F 3138 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : ECE/ELI/Applied Electronics and Instrumentation Engineering

LINEAR INTEGRATED CIRCUITS (LAS)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Draw Op-amp non-inverting buffer with unity gain.
2. Compare closed loop and open loop bandwidth of OP-amp.
3. Give four features of an ideal Op-amp.
4. Draw a single Op-amp circuit to obtain sum of three voltages $V_1 + V_2 + V_3$.
5. Define slew rate. A sine wave of frequency 1 kHz is applied to non-inverting Op-amp of gain 10. Calculate minimum slew rate required to amplify without distortion.
6. A differential amplifier output is found to be 10^{-3} volt when inputs are connected to 1V. If one of the inputs is enhanced to 2V, the output changes to 10^3 volt. Calculate CMRR in dB.
7. Distinguish between Lock range and capture range in a PLL.
8. What is fold back protection in IC 723 ?
9. Differentiate between input and output offset voltages. Also differentiate between input bias current and offset current.
10. Draw the circuit of a 555 astable multivibrator and explain.

(10 × 4 = 40 marks)

Part B

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

11. Draw the block diagram of different stages used in a Operational Amplifier. Explain functions of each block.

Or

12. Explain the frequency response of a operational amplifier as the gain is varied.

Turn over

13. Distinguish between feedbacks present in inverting and non-inverting op-amp. Give features of those feedbacks.

Or

14. Draw a voltage to current convertor using Op-amp and explain its working.

15. Draw the circuit of a sample and hold circuit using op-amp. Explain its working.

Or

16. Explain the working of a Weinbridge oscillator using Op-amp.

17. Draw circuit diagram of a monostable multivibrator using IC 555.

Or

18. Explain how a band stop filter can be realized using LPF and HPF.

19. Explain the working of a PLL and how it can be used for FM demodulation.

Or

20. Explain the working of IC 566 as a VCO.

(5 × 12 = 60 marks)

F 3146 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Electronics and Communication / Electronics and Instrumentation Engineering

MICROPROCESSORS AND MICRO CONTROLLERS (L S)

(Improvement / Supplementary / Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 4 *marks.*

1. What are different types of interrupts used by 8085?
2. Draw the timing diagram of Opcode fetch cycle.
3. Discuss the types of memory available in 89C51.
4. Describe the function of XCH instruction in 89C51.
5. Write short notes on Special Function Registers used in 89C51.
6. Describe the types of interrupts used in 89C51.
7. What is the role of the SCON register in serial data transfer?
8. What is meant by Auto Reload feature and where it is used?
9. Write the expressions for finding the Baud rates in different modes of the Serial interface in 89C51.
10. Distinguish between Microprocessor and Micro controllers.

(10 × 4 = 40 marks)

Part B

Each full question carries 12 *marks.*

11. Explain the internal architecture of 8085 microprocessor with neat diagram.

Or

12. Explain the steps involved in fetching an instruction, MOV C, A, stored in the memory location 2005_H in detail.

Turn over

13. What are the functional blocks available in 89C51? Explain with a block diagram.

Or

14. (a) Write about Bit processing facilities of 89C51 in detail.

    (b) Explain the port configuration $PORT_0$ to $PORT_3$ in 89C51.

(6 + 6 = 12 marks)

15. (a) Describe the 89C51 addressing modes with example.

    (b) How many types of CALL and JMP instructions exist in 89C51? Explain.

(6 + 6 = 12 marks)

Or

16. Explain in detail about all instructions of data transfer group of 89C51 and give example for each one.

17. Explain different steps involved in executing an interrupt in 89C51 in detail.

Or

18. Explain how 89C51 can be interfaced to external data ROM with suitable diagram.

19. Describe the operation of 89C51 timers in detail.

Or

20. How will you decide the Baud rate for mode 1 in 89C51 serial port? Write a program to set the Baud rate at 2400 bits per sec in 89C51.

[5 × 12 = 60 marks]

F 3127 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Electronics and Communication/Applied Electronics and Instrumentation Engineering

COMPUTER ORGANISATION AND ARCHITECTURE (LA)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Explain the importance of bus structures.
2. Explain how floating point numbers are represented.
3. Write brief notes on PLA's.
4. What do you mean by microinstruction ?
5. Explain the need for secondary memory.
6. What are the advantages of having memory modules ?
7. Write a brief note on interrupt nesting.
8. What do you mean by Daisy chain ?
9. Explain about array processors.
10. What are the advantages of pipeline architectures ?

(10 × 4 = 40 marks)

Part B

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

11. Explain the different addressing modes with suitable examples.

Or

12. Explain the design of fast adders.
13. With the help of neat diagrams, explain how data is fetched from memory.

Or

14. Explain about microprogrammed control in detail.

Turn over

15. With neat diagram, explain the internal organisation of static memory and dynamic memory.

Or

16. Explain the different mapping techniques.

17. Explain how a processor access I/O device.

Or

18. Write short notes on :

    (a) Vectored Interrupts.

    (b) I/O Interface standards.

19. Elaborate on the different forms of parallel processing.

Or

20. Write short notes on :

    (i) Interconnection networks.

    (ii) Pipeline Architecture.

(5 × 12 = 60 marks)

F 3117 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Electronics and Communication Engineering

APPLIED ELECTROMAGNETIC THEORY (L)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define Electric potential and Electric field at a point.
2. State Gauss law and explain one of its applications.
3. Write expression for magnetic field at center of a solenoid.
4. State Biot-Savarts law.
5. Write Maxwell's equation in differential form and explain.
6. What is meant by dominant modes in wave guides ? Give their advantages.
7. Write expression for cut-off frequency of a rectangular wave guide. Explain.
8. What is the phase shift between Electric and magnetic fields in em wave propagating in a conducting medium ? Explain.
9. Distinguish between Poisson's and Laplace's equations.
10. What is Skin effect ? Explain how skin depth varies with frequency.

(10 × 4 = 40 marks)

Part B

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

11. Derive the expression for the capacitance of an isolated sphere.

Or

12. Explain the significance of curl and divergence of a vector field. Distinguish between solenoidal and irrotational vector flow.

Turn over

13. Derive an expression for energy stored in a magnetic field.

Or

14. Find the magnetic field intensity in the axis of a ring of radius '*r*' at distance '*h*' from the plane of ring.

15. State and prove Maxwell's equations. Obtain them in integral forms.

Or

16. Obtain an expression for polarization ellipse. Discuss special cases of elliptical polarization.

17. Deduce expressions for field components of TE mode in a rectangular wave guide.

Or

18. What is the dominant mode in rectangular wave guides ? Explain, why TM_{01} mode cannot propagate through rectangular wave guide.

19. Sketch the input impedance of short circuited and open circuited lines, as length is varied.

Or

20. What is the principle of single stub matching ? Derive the expressions for stub length and stub location.

(5 × 12 = 60 marks)

F 3048 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Common to all Branches Except CS and IT

EN 010 501 A—ENGINEERING MATHEMATICS—IV

(Regular—New Scheme)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. For the conformal transformation $w = z^2$, find the coefficient of magnification at $z = (1 + i)$.
2. Expand $\cos z$ in a Taylor's series about $z = \pi/4$.
3. Using bisection method, find the negative root of $x^3 - x + 11 = 0$.
4. Solve $\frac{dy}{dx} = y - \frac{2x}{y}, y(0) = 1$ in the range $0 \le x \le 0.2$ using Euler's method.
5. Obtain the dual of :

   Minimize $Z = 8x_1 + 3x_2 + 15x_3$

   subject to $2x_1 + 4x_2 + 3x_3 \ge 28$

   $3x_1 + 5x_2 + 6x_3 \ge 30$

   $x_1, x_2, x_3 \ge 0$.

(5 × 3 = 15 marks)

Part B

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

6. Prove that the function $\sinh z$ is analytic and find its derivative.
7. Find the sum of the residues of the function $f(z) = \frac{\sin z}{z \cos z}$ at its poles inside the circle $|z| = 2$.
8. Find the real root of $x^4 - x - 9 = 0$ using Newton-Raphson method, correct to three decimal places.
9. Using Runge-Kutta method, find y when $x = 1.2$ in steps of 0.1, if $\frac{dy}{dx} = x^2 + y^2$ and $y(1) = 1.5$.

Turn over

10. By graphical method or otherwise,

Maximise $Z = x_1 + \frac{3}{5}x_2$

subject to $5x_1 + 3x_2 \leq 15$

$3x_1 + 4x_2 \leq 12$

$x_1, x_2 \geq 0.$

(5 × 5 = 25 marks)

Part C

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

Module 1

11. (a) Show that the function $u = e^{-2xy} \sin(x^2 - y^2)$ is hormonic. Find the conjugate function v and express $u + i$ V as an analytic function of z.

(7 marks)

(b) Determine the analytic function whose real part is $e^{2x}(x \cos 2y - y \sin 2y)$. (5 marks)

Or

12. (a) Under the transformation $w = \frac{z - i}{1 - iz}$, find the map of the circle $|z| = 1$ in the w-plane.

(6 marks)

(b) Find the bilinear transformation which maps the points $z = 1, -i, -1$ into the points $w = i, 0, -i$.

(6 marks)

Module 2

13. (a) Evaluate by contour integration $\int_0^{2\pi} \frac{\cos 2\theta \, d\theta}{1 - 2p\cos\theta + p^2}, 0 < p < 1.$ (7 marks)

(b) Obtain the Laurent's series expansion of $f(z) = \frac{1}{(z-1)(z-2)}$ valid in the region $|z - 1| < 1$.

(5 marks)

Or

14. (a) Evaluate $\int_0^{2+i} (\bar{z})^2 \, dz$ along

(i) the real axis to 2 and then vertically to $2 + i$.

(ii) along the line $2y = x$.

(9 marks)

(b) Evaluate $\oint_C \frac{(2z-1)}{z(z+1)(z-3)} dz$, where C is the circle $|z| = 2$. (3 marks)

Module 3

15. Find the real root of :

(a) $xe^x = 3$ and

(b) $x^6 - x^4 - x^3 - 1 = 0$

by Regular-Falsi method, correct to three decimal places.

Or

16. Solve the following system of linear equations by Gauss-Seidel iterative method

$9x + 2y + 4z = 20$

$x + 10y + 4z = 6$

$2x - 4y + 10z = -15.$

Module 4

17. Using Runge-Kutta method of fourth order solve for $y(0.1)$, $y(0.2)$ and $y(0.3)$ if $y^1 = xy + y^2, y(0) = 1.$

Or

18. Solve by Milne's predictor-corrector method, $\frac{dy}{dx} = y - x^2$ with starting values : $y(0) = 1$, $y(0.2) = 1.12186$, $y(0.4) = 1.4682$, $y(0.6) = 1.7379$ and find the value of y when $x = 0.8$.

Module 5

19. Using Big M method, solve the LPP :

Minimize $Z = 10x_1 + 3x_2$

subject to $x_1 + 2x_2 \geq 3$

$x_1 + 4x_2 \geq 4$

$x_1, x_2 \geq 0.$

Or

20. Goods have to be transported from sources S_1, S_2 and S_3 to destinations D_1, D_2 and D_3. The TP cost per unit capacities of the sources and requirements of the destinations are given in the following table. Determine a TP schedule so that the cost is minimized.

	D_1	D_2	D_3	Capacity
S_1	8	5	6	120
S_2	15	10	12	80
S_3	3	9	10	80
Requirement	150	80	50	

(5 × 12 = 60 marks)

F 3107 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Electronics and Communication Engineering/Applied Electronics and Instrumentation

POWER ELECTRONICS (L, A)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. State the conditions for successful turn-on and turn-off of an SCR.
2. Explain the mechanism of *dv/dt* triggering in SCR.
3. A singles-phase fully controlled converter is feeding an RL load, with continuous load current. Draw the variation of the average output voltage with respect to firing angle 'α'.
4. How soft-start feature is implemented in SG 3524 IC ?
5. Draw a three-phase a.c. voltage controller configuration.
6. Draw the waveform of the load voltage of an R-L load fed from a single-phase a.c. voltage controller with firing angle 45° and conduction angle for the thyristors is 120°.
7. Explain the working of a step-down chopper.
8. What is the principle of operation for a Type-B chopper ?
9. Explain the square wave operation of a single-phase voltage source inverter.
10. Compare CSI and VSI.

(10 × 4 = 40 marks)

Part B

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

11. (a) A MOSFET is connected in anti-parallel with a diode (i.e, the source of MOSFET is connected to the anode of the diode and the drain to the cathode). Comment on the polarities of the blocking voltage and conducting current in the combined switch. If the devices are assumed to be ideal, show the characteristics of the combined device in the *v- i* plane. (6 marks)

(b) What are the difficulties in the series operation on of SCRs ? (6 marks)

Or

12. (a) A thyristor is connected in a circuit. The power dissipated in the device is 50 W. If the thermal resistance of the device (from junction to casing) is 0.8°C/W. The thermal resistance (from sink to ambient) of the heat sink in which the thyristor is placed is 0.5°C/W. The ambient temperature is 50°C. The thermal resistance from case to sink is negligible. Will the thyristor be protected, if the maximum allowable temperature at the junction is 125°C ? If a maximum temperature of 120°C is permitted in the device, with the same heat sink and same ambient conditions, how much power can be dissipated in the device safely ?

(8 marks)

(b) Draw the static and dynamic v - i characteristics of an SCR. Mark the salient features and regions of operation.

(4 marks)

13. (a) Draw the internal diagram of IC TL 494 and list the important features. (8 marks)

(b) Calculate the average d.c. voltage of a three-phase controlled rectifier feeding an RL load from a 400 V, 50 Hz a.c. source when operated with a firing angle of 60°.

(4 marks)

Or

14. (a) A single phase fully controlled converter is feeding a highly inductive load. The source is 230 V, 50 Hz a.c. supply. If the firing angle α is 30°, calculate the output average voltage. Estimate change (increase/decrease) in average output voltage when the load is changed into a pure resistive one.

(6 marks)

(b) Briefly explain one method to improve the power factor in controlled rectifiers. (6 marks)

15. A single-phase a.c. voltage controller has a resistive load of R = 10 Ω and the r.m.s. input voltage is 230 V, 50 Hz. The thyristor switch is ON for 3 cycles of OFF for 1 cycle.

(a) Sketch the load voltage waveform.

(b) Evaluate the r.m.s. output voltage V_o.

(c) Evaluate the input power factor.

(d) Evaluate the r.m.s. current in the thyristor.

(e) Evaluate the average current in the thyristor.

(2 + 3 + 3 + 2 + 2 = 12 marks)

Or

16. A single-phase a.c. voltage controller with back-to-back connected SCRs feeds a pure resistive load. The supply source is 230 V, 50 Hz. The resistance is 10 Ω. The firing angle for the SCRs iskept at 30°. Evaluate the following :

(a) The output power in the load.

(b) Due to a circuit fault, it happens that the firing angle of the reverse connected SCR gets delayed to a different value, 45°. Estimate the average d.c. voltage that comes across the load.

(6 + 6 = 12 marks)

17. A four-quadrant chopper scheme is shown in Fig. 1. The switches used are ideal. The d.c. voltage, V_{dc} is 200 V. The switching is done at 5 kHz. The pair of switches labelled S_A are switched simultaneously with a duty ratio 0.75, and when they are OFF, the pair of switches labelled S_B are turned ON, and so on (i.e, when S_A are ON, S_B are OFF and vice-versa). The load is resistive load.

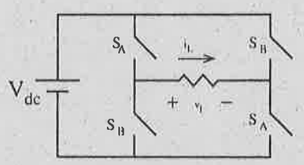


Figure 1 : A Four-Quadrant chopper

(a) Sketch the output voltage waveform for two switching cycles.

(b) Estimate the average voltage across the load in the given conditions.

(c) Estimate the average voltage across the load if the duty ratio of the pair S_A is reduced to 0.25.

(4 + 4 + 4 = 12 marks)

Or

18. Draw the circuit diagram and show the relevant waveforms of a voltage-commutated chopper. Derive the design equations for choosing the commutation elements.

(12 marks)

19. Draw the circuit schematics of a three-phase bridge inverter with ideal switches and feedback diodes. The inverter is feeding an R-L load. Show the load phase voltage and lone-to-line voltage waveforms if the switches conduct for 120°. Indicate the switches conducting in each interval and clearly show the sequence of gating the switches.

(12 marks)

Or

20. Explain how voltage control and harmonic control can be done in inverters using pulse width modulation methods.

(12 marks)

[5 × 12 = 60 marks]

F 3096 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Electronics and Communication Engineering

EC 010 506 – MICROPROCESSORS AND APPLICATIONS (EC)

(Regular – New Scheme)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Describe the function of the following pins in 8085?
   (i) READY ; (ii) HOLD ; (iii) ALE.
2. Explain the following instructions :
   (i) CMC ; (ii) RLC ; (iii) STC.
3. Explain how 8085 responds to INTR input?
4. What are the different modes of operation of 8254?
5. What are the differences between the minimum and maximum modes of 8086?

(5 × 3 = 15 marks)

Part B

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

6. What are the different flags in 8085 and clearly describe their operation with the help of related instructions.
7. Compare the following pairs of instructions with their opcodes, operations, instruction bytes, addressing modes, affected flags and the results:
   (i) SUB B and CMP B ; (ii) RRC and RAR.
8. List and explain all the five hardware interrupts and how 8085 follows the priority among them? How the priority is implemented?
9. Interface 4 × 4 matrix keyboard to the microprocessor using 8279. Draw the circuit and describe its principle.
10. Explain memory segmentation of 8086? What are its advantages?

(5 × 5 = 25 marks)

Turn over

Part C

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

MODULE I

11. (a) How any why $AD_0 - AD_7$ lines multiplexed? Why $A_{15} - A_8$ signals not multiplexed with the data lines ? (6 marks)

(b) With a circuit diagram, explain how a 2K RAM is interfaced to 8085? How the decoder is designed? (6 marks)

Or

12. (a) Explain various machine cycles supported by 8085? (5 marks)

(b) Draw and explain (i) I/O read cycle and (ii) I/O write cycle of 8085. (7 marks)

MODULE II

13. A list of 50 members is stored in memory, starting from 4000 H. Find the number of negative, zero and positive numbers from this list and store these results in memory locations 5000 H, 5001 H and 5002 H respectively. (12 marks)

Or

14. (a) Explain the operations of the following instructions and specify the addressing mode and the number of machine cycles required :

(i) DAA ; (ii) DADB ; (iii) XTHL ; (iv) CNC addr. (8 marks)

(b) Explain the contents of accumulator to run SIM instruction. (4 marks)

MODULE III

15. (a) The first four instruction of a typical subroutine are:

PUSH PSW

PUSH H

PUSH B

PUSH D

What will be the last five instructions of the subroutine? Explain. (5 marks)

(b) If the CALL and RET instructions are not provided in the 8085, could it be possible to write subroutines for this microprocessor? If so, how will you return from the subroutine? Explain with an example. (7 marks)

Or

16. With a neat circuit diagram, describe how will you interface 0808 DAC (or any other DAC) with 8085?

MODULE IV

17. What do you mean by static display and multiplexed display? Draw the circuit arrangement for interfacing 4 digit multiplexed display to 8085 with the help of 8255.

Or

18. With a neat circuit connection diagram, describe how will you interface 8259 with 8085?

MODULE V

19. Draw the read and write cycle timing diagram for 8086 in minimum mode configuration and explain.

Or

20. Explain various signals used in minimum mode and maximum mode operation of 8086?

(5 × 12 = 60 marks)

MODULE 4

17. For a unity feedback system $G(s)=\dfrac{800(s+2)}{s^2(s+10)(s+40)}$, sketch the Bode plot. Find W_{g_c}, W_{p_c}, GM and PM.

(7 marks)

Or

18. Draw the Nyquist plot for the unity feedback control system with open loop transfer function $G(s)=\dfrac{K(1-s)}{(1+s)}$. Using Nyquist stability determine the stability of closed loop system.

(7 marks)

MODULE 5

19. (a) What are Eigen values ? Write its properties. (5 marks)

(b) For the electrical network shown in Fig. 5, derive the state model ?

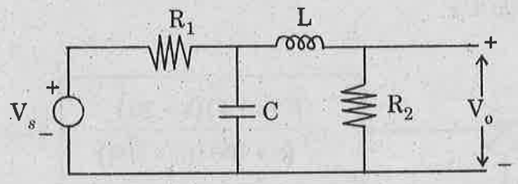


Fig. 5.

(7 marks)

Or

20 (a) Obtain the time response of the following system :

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}1\\ 1\end{bmatrix}u$$

where $u(t)$ is a unit step occurring at $t = 0$ and $x^T(0)=[1 \quad 0]$.

(6 marks)

(b) Consider a control system with state model

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}0\\ 2\end{bmatrix}[u]$$

$$\begin{bmatrix}x_1 & 0\\ x_2 & 0\end{bmatrix}=\begin{bmatrix}0\\ 1\end{bmatrix}.$$

Compute the state transition matrix and find the state response $x(t)$, $t > 0$.

(6 marks)

[5 × 12 = 60 marks]

F 3054 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Electronics and Communication Engineering

EC 010 502—CONTROL SYSTEMS (EC)

(Regular—New Scheme)

Time : Three Hours Maximum : 100 Marks

Graph sheets may be supplied.

Part A

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

1. Define transfer function of a linear time-invariant system.
2. Define the time response specification for the step response of a second order over-damped system.
3. How will you find the gain K at a point on root locus ?
4. What is gain margin and state its relevance in the analysis of a control system.
5. List the properties of a state transition matrix.

(5 × 3 = 15 marks)

Part B

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

6. Obtain the force balance equations for an ideal mass, ideal spring and ideal dash pot.
7. State any five standard test signals commonly used in control system. Sketch their typical plots and obtain their Laplace Transforms.
8. Obtain the transfer function of lag compensator shown in fig. 1. below :

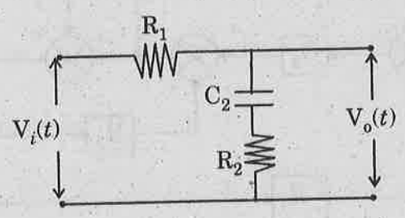


Fig. 1.

9. Consider a negative feedback system having the characteristic equation :

$(s+1)(s+1.5)(s+2)+K=0, K>0$. Find the range of K so that the roots of the characteristic equation lie to the left of the point $s = -1$.

10. Find the state transition matrix if $A=\begin{bmatrix}-1 & 0\\ 0 & -2\end{bmatrix}$.

(5 × 5 = 25 marks)

Part C

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

MODULE 1

11. Obtain the transfer function $\frac{X_1(s)}{F(s)}$ of the mechanical system shown in Fig. 2 below :

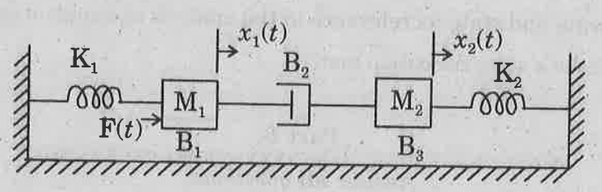


Fig. 2.

Or

12. Find the transfer function of the system given in Fig. 3 below :

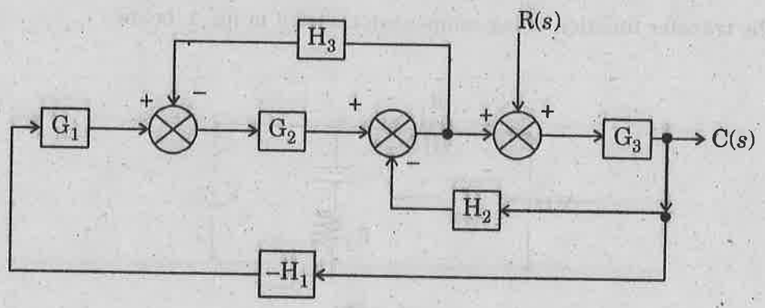


Fig. 3.

MODULE 2

13. A Second order unity feedback system is characterized by the transfer function $\frac{C(s)}{R(s)}=\frac{361}{s^2+16s+361}$. Find the following :

(a) Damping ratio.
(b) Natural frequency.
(c) Settling time.
(d) Peak time.
(e) Peak overshoot.

Assume input to be a step of 1 volt.

Or

14. Using Routh's criterion, determine the stability of the closed loop system as a function of K. Find the value of K that will cause sustained oscillations in the system. Also, find the frequency of oscillations. (Refer Fig. 4.)

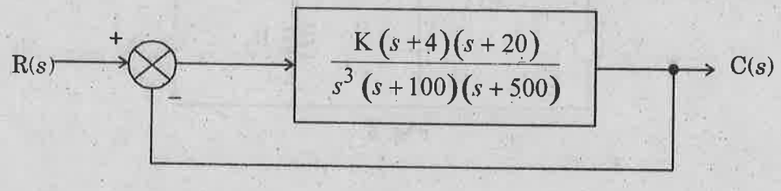


Fig. 4.

MODULE 3

15. Sketch the complete root locus of system having $G(s)H(s)=\frac{K}{s(s+1)(s+2)(s+3)}$. Comment on its stability.

Or

16. Consider a system with open loop transfer function $G(s)=\frac{K}{s(s+1)(s+4)}$. Design lag compensator to meet the following specifications :—

(a) Damping ratio $\delta = 0.4$
(b) Settling time $t_s = 10$ sec.
(c) Velocity error constant $K_v \geq 5\ \text{sec}^{-1}$.

Turn over

F 3063 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Electronics and Communication

EC 010 503—DIGITAL SYSTEM DESIGN (EC)

(Regular—New Scheme)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Differentiate between behaviour and structural model used in Verilog HDL.
2. Draw the structure of a 3-to-8 decoder.
3. Define synchronizer failure and metastability.
4. When do we say that two states in a state diagram are equivalent ?
5. Explain path sensitization method of finding a test vector.

(5 × 3 = 15 marks)

Part B

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

6. Write Verilog code for a 8 : 1 multiplexer and explain.
7. Illustrate how PLA can be used for combinational logic design with reference to $f = \Sigma\, m\,(0, 1, 3, 4)$.
8. Design a sequence detector to detect the sequence 101 from 10101.
9. What are the different state machine styles ? Which is better ? Explain advantages and disadvantages.
10. With an example, describe the test bench used for testing a combinational circuit.

(5 × 5 = 25 marks)

Part C

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

Module I

11. Describe all the operators in Verilog HDL with the help of suitable examples.

Or

12. Write the verilog code for a positive edge sensitive 8 bit D-type register with synchronous set and reset inputs.

MODULE II

13. Explain the Quine-Mc Cluskey algorithm to implement

$$f = \Sigma(0, 2, 5, 7, 9, 11, 13, 15, 16, 18, 21, 23, 25, 27, 29, 31).$$

Or

14. Implement the following Boolean functions using PLA with both true and complemented outputs. Map to arrive at a design with a minimal number of product terms in the PLA. Write PLA table.

$$f_1 = \Sigma(3, 6, 7)$$
$$f_2 = \Sigma(0, 1, 2, 6, 7)$$
$$f_3 = \Sigma(0, 1, 3, 4, 5).$$

MODULE III

15. Show the design of a Mealy machine sequence detector that detects the 100 and 001 sequences on its serial input. Provide an asynchronous reset input that starts the detector in its first state.

Or

16. A network produces a '1' output if and only if the current input and the previous three inputs correspond to either of the sequences 0110 or 1001. The output '1' is to occur at the time of the fourth input of the recognized sequence. Outputs of '0' are to be produced at all other times. Construct the state diagram.

MODULE IV

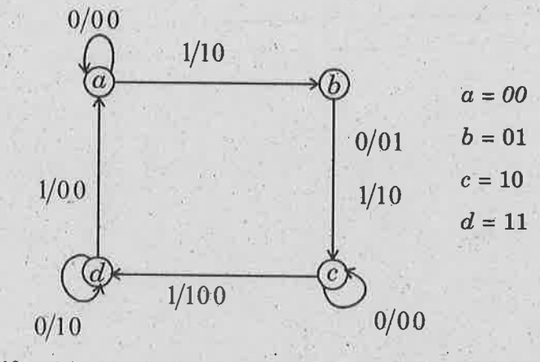
17. Construct a state diagram for two circuits both having three states S_1, S_2, S_3, and a single control input which gives rise to two input conditions I_1 and I_2.

    (a) The first is divide by 3 up-counter which behaves normally when the control input is '0' and the circuit is reset to state S_1 on the next clock pulse if the control input is '1'.

    (b) The other circuit is an up-down divide by 3 counter whose direction is determined by the logic values of control input.

Or

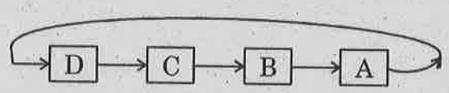
18. Design a clocked sequential circuit using T flip flops for the state diagram shown below :



19. Design a reversible shift register whose stages are connected in ring form, making use of the following specifications :

    (a) Each clock pulse will cause the register to shift when a control signal LR is '1' and is to shift right when the control signal LR is '0'.

    (b) Shift register is to be loaded in parallel from data appearing on four input pins under the control of a signal LS which will come loading when TRUE and shifting when FALSE.



Or

20. Model a 4 bit barrel shifter using Verilog HDL.

(5 × 12 = 60 marks)

F 3074 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Electronics and Communication Engineering

EC 010 504 – ELECTRICAL DRIVES AND CONTROL (EC)

(Regular - New Scheme)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. List the different methods of speed control of a d.c. motor?
2. Define slip. Why cannot an induction motor run at synchronous speed?
3. Compare IGBT and SCR as switching devices.
4. List different methods of voltage control adopted in inverters.
5. What are the differences between true synchronous mode and self control mode for variable frequency control of synchronous motor?

(5 × 3 = 15 marks)

Part B

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

6. Describe the principle of compound motors. Why differentially compound DC motors are not used in practice?
7. Draw the equivalent circuit of a single-phase transformer referred to primary side. Explain the parameters.
8. By making use of the two-transistor analogy, explain the V-I characteristics of an SCR.
9. With neat circuit and waveforms explain the principle of step-up chopper operation.
10. Explain the four quadrant operation of an electric drive with an example.

(5 × 5 = 25 marks)

Turn over

Part C

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

MODULE I

11. (a) Neatly sketch and explain (i) torque versus armature current and (ii) torque versus speed characteristics of d.c. shunt and series motors. Mention their applications.

(b) A 4-pole d.c. shunt motor takes 22 Amp from 230 V. supply. The armature and field resistances are 150 W and 150 W respectively. The armature is lap connected with 300 conductors. If the flux per pole is 20mWb, calculate the speed and torque.

(6 + 6 = 12 marks)

Or

12. (a) Why sometimes d.c. shunt generator fails to build up voltage? What remedial measures are to be taken to overcome these?

(b) A 4-pole d.c. shunt generator with a lap wound armature has an armature resistance of 150 W and field resistance of 50W. The generator is supplying sixty, 220 V, 40W lamps. Find the armature current and the generated e.m.f. The contact drop per brush is 1 volt.

(6 + 6 = 12 marks)

MODULE II

13. (a) Explain how the primary responds to a secondary load current? Draw and explain the phasor diagram of a transformer supplying a leading p.f. load?

(b) A 2200 V, 3-phase alternator is running at 300 r.p.m. and has 24 poles. Find the number of conductors in the stator winding, if the magnetic flux is 0.055 Wb/pole. Assume distribution factor as 0.97.

(6 + 6 = 12 marks)

Or

14. (a) Explain why the synchronous motor has no starting torque. Explain any one starting method used?

(b) The rotor of a 4 pole, 50Hz, slip-ring induction motor has a resistance of 0.25 ohm per phase and the full-load speed is 1440 r.p.m. Calculate the external resistance per phase which must be added to reduce the speed to 1200 r.p.m. The torque remains the same as before.

(6 + 6 = 12 marks)

MODULE III

15. (a) Explain the dynamic turn-on and turn-off characteristics of a thyristor.

(b) A thyristor can be turned on by a dv/dt of 800V/μS. If the charging current flowing through the junction is 16 mA, determine the junction capacitance.

(7 + 5 = 12 marks)

Or

16. (a) Define and explain the following with respect to thyristors:

(i) I^2t rating.

(ii) peak repetitive forward breakover voltage.

(iii) di/dt rating. (3 × 2 = 6 marks)

(b) Explain the waveforms and characteristic curves of a power MOSFET. (6 marks)

MODULE IV

17. (a) Explain the need and functioning of a free-wheeling diode in a power electronic converter circuit.

(b) With a neat block diagram, describe the working of on-line UPS. (6 + 6 = 12 marks)

Or

18. (a) Explain multiple - pulse width modulation technique of varying the magnitude of output voltage in a single-phase inverter?

(b) With the help of a neat block diagram, explain the working principle of SMPS? Compare and contrast its performance with a linear regulator? (6 + 6 = 12 marks)

MODULE V

19. Why do you control the speed of DC motors? With a neat diagram, explain how will you control a variable speed drive using DC to DC controlled converters?

Or

20. Explain the speed control of three-phase induction motor in the constant v/f mode. Give the control system block diagram and explain each block. Bring out the significance of this mode of control with the help of torque - speed characteristics.

[5 × 12 = 60 marks]

F 3086 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Electronics and Communication Engineering

EC 010 505—APPLIED ELECTROMAGNETIC THEORY (EC)

(Regular—New Scheme)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Explain divergence theorem in electrostatic field.
2. Define the term depth of penetration and its practical significance.
3. Why do you use waveguides to guide EM waves ?
4. Explain dominant mode in circular waveguides.
5. What is a distortionless line ? How to achieve distortionless condition on the line ?

(5 × 3 = 15 marks)

Part B

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

6. A charge of uniform density $\rho_s = 0.3\,n$ C/m^2 covers the plane $2x - 3y + z = 0$ m. Find $\bar{E}$ on the side of the plane containing origin.
7. What is displacement current ? Derive the current continuity equation.
8. A 10 GHz plane wave travelling in free space has an amplitude of $E_y = 10$ V/m. Calculate the phase velocity, wavelength and propagation constant.
9. Describe various methods of coupling to cavity resonator.
10. Discuss the flow of electromagnetic power over a transmission line.

(5 × 5 = 25 marks)

Turn over

Part C

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

MODULE I

11. (a) A charge of – 0.3 μC is located at A (25, – 30, 15) (in cm) and a second charge of 0.5 μC is at B (– 10, 8, 12) cm. Find the electric field intensity at P (15, 20, 48) cm.

(6 marks)

(b) Derive electrostatic boundary conditions between two perfect dielectrics. (6 marks)

Or

12. (a) Give the potential $V = 50\left(\frac{\sin\theta}{r^2}\right)$ in free space :

(i) determine whether V satisfies Laplace's equation ;

(ii) find total charge stored inside the spherical shell $1 < r < 2$.

(7 marks)

(b) Derive Poisson's equation. (5 marks)

MODULE II

13. (a) Distinguish between conduction current and displacement current. (5 marks)

(b) Find the frequency at which conduction current density and displacement current density are equal in a medium with $\sigma = 2 \times 10^4$ s/m and $\epsilon_r = 80$.

(7 marks)

Or

14. (a) State and explain Poynting theorem. (6 marks)

(b) The depth of penetration in a certain conducting medium is 0.1 m. The frequency of the EM wave is 1 MHz. Calculate the conductivity of the conducting medium.

(6 marks)

MODULE III

15. The separation between parallel plates of a parallel plate waveguide is 3 cm. It is filled with a dielectric with relative permittivity of 4. The signal frequency is 6GHz. Find the propagating modes. For each propagating modes, calculate the following : (a) Cut-off frequency ; (b) cut-off wavelength ; (c) guide wavelength λ_g ; and (d) phase velocity v_{ph}.

Or

16. (a) Explain how standing waves can be produced in a waveguide. What is the spacing in terms of wavelength between successive minima ?

(7 marks)

(b) Find out the modes propagated at frequencies below 3.75 GHz for a square waveguide 10 cm on a side ?

(5 marks)

MODULE IV

17. (a) Calculate the cut-off wavelength, the guide wavelength and the characteristic wave impedance of a circular waveguide whose internal radius is 2.5 cm and operates with 8 GHz signal propagating in it in the TE_{11} mode.

(9 marks)

(b) For rotary joints, circular waveguides are preferred over the rectangular waveguides. Why ?

(3 marks)

Or

18. Derive an expression for the Q of an air filled rectangular resonator having dimensions $a \times b \times d$. The resonator is operated in the TM_{110} mode.

MODULE V

19. The open circuit and short circuit impedances measured at the input terminals of a lossless transmission line of length 1.5 m, which is less than a quarter wavelength, are $-j\,54.6\ \Omega$ and $j\,103\ \Omega$ respectively.

(i) Find z_0 of the line.

(ii) Without changing the operating frequency, find the input impedance of a short-circuited line that is twice the given length.

(iii) How long should the short circuited line be in order for it to appear as an open circuit at the input terminals ?

Or

20. What is single stub matching ? Derive expressions for stub length and its location from load end.

[5 × 12 = 60 marks]

	D	F	G	H	Supply
A	19	30	50	10	7
B	70	30	40	60	9
C	40	8	70	20	18
Demand	5	8	7	14	34

(10 marks)

F 3101 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Common to all branches except Computer Science and Engineering/Information Technology

ENGINEERING MATHEMATICS—IV (CMELPASUF)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Answer any **one** *question from each module.*
All questions carry equal marks.

Module I

1. (a) Evaluate $\int_C z^2 dz$ where C is given by :

(i) The line $x = 2y$ from (0, 0) to (2, 1).

(ii) The line segment along the real axis from (0, 0) to (2, 0) and then vertically to (2, 1).

Can you expect path independency for the above integrals ? Give reason. (12 marks)

(b) Find the Laurents series expansion of $f(z) = \frac{z}{(z^2-1)(z^2+3)}$ in $|z| > 4$. (8 marks)

Or

2. (a) Using contour integration, evaluate $\int_0^{2\pi} \frac{d\theta}{5+4\cos\theta}$. (10 marks)

(b) Using contour integration, evaluate $\int_{-\infty}^{\infty} \frac{x^2}{(x^2+1)^2} dx$. (10 marks)

Module II

3. (a) Find by Newton-Raphson method, the positive root of the equation $x^3 + x^2 + x = 100$. (10 marks)

(b) Find by method of false position, the root of the equation $xe^x = 1$. (10 marks)

Turn over

4. (a) Apply Gauss-Seidel method to solve the equations :

$10x+y+z=12,\ 2x+10y+z=13,\ x+y+5z=7$. (12 marks)

(b) Find a root of the equation $x^3-2x=5$, using bisection method correct to 3 decimal places. (8 marks)

Module III

5. (a) Use Taylor's series method to find $y(4.1)$ and $y(4.4)$ correct to three decimal places, given that $\frac{dy}{dx}=\left(x^2+y\right)^{-1}$, $y(4)=5$. (8 marks)

(b) Use Runge-Kutta method to find $y(0.4)$ in steps of 0.2 given $\frac{dy}{dx}=1+y^2\ y(0)=0$ correct to five decimal places. (12 marks)

Or

6. (a) Use Euler's modified method to compute $y(1, 1)$, given that $\frac{dy}{dx}=x(1+y)\ y(1)=1$ taking $h = 0.05$. Correct to 3 decimal places. (10 marks)

(b) Using Milne's Predictor-Corrector method find $y(1.2)$ taking $h=0.1$, given $\frac{dy}{dx}=y-x^2$, $y(1)=1$. (10 marks)

Module IV

7. (a) Prove Shifting rules and hence show that $Z\left(\frac{1}{n!}\right)=e^{\frac{1}{z}}$. (8 marks)

(b) Using Z-transform solve $y_{n+2}-5y_{n+1}+6y_n=5^n$ with $y(0) = 0, y(1) = 1$. (12 marks)

Or

8. (a) If $Z(u_n)=\frac{2z^2+3z+4}{(z-1)^3}$, find the values of u_1 and u_2. (10 marks)

(b) Compute the following :

(i) $Z\left[\frac{2z^2+3z}{(z+2)(z-4)}\right]$. (ii) $Z^{-1}\left[\frac{z}{(z+1)^2(z-1)}\right]$. (10 marks)

Module V

9. (a) Use graphical method to solve the following L.P.P. :

Minimize $Z=20x+10y$

subject to the constraints,

$x+2y\le 40$,

$3x+y\ge 30$,

$4x+3y\ge 60$ with $x, y \ge 0$.

(8 marks)

(b) How will you identify alternate solution of an L.P.P. ? Using simplex algorithm, solve the following L.P.P. :

Maximize $Z=3x+2y+5z$

subject to the constraints,

$x+2y+z\le 430$,

$3x+2z\le 460$,

$x+4z\le 420$ with $x, y, z\ge 0$.

(12 marks)

Or

10. (a) Use Big-M method to solve the following L.P.P. :

Minimize $Z=2x_1+9x_2+x_3$

subject to the constraints,

$x_1+4x_2+2x_3\ge 5$,

$3x_1+x_2+2x_3\ge 4$,

with $x_1, x_2, x_3\ge 0$.

(10 marks)

(b) The following table gives cost matrix of transporting one unit of product from the sources A, B and C to the destinations D, F, G and H. Determine the optimum allocation minimum cost using MODI method :