F 3455 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Third Semester

Branch : Electronics and Communication, Applied Electronics and Instrumentation Electronics and Instrumentation Engineering

SOLID STATE DEVICES (LAS)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Draw the energy band diagrams for metal, semiconductor and insulator.
2. State the properties of an intrinsic semiconductor.
3. State and explain the significance of Einstein equation.
4. Clearly explain the avalanche breakdown. Why it damages the *pn* junction ?
5. Draw and contrast the energy band diagrams of an ordinary as well as a tunnel diode.
6. Explain the working principle and applications of a photodiode.
7. Why the leakage current in a CE configuration is more serious than that in a CB ? What is their temperature dependence ?
8. What is the principle and applications of a Schottky transistor ?
9. Sketch and explain the C.V. diagram of a MOS capacitor.
10. Explain how FET can be used as VVR.

(10 × 4 = 40 marks)

Part B

Answer **either** *Section (a)* **or** *(b) of each module.*
Each full question carries 12 *marks.*

MODULE 1

11. (a) What are intrinsic and extrinsic semiconductors ? Sketch and explain the Fermi level diagram in all these cases. Write expression for the conductivity for these cases.

Or

(b) Describe the different types of currents in a semiconductor ? Derive an expression for the total current. Discuss the effect of temperature on total current.

(12 marks)

Turn over

MODULE 2

12. (a) Describe clearly, how a contact potential is developed when a *pn*-junction is formed. Sketch the charge density, electric field, potential and energy distribution diagrams along the complete *pn*-junction.

Or

(b) From fundamentals, derive the Diode current equation.

(12 marks)

MODULE 3

13. (a) Explain the constructional details and principle of operation of tunnel diode with the help of its VI characteristics. Discuss its applications.

(12 marks)

Or

(b) (i) Explain the principle of working of a varactor diode. (6 marks)

(ii) Explain the phenomena of Zener breakdown. Describe clearly, why it is not a destructive type.

(6 marks)

MODULE 4

14. (a) Sketch the carrier profile in a *pnp* transistor which is biased in the active region and describe each current component with the help of equations.

(12 marks)

Or

(b) (i) With the help of a neat diagram, explain the principle of voltage amplification by an *npn* transistor.

(8 marks)

(ii) Explain Early Effect. What is reach-through ? (4 marks)

MODULE 5

15. (a) (i) Draw and explain the energy band diagram for an ideal MOS capacitor for an applied voltage.

(7 marks)

(ii) Calculate the maximum width of the depletion region with for an ideal MOS capacitor on P type silicon with $N_A = 10^{16}$/cc. The relative dielectric constant of silicon is 11 and $n_i = 1.5 \times 10^{10}$/cc.

(5 marks)

Or

(b) With a neat constructional diagram, explain the principle of operation of a *n*-channel depletion type MOSFET. Draw and mark pinch-off, saturation and linear regions on its characteristics.

(12 marks)

[5 × 12 = 60 marks]

F 3462 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Third Semester

Branch : Electronics and Communication, Applied Electronics and Instrumentation, Electronics and Instrumentation Engineering

ELECTRONIC CIRCUITS—I (L,A,S)

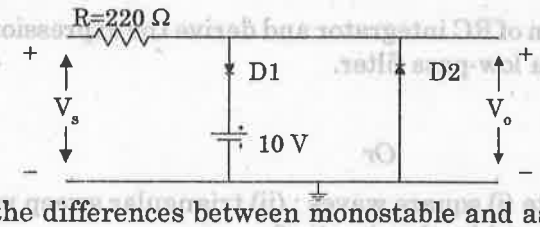
(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What is surge current ? How it is important with regard to a rectifier using capacitor filter ?
2. Explain the practical significance of TUF. Compare the values for the three rectifier circuits.
3. Define the four *h*-parameters of a CB transistor.
4. What is VVR ? Explain its operating principle.
5. Define the three stability factors of a transistor ?
6. What is thermal runaway ? Suggest two distinct methods to eliminate the same.
7. In a self biased FET amplifier circuit, V_{DD} = 30 V, R_D = 2.5 K, R_S = 500 Ω and I_D = 2.5 mA. Calculate V_{DS} and V_{GS}.
8. Why is biasing needed for a transistor to work as an amplifier ? Explain with necessary diagrams.
9. A voltage of V_S = 15 sin wt is applied at the input of the circuit shown in Figure below. Sketch the input and output voltage waveforms assuming silicon diodes used :



10. Clearly explain the differences between monostable and astable multivibrator circuits and their output waveforms.

(10 × 4 = 40 marks)

Part B

Answer **either** *section (a)* **or** *(b) of each module.*
Each full question carries 12 *marks.*

Module 1

11. (a) With the help of neat circuit diagrams and waveforms, explain the working of a bridge rectifier. Derive equations for its average output current, ripple factor, maximum-efficiency.

Or

Turn over

(b) Draw the circuit diagram of a series pass voltage regulator with negative feedback and short circuit protection. Design the circuit for $V_0 = 6$ V, $I_{Lmax} = 200$ mA, overload protected.

Module 2

12. (a) Draw the circuit of a CC amplifier and deduce its *h*-parameter equivalent circuit. Derive expressions for R_i, R_o, A_i and A_v.

Or

(b) Sketch and explain the shapes of CE input and output characteristics. Label the operating regions on both the above characteristics and explain their applications.

Module 3

13. (a) With the help of circuit diagrams, comment on the current stabilities of (i) base bias ; (ii) self bias circuits. Derive the stability factors and justify your argument.

Or

(b) Draw the circuit diagram of a potential divider bias CE amplifier and deduce its a.c. equivalent circuit. Derive its A_i, R_i and A_v.

Module 4

14. (a) Draw the circuit of a voltage divider biased RC coupled CE amplifier and design it using stability factor method, to give a voltage gain of 80 at an output sinusoidal swing of 8V peak amplitude.

Or

(b) Draw the circuit of a potential divider bias CS amplifier and derive its A_v, R_o and R_i.

Module 5

15. (a) (i) Draw and explain a diode clamper to insert a d.c. level of + 3 volt to any input waveform. (6 marks)

(ii) Draw the circuit diagram of RC integrator and derive the expression for its output voltage. Show how it can act as a low-pass filter. (6 marks)

Or

(b) Draw the circuits to generate (i) square waves ; (ii) triangular sweep voltage and explain how the above waveforms generated by the circuits ?

[5 × 12 = 60 marks]

F 3469 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Third Semester

Branch – Electronics and Communication, Applied Electronics and Instrumentation
Electronics and Instrumentation Engineering

COMPUTER PROGRAMMING (L, A, S)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Write neat and efficient C programs whenever necessary.

Part A

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

1. What are Library functions. Mention any four library functions in C.
2. Explain scanf () and printf () function in C, with their syntax and examples.
3. Explain with examples the "if" statement and "nested if" statements in C.
4. Explain various types of functions supported by C. Give examples for each of the C functions.
5. What are the various storage classes in C? Discuss their uses and scope.
6. What is a union? For what kind of applications are unions useful? Explain with an example.
7. Describe how pointers are used for handling character strings.
8. Demonstrate how pointers can be used to access data items of a structure.
9. Explain how a file is opened and closed, with an example.
10. Write a C program to find the area of circle using macro.

(10 × 4 = 40 marks)

Part B

Answer **either** *Section (a)* **or** *(b) from each module.*
Each full question carries 12 *marks.*

Module 1

11. (a) (i) Explain all the different data types in C with appropriate examples. (6 marks)

(ii) Write a C program to exchange the values of variables A and B, without using any other temporary variable. (6 marks)

Or

(b) (i) What is the conditional operator? Explain with an example. (4 marks)

(ii) Write a C program to count and print the number of words in a sentence entered from the keyboard at run time. (8 marks)

Module 2

12. (a) Write a C program that will read a positive integer and determine if it is a prime number. (12 marks)

Or

(b) Write a function to accept 15 characters and display whether each input character is a digit, a lower case or an upper case letter or a symbol. (12 marks)

Module 3

13. (a) Read the employee number, name and salary of 500 employees in a firm, prepare the pay roll in the ascending order of salaries and print it. (12 marks)

Or

(b) Define a structure called "student" that will describe the following information: Roll number, name, class, submark1, submark 2, submark 3, submark 4 and submark 5 and the total. Using "student", declare an array stu_list with 60 elements. Write a program to read the information about all the 60 students and print the details along with total marks. (12 marks)

Module 4

14. (a) Write a C program using pointers to count the number of words in a given page. (12 marks)

Or

(b) Using pointers, write a C program to sort the given list of numbers in descending order. (12 marks)

Module 5

15. (a) Write a menu driven C program to

(i) insert a record in a file.

(ii) Delete a record in a file. (12 marks)

Or

(b) Write a program in C to create a file named "DEPARTMENT" for storing information about employees. The record consists of the name of staff, designation, basic pay and earning. Calculate the earning as basic + DA, where DA is 187% of the basic pay. (12 marks)

[5 × 12 = 60 marks]

(ii) Determine the Z and Y parameters for the two-port network shown in fig.8.

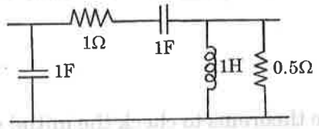


Fig.8.

(8 marks)

Or

(b) (i) Determine the *h*-matrix of the network in Fig.9.

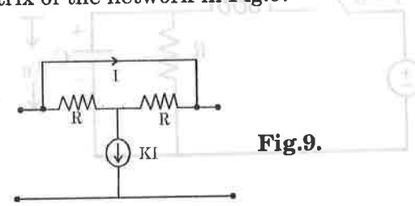


Fig.9.

(6 marks)

(ii) Design a T and π section constant *k* high pass filter having cutt-off frequency of 12 kHz and nominal impedance R_0 = 500 Ω. Also find its characteristic impedance and phase constant at 24 kHz.

(6 marks)

MODULE 5

15. (a) (i) Check whether $p(s)\dfrac{s^2-s-8}{s^2+2s-2}$ is positive real ? (6 marks)

(ii) Realise $z(s)\dfrac{s^4+7s^2+9}{s\left(s^2+4\right)}$ in first cauer form and draw the circuit. (6 marks)

Or

(b) (i) Check whether (i) s^2+4s+7 and (ii) $s^4+3s^2+6s+20$ are Hurwitz ? (6 marks)

(ii) Realise $z(s)\dfrac{s\left(s^2+4\right)}{2\left(s^2+1\right)\left(s^2+9\right)}$ in Foster I form of LC network. (6 marks)

[5 × 12 = 60 marks]

F 3439 (Pages : 4) Reg. No. ECE

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Third Semester

Branch—Electronics and Communication, Applied Electronics and Instrumentation Electronics and Instrumentation Engineering

NETWORK THEORY (L A S)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define and distinguish beween :
   (i) mesh and node. (ii) mesh and super mesh.
2. Two similar coupled coils of resistance 5Ω and self inductance 1H are in series. This is in series with a 100μF capacitor. A 200V, 50Hz source energizes the circuit. Draw the circuit, place the dot markings and calculate the coupling coefficeint so that the circuit behaves like a pure resistor.
3. Define and explain the terms : oriented graph, incidence and reduced incidence matrices, basic cut-set and tie-set matrices.
4. State and explain Norton's theorem with a general example. How would you obtain the Thevenin's equivalent from the Norton's equivalent circuit ? Illustrate.
5. State and prove initial value theorem when the excitation is continuous.
6. Obtain Laplace Transform of a ramp function ?
7. Define the driving point impedance and admittance of a two-port network.
8. Define characteristic impedance. Explain its practical significance.
9. Write the properties of Hurwitz polynomial ?
10. Compare the properties of foster and causer forms of networks.

(10 × 4 = 40 marks)

Part B

Answer **either** *Section* (*a*) **or** (*b*) *from each module.*
Each full question carries 12 *marks.*

MODULE 1

11. (a) (i) Use source transformation to convert the circuit shown in fig.1. to a simple Norton equivalent.

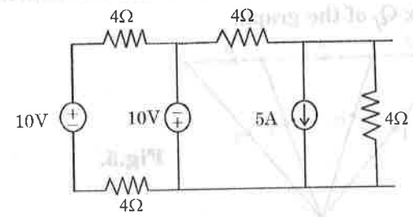


Fig.1.

(6 marks)

(ii) Calculate the power delivered by the dependent voltage source in the circuit shown in fig.2.

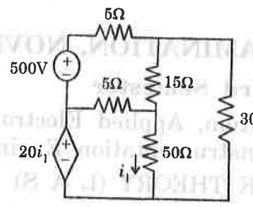


Fig.2.

(6 marks)

Or

(b)Calculate the effective inductance of the circuit shown in fig.3. across the terminals AB.

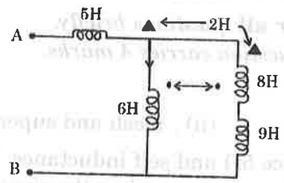


Fig.3.

(12 marks)

MODULE 2

12. (a) (i) A source of 100 V feeds a load impedance Z_L through a series impedance Z_s (25 + j40) Ω.

1 Determine the load impedance for maximum power transfer and the value of the maximum power.

2 If the load consists of a pure resistance R_L, find the value of R_L for which maximum power is transferred to the load. Determine the value of the maximum power ?

(6 marks)

(ii) Using Superposition theorem, determine the current in each branch of the network in fig.4.

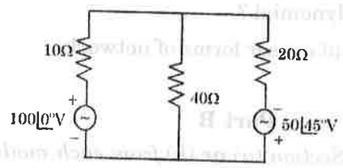


Fig.4.

(6 marks)

Or

(b) Draw the fundamental loops and fundamental cut-sets corresponding to a tree T of the network graph which is shown by solid lines in Fig.5. write the fundamental loop matrix B_f and the fundamental cut-set matrix Q_f of the graph.

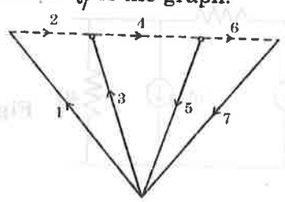


Fig.5.

(6 marks)

MODULE 3

13. (a) The circuit parameters of Fig.6 are R = 10 kΩ, L = 800 mH, C = 100 nF and V_{dc} = 70V, find :

(i) v_0 (t) for $t \geq 0$

(ii) i_0 (t) for $t \geq 0$

(iii) Use initial and final value theorems to check the initial and final values of current and voltage.

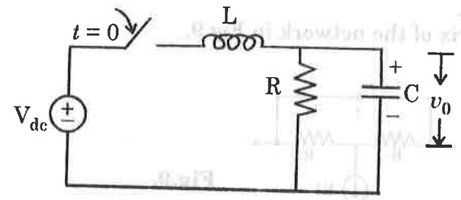


Fig.6.

(12 marks)

Or

(b) Determine the Fourier Transform of the exciting voltage :

$$v(t) = \begin{cases} Ae^{-t}, & t \geq 0 \\ 0, & t < 0 \end{cases}$$

and sketch the amplitude and phase spectra. If the above voltage is applied across a series RC circuit, find $i(t)$.

(12 marks)

MODULE 4

14. (a) (i) Find the transmission parameters for the network shown in Fig.7.

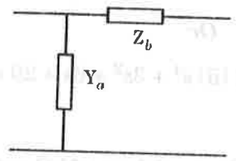


Fig.7.

(4 marks)

Turn over

F 3447 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2010

Third Semester

Branch : Electronics and Communication, Applied Electronics and Instrumentation, Electronics and Instrumentation Engineering

ELECTRICAL TECHNOLOGY (LAS)

(Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*

Each question carries 4 *marks.*

1. What are the conditions to be satisfied to build up voltage of a d.c. shunt generator ?
2. What do you mean by critical speed ? Explain with the help of characteristic curves ?
3. Draw the speed torque characteristics of d.c. shunt, series and compound motors and compare them.
4. What are the advantages and limitations of Swinburn's test ? Why the generator efficiency is greater than that of the motor efficiency ?
5. Starting from ideal transformer, arrive at the equivalent circuit of a practical transformer ?
6. A 220/2200 V transformer takes no-load current of 5 A at 0.25 power factor lagging. Calculate (i) Core loss ; (ii) magnetising current.
7. Obtain the e.m.f. equation of an alternator. What are the factors affecting the induced voltage ?
8. Why is it not possible for the rotor speed of an induction motor to be equal to the speed of its rotating magnetic field ?
9. Explain the principle of working and application of a.c. contactor.
10. Write the applications of stepper motor. Express the various standard specifications of the same.

(10 × 4 = 40 marks)

Turn over

Part B

Answer **either** *Sections (a)* **or** *(b) of each module.*
Each full question carries 12 *marks.*

MODULE 1

11. (a) (i) Define efficiency of a d.c. generator ? Explain the conditions for maximum efficiency. (4 marks)

(ii) A 4-pole, lap wound, d.c. shunt generator has a useful flux per pole of 0.07 Wb. The armature winding consists of 200 turns each of 0.004 Ω resistance. Calculate the terminal voltage when running at 900 r.p.m. if the armature current is 50 A. (8 marks)

Or

(b) A shunt generator delivers 200 A at a terminal voltage of 250 V. The armature resistance and shunt field resistance are 0.02 Ω and 50 Ω respectively. The iron and friction losses are equal to 950 W. Calculate the (i) e.m.f. generated ; (ii) copper losses ; (iii) output of the prime mover in kW and (iv) efficiency. (12 marks)

MODULE 2

12. (a) List the different methods of speed control in DC machines. Explain any two of them in detail, bringing out their merits and demerits.

Or

(b) (i) Explain armature reaction and its effect in a d.c. generator. (5 marks)

(ii) A 5 HP, 200 V shunt motor has a full load efficiency of 85 %. If $R_a = 1\Omega$, find the resistance to be included in the armature circuit to limit the starting current to its full load value. Find the starting current without this resistance. $R_{jh} = 100\ \Omega$. (7 marks)

MODULE 3

13. (a) (i) With a neat phasor diagram, explain the behaviour of a practical transformer when it is on a lagging load. (6 marks)

(ii) The full load voltage drops in a transformer are 2 % and 4 % due to resistance and leakage reactances respectively. The full load copper loss is equal to ironloss. Calculate (i) efficiency at half load u.p.f. ; (ii) the lagging p.f. on the full load output at which the voltage drop is maximum ; and (iii) this maximum percentage voltage drop. (6 marks)

Or

(b) The efficiency at unity power factor of a 6600/440 V, 250 kVA single phase transformer is 98 % both at full load and half load. The power factor on no-load is 0.2 and full load regulation at a lagging power factor of 0.8 is 4 %. Draw the equivalent circuit referred to 440 V side, labelling the values. (12 marks)

MODULE 4

14. (a) (i) From fundamentals, show that the maximum torque developed by an induction motor is independent of rotor resistance. Draw the torque-slip characteristics and show the effect of rotor resistance. (6 marks)

(ii) A 18 kW, 4-pole, 50 Hz, 3-phase induction motor has friction and windage losses of 2.5 % of output. The full-load slip is 4 %. Calculate for full load (1) the rotor copper loss ; (2) the rotor input ; (3) the shaft torque. (6 marks)

Or

(b) The stator of a 3-phase, 16-pole alternator has 144 slots and there are 4 conductors per slot connected in two layers and the conductors of each phase are connected in series. If the speed of the alternator is 375 r.p.m., calculate the e.m.f. induced per phase. Resultant flux in the air-gap is 5×10^{-2} Wb per pole sinusoidally distributed. Assume the coil span as 150° electrical. (12 marks)

MODULE 5

15. (a) With a neat diagrams, describe the working construction and working principle of a d.c. servomotor. Explain its applications.

Or

(b) (i) Describe the principle of working of an electromagnetic relay. (6 marks)

(ii) Explain any one application of a tachogenerator with a practical case set up. (6 marks)

[5 × 12 = 60 marks]