PROM. (4 marks)

MODULE 4

17. (a) Explain how a Translation Look-aside Buffer improves the speed of address translation process in virtual memory technique. (6 marks)

(b) Explain accessing a cache and handling the cache misses with suitable examples. (6 marks)

Or

18. Give an example to illustrate direct-mapped, set-associative, fully-associative caches and list their merits and demerits.

MODULE 5

19. What are the different techniques to communicate with the processor for I/O operation ? What are the drawbacks of these techniques and how it is resolved ?

Or

20. Explain in detail, the architecture of I/O bus, especially SCSI bus and PCI bus.

[5 × 12 = 60 marks]

G 5422 (Pages : 2) Reg. No..... 1 copy .....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 604—DIGITAL SIGNAL PROCESSING (EE)

(New Scheme—Regular)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Define a signal. What is a system ? What is signal processing ?
2. What do you understand by DFT computation burden ? Explain.
3. Compare forward and backward difference methods of IIR filter design.
4. List the properties of a causal linear phase FIR filter.
5. Compare floating point and fixed point arithmetics.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. State and explain sampling theorem.
7. Graphically perform circular convolution of the sequences $x_1[n] = \{2, 1, 2, 1\}$ and $x_2[n] = \{1, 2, 3, 4\}$.
8. Convert the analog filter with system function $H(s) = (s + 0.1)/(s + 0.1)^2$ into a digital filter by means of impulse invariance method.
9. How will you design an FIR filter using Fourier series method ?
10. What are the main areas of speech processing ?

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. Determine the output $y[n]$ of a relaxed LTIV system with impulse response $h[n] = a^n u[n], |a| < 1$ when the input is a unit step sequence. Use graphical method of convolution.

Or

12. Derive symmetry properties of DTFT of a complex valued signal $x[n]$.

Turn over

13. Find the response of the system with input $x[n]$ and impulse response $h[n]$, using overlap add method. Given $h[n] = \{1, 2, 3\}$ and $x[n] = \{1, 2, 0, -3, 4, 2, -1, 1, -2, 3, 2, 1, -3\}$.

Or

14. Given $X(k) = \{1, 1- j, 1, 0, 1, 0, 1, 1+ j\}$. Find $x[n]$ using DIF-FFT algorithm.

15. Determine cascade and parallel realizations for the system described by the system function :

$$H(z) = 10\frac{(1-0.5z^{-1})(1+2z^{-1})(1-\frac{2}{3}z^{-1})}{(1-0.75z^{-1})\left(1-\frac{z^{-1}}{8}\right)(1-z^{-1}+0.5z^{-2})}.$$

Or

16. A digital IIR lowpass filter is required to meet the following frequency specifications : passband ripple ≤ 1 dB, passband edge frequency = $0.33\,\Pi$ rad/sample, stopband attenuation $\geq$ 40 dB, stopband edge frequency = $0.5\,\Pi$ rad/sample. Determine the order of the digital Butterworth filter, designed by bilinear transformation. Take T = 1 second.

17. Sketch the lattice realization of the FIR filter with the following difference equation

$y[n] = x[n] + 3.1\,x[n-1] + 5.5\,x[n-2] + 4.2\,x[n-3] + 2.3\,x[n-4]$.

Or

18. The desired frequency of a low pass filter is given by $H_d(\omega) = \begin{cases} e^{-j3\omega}; & |\omega| < \frac{3\Pi}{4} \\ 0 \;:\; \frac{3\Pi}{4} < |\omega| < \Pi & \end{cases}$.

Determine the frequency response of the FIR filter if Hamming window,

$\omega_{Ham}(n) = 0.54 - 0.46\cos\frac{2\Pi n}{N-1}$, $0 \leq n \leq N-1$, with N = 7.

19. Explain the architecture of TMS 320 C54xx processor.

Or

20. Consider a second order IIR filter with $H(z) = \frac{1.0}{(1-.5z^{-1})(1-0.45z^{-1})}$. Find the effect of quantization on pole locations of the given system function in direct form.

(5 × 12 = 60 marks)

G 5434 **(Pages : 2)** **Reg. No.....Copy.....**

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 605 – MICROCONTROLLERS AND EMBEDDED SYSTEMS (EE)

(New Scheme – Regular)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 3 *marks.*

1. Describe the bits of PSW register in 8051.
2. Give examples of Single Bit Instructions in 8051.
3. What are the various modes of operation of Timers in 8051?
4. Draw the connection of a screw segment display to 8051.
5. What are the various Reset conditions in PIC?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. What are the various special Function Registers in 8051?
7. What are the various types of Instructions in 8051? Give examples.
8. What are the SFRs associated with Interrupts Programming? How they are enabled or masked?
9. Show how a server segment display can be interfaced to 8051.
10. Describe briefly on PIC memory organisations.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. With a neat block diagram, explain the architecture and salient features of 8051 microcontroller.

Or

Turn over

12. (a) Describe the internal memory mapping of 8051.

(b) What are the various sources of interrupts in 8051. Discuss on their priority.

(7 + 5 = 12 marks)

13. (a) What are the various Logical Instructions in 8051? Give examples.

(b) Assuming that ROM space starting at 250 H contains "America", write a program to transfer the bytes into RAM locations starting at 40 H.

(6 + 6 = 12 marks)

Or

14. (a) What are the various addressing modes in 8051? Give examples.

(b) Assume that 5 BCD data items are stored in RAM locations starting at 40 H. Write a program to find the sum of all the numbers. The result must be in BCD.

(6 + 6 = 12 marks)

15. (a) Generate a squarewave with ON time 3 ms and an OFF time of 10 ms on all pins of port O. Assume XTAL of 22 MHz.

(b) What are the various modes of operation of serial communications in 8051.

(8 + 4 = 12 marks)

Or

16. (a) What are the various character transmission techniques?

(b) Write a program to take data through ports 0, 1 and 2, one after the other and transfer this data serially, continuously.

(4 + 8 = 12 marks)

17. Describe the interfacing of a matrix keyboard to 8051. Write the programme to check whether any key is pressed or not and to identity the key pressed.

(12 marks)

Or

18. (a) Show how an ADC 0808 can be interfaced to 8051.

(b) How 8051 can be used for frequency measurement?

(7 + 5 = 12 marks)

19. With neat block diagram, describe the architecture of PIC 16F877 microcontroller.

(12 marks)

Or

20. (a) Describe the addressing modes in PIC 16F877 microcontroller with examples.

(b) Write an assembly language program to generate a squarewave using PIC 16F877 microcontroller.

(5 + 7 = 12 marks)

[5 × 12 = 60 marks]

G 5456 (Pages : 2) Reg. No.....1 copy.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 606 L05—BIOMEDICAL ENGINEERING (Elective I) (EE)

(New Scheme—Regular)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. What is the difference between isometric and Isotonic transducers ?
2. What is Einthoren triangle ?
3. Explain the principle of blood pumps.
4. Write short note on oxymeters ?
5. Explain radiographic and fluoroscopic techniques.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Explain the physiology of respiratory system.
7. Explain the conducting system of heart.
8. Explain the direct methods for blood pressure measurement.
9. Explain short wave diathermy.
10. What are the medical applications of thermography ?

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Explain the various types of shock hazards from electrical equipments and methods of preventing such accidents.

Or

12. Explain the formation of action potential and the process of propagating it from one cell to another cell with neat diagram.

Turn over

13. Explain with the help of block diagram the working of ECG machine.

Or

14. Draw the block diagram of EEG machine and explain the working.

15. What is Haemodialysis ? Explain the working of any one type of haemodialyser.

Or

16. Explain :

    (a) Internal pacemakers. (6 marks)

    (b) Heart-Lung machine. (6 marks)

17. (a) Explain the working of blood flow meters. (6 marks)

    (b) Explain the pulmonary function analyser. (6 marks)

Or

18. (a) Explain the working of ventilator and explain the different types. (7 marks)

    (b) Explain the working of Anesthesia machine. (5 marks)

19. Explain with the help of block diagram the working of magnetic resonance imaging system.

Or

20. Describe briefly the working of CT machine. What are the important applications of CT ?

[5 × 12 = 60 marks]

G 5457 (Pages : 2) Reg. No.....Copy.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 606 L06 – RENEWABLE ENERGY RESOURCES (Elective I) (EE)

(New Scheme – Regular)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Define (a) Energy intensity ; (b) Energy GDP elasticity.
2. Define Solar constant, Air mass of irradiance.
3. Give brief description of PV hybrid systems.
4. What are the different types of rotors used in wind turbines?
5. What are the different types of geothermal resources?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Explain the impact of renewable energy generation on environment. Give two points in each process.
7. Draw neat diagram of flat plate collector and any *one* diagram of concentrating collector and explain in detail.
8. Explain the applications of stand alone PV systems.
9. What are the advantages and disadvantages of wind energy systems?
10. What are the different types of tidal plants? Explain each in brief.

(5 × 5 = 25 marks)

Part C

Each full question carries 12 *marks.*

11. Explain the present energy scenario in India. Explain the advantages and limitations of renewable energy sources.

Or

Turn over

12. What are the types of turbines that are used in renewable hydro power? Explain.

13. Explain terrestrial solar radiation, solar radiation geometry and explain the empirical equation for estimating the availability of solar radiation.

Or

14. Write notes on :

    (a) Solar pumping system.

    (b) Solar green house.

    (c) Solar furnace.

15. What is photovoltaic effect? Define efficiency of solar cells. What are the semiconductor materials used for solar cells? Explain.

Or

16. What is PV systems? Explain the types and its application.

17. Explain the modes of wind power generation. Give its application.

Or

18. Explain the principle of operation of an acidic fuel cell. Explain the characteristics and applications of fuel cells?

19. Explain biomass resources. Explain biomass conversion process, explain its application.

Or

20. Explain geothermal resources. How the electric power can be developed from geothermal resources?

(5 × 12 = 60 marks)

G 5411 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 603—CONTROL SYSTEMS (EE)

(New Scheme—Regular)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. What are the constructional features of a D.C. servomotor ? Explain.
2. Explain Nyquist stability criterion.
3. Explain the realisation of a phase lead compensator using Op-Amp.
4. Derive the relation between transfer function and state model.
5. Describe a method for the evaluation of state transition matrix.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Derive a relation between phase margin and damping ratio of a second order system.
7. Write a note on log magnitude *vs.* phase plot.
8. Derive the transfer function of a lag compensator sketch its polar plot.
9. Convert the following system matrix into canonical form :

$$\begin{bmatrix} 4 & 1 & -2 \\ 1 & 0 & 2 \\ 1 & -1 & 3 \end{bmatrix}.$$

10. Obtain a state model for the system described by $y(k+2)+6y(k+1)+10y(k)=u(k)$.

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. Explain the construction, working and applications of synchros.

Or

Turn over

12. Plot the Bode diagrams for the system with transfer function $\frac{10}{s(1+0.4s)(1+0.1s)}$ and find phase margin and gain margin.

13. Find the gain margin and phase margin of the system whose transfer function is $\frac{1+s}{s(1+3s)(1+5s)}$.

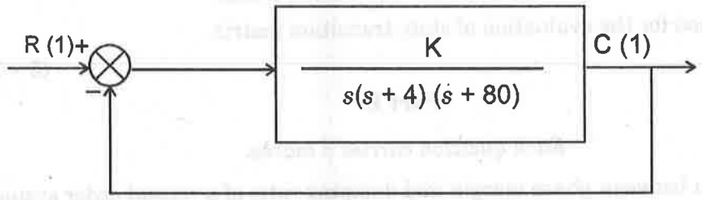
Or

14. Using Nyquist stability criterion test the stability of the system whose open loop transfer function is $\frac{K}{s(s+2)(s+10)}$.

15. Consider a unity feedback system with open loop transfer function, $\frac{K}{s(s+8)}$. Design a lead compensator to have peak overshoot of 9.5%, natural frequency of 12 rad/sec and velocity error coefficient greater that 10 C^0.

Or

16. For the system shown below design a lag compensator to have PM $\geq 33^\circ$ and $K_v = 30\ sec^{-1}$.



17. Obtain two different state models for the system given by :

$$\frac{Y(s)}{U(s)} = \frac{10}{s^3+4s^2+2s+1}.$$

Or

18. The state model of a system is given by :

$$\dot{X} = \begin{bmatrix} 0 & 0 & 1 \\ -2 & -3 & 0 \\ 0 & 2 & -3 \end{bmatrix} X + \begin{bmatrix} 0 \\ 2 \\ 0 \end{bmatrix} 4$$

$$Y = [1 \quad 0 \quad 0]X$$

Obtain the controllable and observable canonical forms.

19. Obtain the time response of the system described by :

$$\dot{X} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} X + \begin{bmatrix} 0 \\ 1 \end{bmatrix} 4$$

$$X[0] = [1 \quad 0]^T.$$

Or

20. Find the state transition matrix of the system matrix :

$$A = \begin{bmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 1 & -2 & 1 \end{bmatrix},$$ using any two different methods.

(5 × 12 = 60 marks)

G 5030

(Pages : 3) Reg. No. 6th sem EEE

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electrical and Electronics Engineering

CONTROL SYSTEMS—I (E)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Graph sheets and semilog sheets to be supplied.

Part A

Answer **all** *questions briefly.*
Each question carries 4 marks.

1. With an example, describe a closed loop control system. What are its advantages and disadvantages ?
2. What is feedback ? What are the effects of feedback on parameter variations ?
3. Draw the block diagram of an armature controlled d.c. motor.
4. Define static error coefficients.
5. For the characteristic equation $s^3 + 3s^2 + 5s + k = 0$, how an increase in the value of K will affect the stability and frequency of oscillation.
6. How transportation lag is analysed using frequency response ? How these systems are classified ?
7. Using Bode asymptotic plot, how the gain margin and phase margin are defined. Using these how the stability of a closed loop system is ascertained ?
8. Draw the polar plot of the system with $G(s)H(s) = \dfrac{60}{s(s+1)(s+2)}$, on a plain paper.
9. Explain the working of a stepper motor.
10. What is the principle of magnetic amplifier ? What are its role in a control system ?

(10 × 4 = 40 marks)

Turn over

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. Simplify the block diagram given below and derive the transfer function (Fig. 1).

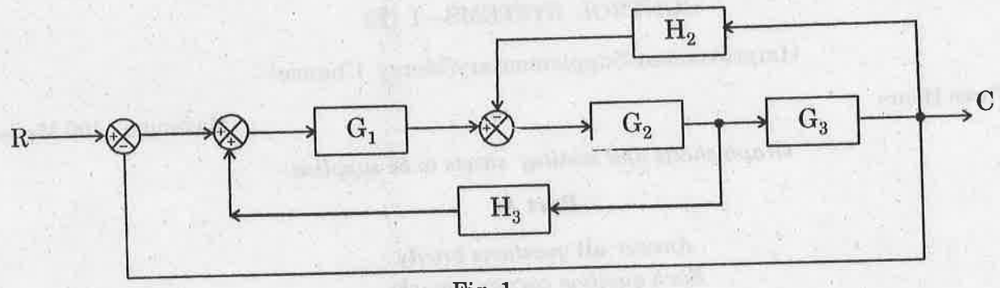


Fig. 1

Or

12. Draw the equivalent signal flow graph for the system shown in the figure (1) above and hence find its overall transfer function.

Module 2

13. A unity feedback system is characterised by an open-loop transfer function $G(s)=\frac{K}{s(s+8)}$.

Determine the gain K so that the system will have a damping ratio of 0.5. For this value of K, determine the settling time, peak overshoot and peak time for a unit step input.

Or

14. A unity feedback system has $G(s)=\frac{40(s+2)}{s(s+1)(s+4)}$.

Determine :

(i) Type of the system.

(ii) All error coefficients

(iii) Error for ramp input with magnitude 4.

Module 3

15. Consider unity feedback system with an open-loop transfer function of $G(s)=\frac{K(s+1)(s+2)}{(s+0.1)(s-1)}$

find the root loci of the system and the value of K for which it is critically damped.

Or

16. (a) Determine the range of K, such that the feedback system having characteristic equation $S(s^2+s+1)(s+4)+K=0$ will be stable.

(6 marks)

(b) Determine the stability of the system with closed loop transfer function :

$$\frac{C(s)}{R(s)}=\frac{10}{s^6+2s^5+2s^4+3s^3+5s^2+6s+1}$$

(6 marks)

Module 4

17. Draw the Bode plot of the system whose open-loop transfer function is :

$GH(s)=\frac{K}{S(1+s)(1+0.1s)(1+0.02s)}$. Determine the value of K for the gain margin of 10 dB.

Or

18. Construct the Bode plots for a unity feedback systems whose open-loop transfer function is $G(s)=\frac{10}{S(s+1)(0.02s+1)}$. From the Bode plot determine :

(a) Gain and phase cross over frequencies.

(b) Gain and phase margin and

(c) Stability of the system.

Module 5

19. The open loop transfer function of a unity feedback system is $G(s)H(s)=\frac{5}{S(s+1)(s+2)}$. Draw the Nyquist plot and hence find out whether the system is stable or not.

Or

20. For the system shown in Fig. 2, find phase margin and gain margin using Nyquist plot for K = 0. Also find the range for K for stability.

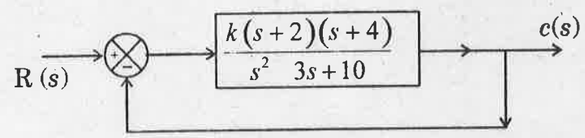


Fig. 2

(5 × 12 = 60 marks)

G 5040

(Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL MACHINES II (E)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Mark

Part A

Answer **all** *questions briefly.*
Each question carries 4 marks.

1. Derive equation for the induced e.m.f. in a 3-phase alternator.
2. Define coil span factor. Explain its significance.
3. Explain the potier method of pre-determination of the voltage regulation of cylindrical roto alternator.
4. Explain the effect of load power factor on the armature reaction of an alternator.
5. Explain the effect of change of fuel supply on the alternators connected in parallel.
6. Explain hunting in synchronous machines.
7. Draw and explain power angle characteristics of a smooth cylindrical rotor-alternator.
8. What are transient and subtransient reactances ?
9. Explain any *one* excitation system of alternator.
10. Obtain the expression for torque of a d.c. machine using Generalised machine theory.

(10 × 4 = 40 marks

Part B

Answer any **one** *full questions from each module.*
Each full question carries 12 *marks.*

MODULE 1

11. A 3-phase, 50 Hz, 2-pole, star connected turbo alternator has 54 slots with 4 conductors per slot The pitch of the coils is 2 slots less than the pole pitch. If the machine gives 3300 V between line on open circuit with sinusoidal flux distribution, determine the useful flux per pole.

Or

Turn over

12. A 3-phase, 16-pole synchronous generator has a resultant air-gap flux of a 0.06 wb per pole. The flux is distributed sinusoidally over the pole. The stator has 2 slots per pole per phase and 4 conductors per slot are accommodated in two layers. The coil span is 150° electrical. Calculate the phase and line induced voltage when the machine runs at 375 r.p.m..

MODULE 2

13. (a) What is armature reaction ? Explain the effect of armature reaction on the terminal voltage of an alternator at (i) unity power factor load ; (ii) zero lagging p.f. load and ; (iii) zero leading p.f. load. Draw the relevant phasor diagrams.

(7 marks)

(b) Explain the procedure to conduct slip test on salient pole alternators to determine its X_d and X_q. Give the circuit diagrams.

(5 marks)

Or

14. A 400V, 50Hz, delta-connected alternator has a direct-axis reactance of 0.1 Ω and a quadrature-axis reactance of 0.07Ω per phase. The armature resistance is negligible. The alternator is supplying 1000 A at 0.8 lagging pf.

(a) Find the excitation e.m.f. neglecting saliency and assuming $X_s = X_d$.

(b) Find the excitation e.m.f. taking into account the saliency.

MODULE 3

15. (a) Explain the different methods of starting of synchronous motors. (5 marks)

(b) A 2000 KVA, 3-phase, 8-pole alternator is driven at 750 r.p.m., run in parallel with other machines on 6000V bus-bars. Find the synchronizing power per mechanical degree of displacement and the corresponding synchronising torque. The synchronous reactance is 6 ohm per phase.

(7 marks)

Or

16. (a) Explain automatic synchronising. (5 marks)

(b) A 400 V, 10 HP, 3-phase synchronous motor has negligible armature resistance and a synchronous reactance of 10Ω/phase. Determine the minimum armature current and the corresponding e.m.f. for full load condition. Assume on efficiency 88%.

(7 marks)

MODULE 4

17. (a) Describe a method to obtain V and inverted V-curves of a 3-phase synchronous machine.

(8 marks)

(b) A 2-pole, 50 Hz, 3-phase, 100MVA, 33 KV turbo alternator connected to the infinite bus has a moment of inertia of 10^6 kg m^2 in its rotating parts. It has a synchronous reactance of 0.5 pu. Calculate the natural frequency of oscillation.

(4 marks)

Or

18. A 5 MVA, 10 kV, 1500 r.p.m., 50 Hz alternator runs in parallel with other machines. Its synchronous reactance is 20%. Find for (a) no-load, ; (b) full-load at power-factor 0.8 lagging, synchronising power per unit mechanical angle of phase displacement and calculate the synchronising torque if mechanical displacement is 0.5°.

MODULE 5

19. Develop the voltage-current relationship for a generalized two axis machine windings on stator and rotor on both axis. Obtain expressions for the torque and output voltage.

Or

20. (a) Describe the methods of increasing the response of an exciter.

(b) Describe the important features and applications of brushless alternator.

[5 × 12 = 60 marks]

G 5050 (Pages : 3) Reg. No.....1 copy.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electrical and Electronics Engineering

ELECTRICAL POWER TRANSMISSION (E)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 4 *marks.*

1. Explain briefly the 'skin effect' in a transmission line. On what factors does it depend?
2. A single-phase, 25 km long overhead line consists of two conductors 1.8 meters apart, diameters of each conductor being 6 mm. If the line voltage is 3.3 kV, 50 Hz, determine the charging current of the open circuited line.
3. Discuss the advantages and disadvantages of bundled conductors.
4. Write a short note on testing of insulators.
5. Briefly explain the Ferranti effect.
6. What is booster transformer? Explain its role in power system.
7. What are the advantages and disadvantages of corona?
8. What are the factors considered when selecting a location for substation?
9. Briefly explain the need for EHV transmission.
10. What are the technical advantages of HVDC transmission system?

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. (a) Show that the inductance of each conductor of a single-phase line composite conductor is given by $L = 2 \times 10^{-7}$ In (D_m/D_s) H/m where D_m and D_s are mutual geometric mean distance between conductors and self geometric mean distance of the conductor respectively. (12 marks)

Or

(b) Briefly explain the effect of earth on capacitance of transmission lines.

(c) Calculate the capacitance of a conductor per phase of a three-phase 400 km long line, with the conductors spaced at the corners of an equilateral triangle of side 4 m and the diameter of each conductor being 2.5 cm.

(7 + 5 = 12 marks)

12. (a) What is sag? Derive the expression for sag when the conductor takes the form of a parabola, supported at equal levels.

(b) Two towers of height 40 m and 90 m, respectively support a transmission line conductor at a water crossing. The horizontal distance between the towers is 500 m. if the allowable tension in the conductor is 1600 kg, find the minimum clearance of the conductor. Weight of the conductor is 1.1 kg/m. bases of the towers can be considered to be at water level.

(6 + 6 = 12 marks)

Or

(c) What is string efficiency? Discuss the different methods for improving the string efficiency.

(12 marks)

13. (a) How do you classify transmission lines?

(b) A 220 kV, 50 Hz, three-phase transmission line is 50 km long. The resistance per phase is 0.15 Ω/km, the inductance per phase is 1.33 mH/km and the shunt capacitance is negligible. Use short line model to determine : (i) the voltage and power at the sending end, (ii) voltage regulation and efficiency when the line is supplying a three-phase load of 400 MVA, 220 kV at 0.8 p.f. lagging.

(4 + 8 = 12 marks)

Or

(c) Draw the vector diagram of nominal T model of medium transmission line. Also derive the ABCD constants.

(12 marks)

14. (a) In a 3-phase overhead line, the conductors have an overall diameter of 3 cm each and are arranged in delta formation. Assuming a critical disruptive voltage of 250 kV between the lines, an air density factor of 0.9 and m_0 = 0.95, find the minimum spacing between conductors that is allowable. Assume fair weather conditions.

(b) Briefly explain the factors affecting corona loss.

(6 + 6 = 12 marks)

Or

(c) Briefly explain the various methods of neutral grounding.

(12 marks)

15. (a) Discuss the different methods to increase the transmission capability of EHV lines.

(b) What are the different types of HVDC transmission systems? Describe them.

(6 + 6 = 12 marks)

Or

(c) With the help of neat sketches, explain the various components of HVDC transmission system.

(12 marks)

[5 × 12 = 60 mark]

MODULE 5

19. Determine H (*z*) for the lowest order Butterworth filter satisfying the constraints :

$$\left| H\left(e^{jw}\right) \right| \leq 0.2 \text{ for } \frac{3\pi}{4} \leq w \leq \pi\sqrt{0.5},$$

$$\left| H\left(e^{jw}\right) \right| \leq 1 \text{ for } 0 \leq |w| \leq \frac{\pi}{2}$$

T = 1 second.

Or

20. (a) Design a Chebyshev analog low pass filter that has – 3dB cut-off frequency of 100 rad/sec. and a stop band attenuation of 25 dB or greater for all radian frequencies past 250 rad/sec. (8 marks)

(b) Mention the key features of TMS 320 C DSP processor family. (4 marks)

[5 × 12 = 60 marks]

G 5059

(Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch—Electrical and Electronics Engineering

DIGITAL SIGNAL PROCESSING (E)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. Illustrate causal and non-causal, and stable and unstable digital systems, showing input and output sequences.

2. A linear shift invariant system is characterized by its unit sample response $h\ (n)$ given by $h\ (n) = a^n\ u\ (n)$.

   (i) Does this represent a causal system?

   (ii) Is the system BIBO stable ?

3. A sequence $x\ [n]$ has DFT given by $x\ [k] = [1, 7]$. What is the DFT of $x\ [(n-1) \bmod 2]$?

4. Obtain the N-point DFT of the sequence $x\ (n) = e^{jw_{min}}$, $0 \leq n \leq (N-1)$.

5. Find the inverse Z-transform of $F\ (z) = \dfrac{z}{(z-1)^2\ (z-2)}$.

6. Given $H\ (z) = (1 + 2z^{-1} - z^{-2})\ (1 - z^{-1} - z^{-2})$ for a FIR system. Obtain the realisation in cascade form.

7. Realise the following system function by linear phase FIR structure :—

$$H(z) = \frac{2}{3}z + 1 + \frac{2}{3}z^{-1}.$$

8. A linear phase FIR filter has seven coefficients as listed below :

   $h\ (0) = h\ (6) = -0.032$
   $h\ (1) = h\ (5) = 0.036$
   $h\ (2) = h\ (4) = 0.046$
   $h\ (3) = -0.046$

   Draw the realisation diagrams for the filter using

   (i) direct (transversal) ; and

   (ii) linear phase structures.

Turn over

9. Why is IIR filter design called an indirect way of designing digital filter?

10. Explain forward differencing method of transforming analog filter to digital filter.

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. (a) Solve for $y(n)$ if $y(n) = x(n) - 3y(n-1)$ $x(n) = \left(\frac{1}{2}\right)^n u(n)$ and $y(-1) = 1$. (8 marks)

(b) The impulse response of a system is $h(n) = a^{-n} u(-n)$ with $0 < a < 1$. Check whether the system is stable and causal. (4 marks)

Or

12. (a) Determine which of the following systems is invertible? If it is, construct the inverse system. If it is not, find two input signals that have the same output :

(i) $y(t) = 2x(t)$.

(ii) $y(t) = x(t+1)$.

(ii) $y(t) = \cos x(t)$.

(3 × 2 = 6 marks)

(b) Determine the CTFT of the following continuous-time function defined for $-\infty < t < \infty$,

$$y_a(t) = \cos(\Omega_0 t).$$

(6 marks)

Module 2

13. (a) Compute DFT of the following sequence $x(n) = [1, j, -1, -j]$. (6 marks)

(b) Evaluate the 8-point DFT of the $x(n)$ by DIFFFT algorithm for $x(n) = \{1, 3, 5, 7, 2, 4, 6, 8\}$. (6 marks)

Or

14. (a) If $X_1(k)$ and $X_2(k)$ are DFT's of discrete time sequences $x_1(n)$ and $x_2(n)$ respectively, each of length N and $X_3(k) = X_1(k).\ X_2(k)$, show that

$$x_3(n) = \sum_{m=0}^{N-1} x_1(m)\, x_2[(n-m)]_N ; 0 < n < (N-1)$$

(6 marks)

(b) Compute the circular convolution of $x_1(n)$ (N) $x_2(n)$, for N = 4, $x_1(n) = \{2, 1, 1, 2\}$ $x_2(n) = \{1, -1, -1, 1\}$. (6 marks)

Module 3

15. A system is represented by transfer function

$$H(z) = 3 + \frac{4z}{\left(z - \frac{1}{2}\right)} - \frac{2}{\left(z - \frac{1}{4}\right)}$$

(i) Does this H (z) represent a FIR or IIR filter ? (4 marks)

(ii) Give a difference equation realization of the system using Direct form I and Direct form II. (8 marks)

Or

16. (a) Determine the inverse z-transform of, $x(z) = \frac{z}{3z^2 - 4z + 1}$ if the regions of convergence are

(i) $|z| < 1$, (ii) $|z| < \frac{1}{2}$ and (iii) $\frac{1}{2} < |z| < 1$.

(3 × 2 = 6 marks)

(b) Determine the z-transform of the analog input signal $x(t) = e^{-at}$ applied to digital filter. (6 marks)

Module 4

17. (a) Realise the linear phase FIR filter having the following impulse response

$$h(n) = \delta(n) - \frac{1}{4}\delta(n-1) + \frac{1}{2}\delta(n-2) + \frac{1}{2}\delta(n-3) - \frac{1}{4}\delta(n-4) + \delta(n-5).$$

(6 marks)

(b) Design a symmetric FIR low pass filter whose desired frequency response is

$$H_d(w) = \begin{cases} e^{-jw_n} & , \text{ for } |w| \le w_c \\ 0 & , \text{ otherwise.} \end{cases}$$

Filter length is 7 and w_c = 1 radian/sample. Use rectangular window. (6 marks)

Or

18. Design an ideal bandpass filter with frequency response, $H_d(e^{jw}) = 1$ for $\frac{\pi}{4} \le |w| \le \frac{3\pi}{4}$. Use rectangular window with N = 11 in the design.

Turn over

G 5393

(Pages : 3)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 601—POWER GENERATION AND DISTRIBUTION (EE)

(New Scheme—Regular)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 3 *marks.*

1. Explain the function of surge tank.
2. What is the effect of power factor on cost of generation ?
3. What is the need of primary distribution in an electric power system ?
4. What is ferroresonance ?
5. Discuss the need for energy management.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Discuss the factors to be considered while selecting site for a hydroelectric plant.
7. Explain load factor and diversity factor. What is the importance of load factor ?
8. What are the advantages of doubly fed distributor over single fed distributor ?
9. Discuss the relative merits and demerits of underground and overhead systems.
10. Explain the types of Energy Audit.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. (a) Draw and explain the schematic arrangement of Nuclear power plant. (8 marks)
    (b) Why is regenerator used in gas turbine power plants ? (4 marks)

Or

12. (a) Draw the layout of a diesel power plant and explain the auxiliaries used. (8 marks)

(b) Discuss the types of condensers used in thermal stations. (4 marks)

13. (a) What are the objectives of Tariff ? Explain two part tariff and power factor tariff. (8 marks)

(b) A 100 MW power station delivers 100 MW for 2 hours, 50 MW for 4 hours, 25 MW for 4 hours and is shunt down for the rest of each day. It is also shut down for maintenance for 45 days each year. Calculate annual load factor. (4 marks)

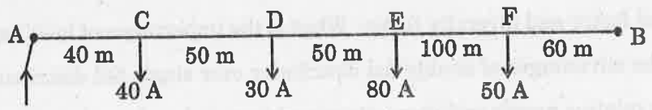
Or

14. (a) What are load curves and load duration curves ? Discuss the effect of variable load on power station operation. (8 marks)

(b) The maximum demand of a consumer is 4.5 kW and the total energy consumption is 8760 kWh. It the energy is charged at the rate of 20 paise per unit for 500 hours use of the maximum demand per annum plus 10 paise per unit for additional units, calculate the cost/kWh. (4 marks)

15. (a) State and explain Kelvin's law. What are its limitations ? (8 marks)

(b) A 2 wire d.c. distributor AB of 300 m is fed from A and is loaded as in figure. If the maximum permissible voltage drop is not to exceed 10V, find the cross-section area of the conductor. Take $\rho = 1.8 \times 10^{-8}\ \Omega$ m.



(4 marks)

Or

16. (a) Explain and compare Radial and Ring main distribution systems. (8 marks)

(b) A 2-conductor line 1 km length supplies a constant current of 200 A throughout the year. The cost of cable and installation is Rs. $(20a + 20)$ per metre where a is conductor cross-section area in cm^2. The cost of energy is Rs. 5 paise per unit and interest and depreciation charges are 10%. Calculate the most economical conductor size. Take resistivity of conductor 1.73 $\mu\Omega$ cm. (4 marks)

17. Write short notes on the following :

(a) Three phase three wire and four wire distribution systems.

(b) Power factor improvement using capacitors.

(c) Voltage drop computation in underground cable system.

(4 × 3 = 12 marks)

Or

18. A single phase distributor 1 km long has resistance and reactance per conductor 0.1 Ω and 0.15 Ω respectively. At far end, the voltage is 200 V and the current is 100 A at a power factor of 0.8 lag At the midpoint of the distributor, a current of 80 A is tapped at a p.f. of 0.6 lag with respect to the voltage at the midpoint. Calculate the sending end voltage and the phase angle between voltages at the two ends. (12 marks)

19. Explain the various measures adopted to achieve energy saving in electric motors. (12 marks)

Or

20. Explain the following :

(a) Demand side energy management.

(b) Energy Auditing.

(6 × 2 = 12 marks)

[5 × 12 = 60 marks]

G 5402 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electrical and Electronics Engineering

EE 010 602—INDUCTION MACHINES (EE)

(New Scheme—Regular)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Discuss the construction of rotor of squirrel cage induction motor.
2. Explain how starting torque is increased in slip ring induction motor.
3. List the applications of induction generator.
4. Explain the principle of commutator motor.
5. What is magnetic levitation ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Explain cogging and how is it eliminated.
7. Explain single phasing in three phase induction motor.
8. How does slip ring induction motor operate as synchronous induction motor ?
9. State merits, demerits and applications of repulsion motor.
10. Discuss the types of stepper motors.

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. A 415 V, 40 HP, 4 pole, 50 Hz, delta-connected induction motor gave the following test data :

No-load test	: 415 V, 21 A, 1250 W
Blocked rotor test	: 100 V, 45 A, 2730 W

Turn over

Construct the circle diagram and determine :

(a) Line current, power factor and efficiency for rated output.

(b) Maximum torque and corresponding slip. Assume stator and rotor copper losses are equal at stand-still.

(12 marks)

Or

12. (a) Draw and explain the phasor diagram of three-phase induction motor. (6 marks)

(b) The power input to a 500 V, 50 Hz three-phase induction motor running at 975 r.p.m. is 40 kW. The stator losses are 1 kW and friction and windage losses are 2 kW. Calculate the rotor copper loss, power output, efficiency and shaft torque.

(6 marks)

13. (a) Explain auto transformer starting and star delta starting of induction motor. (8 marks)

(b) A 4 pole induction motor and 6-pole induction motor are cumulatively cascaded and connected to 50 Hz supply. The frequency in the rotor circuit of the 6-pole motor is found to be 1 Hz. Determine the ship in each motor and the actual speed of the set.

(4 marks)

Or

14. (a) Discuss briefly the various methods of speed control of three-phase induction motor.

(8 marks)

(b) Determine the suitable autotransformer ratio for starting a 3-phase induction motor with line current not exceeding three times the full-load current. The short circuit current is 5 times the full-load current and full-load ship is 5%. Estimate the starting torque in terms of full-load torque.

(4 marks)

15. (a) Explain the working of Induction generator. What are the types of Induction generators ?

(8 marks)

(b) Draw and explain the equivalent circuit of single-phase induction motor. (4 marks)

Or

16. (a) Explain the construction and operation of synchronous induction motor. (8 marks)

(b) Draw and explain the torque slip curve of induction machine when it operate as motor and generator.

(4 marks)

17. (a) Explain the construction and working of universal motor. (8 marks)

(b) Write short note on compensated induction motor. (4 marks)

Or

18. (a) Explain the construction and operation of repulsion motor. (8 marks)

(b) Discuss how e.m.f. is induced in commutator winding of AC commutator machines.

(4 marks)

19. Explain the construction, operation and working of the following :

(a) Switched reluctance motor.

(b) Permanent magnet synchronous motor.

(6 + 6 = 12 marks)

Or

20. (a) Explain the modes of operation of variable reluctance stepper motor. (8 marks)

(b) Discuss the applications of linear induction motor. (4 marks)

[5 × 12 = 60 marks]