F 4798 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Third Semester

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

ELECTRONIC CIRCUITS—I (L A S)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What is PIV ? What is its significance in the context of a rectifier circuit ?
2. Give the standard output voltage values available in 78XX and 79XX three pin IC regulators.
3. Compare the current gains of three configurations of bipolar transistor, giving typical values.
4. Sketch the depletion regions of JFET at (i) pinch off and (ii) saturation.
5. What is meant by transitor biasing ? Why it is needed ?
6. Draw the circuit of bias compensation for V_{BE} and explain how the compensation is achieved.
7. Sketch the phase response of an RC coupled BJT amplifier and explain its important features.
8. Draw the circuit diagram of a fixed biased JFET amplifier.
9. Draw the circuit of RC differentiator and prove that v_0 is proportional to the derivative of the input v_i.
10. With a circuit and sinewave input, describe the working of a negative clamper using diode.

(10 × 4 = 40 marks)

Part B

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

11. (a) Compare the merits and demerits of centre tapped FWR with bridge rectifier. (4 marks)

    (b) With neat circuit diagram and waveforms, explain the working of C filter. Derive expression for its ripple factor.

(8 marks)

Or

Turn over

12. Draw and design a circuit diagram of series pass voltage regulator with feedback control and short circuit protection having $V_0 = 5$ volt, $I_{max} = 120$ mA. Assume reasonable data.

13. Draw the circuit diagram of a CE amplifier and explain how it amplifies the voltage and current. Deduce its *h*-parameter (exact) equivalent circuit.

Or

14. Describe how h_{ie}, h_{re}, h_{fe} and h_{oe} are determined from its characteristic graphs. Also draw the circuit diagrams to plot these characteristics and explain the procedure.

15. Draw the circuits of (i) base bias and (ii) emitter bias amplifiers and explain how more stability is exhibited in the latter circuit. Derive the relevant expression to justify the same.

Or

16. Draw and explain the circuit of collector-base feedback amplifier. Derive expressions for its stability factor and comment on its stability. Draw its dc and ac load lines in a single graph and explain how Q point is determined.

17. Draw and design the circuit of a RC coupled amplifier for a $A_v = 120$, output signal swing 10 volt peak to peak, bandwidth 20 Hz to 5 kHz exactly.

Or

18. Draw the circuit of a self biased JFET amplifier and explain its amplification. Design the circuit for $A_v = 20$.

19. Draw the circuit diagram of collector coupled astable multivibrator which can give sharp rise and falling edges. Explain its operation with necessary waveforms.

Or

20. With a neat constructional details and characteristics, explain the working principle and different operating regions of UJT.

[5 × 12 = 60 marks]

F 4734 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Third Semester

Branch : Applied Electronics and Instrumentation/Electronics and Communication Engineering

AI 010 304/ EC 010 304—SOLID STATE DEVICES (AI, EC)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Assume missing data, if any, reasonably, stating the same.

Part A

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

1. Define intrinsic semiconductor. List its properties.
2. Explain, why silicon, germanium and Gallium Arsenide diodes having the same areas, the same lifetimes and the same doping have differences in their characteristics.
3. Describe a metal semiconductor contact. What are its significances ?
4. Why, generally power transistors have low values of α ?
5. Why E-MOSFET is called a "normally-off MOSFET" ?

(5 × 3 = 15 marks)

Part B

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

6. A S_i sample is doped with 10^{18} Arsenic atoms per CC. Calculate the equilibrium concentration P_o at 300 K ? Where is E_F relative to E_i ?
7. A sample of Silicon is doped with 10^{17} phosphorus atoms per cubic centimeter. What is the Hall voltage if the sample is 80 μm thick, $I_x = 1$ mA, $B_z = 10^{-5}$ Wb/m.^{2}, $\mu = 700$ cm.^{2}/V-sec.
8. The doping concentrations of an abrupt silicon PN junction diode are $N_A = 10^{15}$/cc, $N_D = 10^{18}$/cc. The area of the junction is 3×10^{-5} cm.^{2}, $n_i = 10^{10}$/cc. Calculate the junction capacitance at (i) zero bias ; (ii) reverse bias of 10 V. Assume $\epsilon = 10^{-12}$.
9. Derive an expression for the ratio of collector current to base current and hence prove that the BJT in the CE configuration is a linear current amplifier.
10. With a neat constructional diagram, explain the working principle of an IGBT.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. With neat sketches, explain the energy band diagrams, density of states, Fermi-Dirac distribution and carrier concentrations for (i) intrinsic ; (ii) *p*-type ; and (ii) *n*-type semiconductors at thermal equilibrium.

Or

12. (a) Explain the process of carrier generation and recombination in a semiconductor. (7 marks)

(b) Explain the effect of temperature variation on an intrinsic semiconductor. (5 marks)

13. (a) Derive an expression for the law of a p-n junction. Show how does the law explain the shape of its V-I characteristics.

(7 marks)

(b) Using neat sketches, describe all the current components of a diode when (i) forward biased; and (ii) reverse biased.

(5 marks)

Or

14. In a very long P-type S_i bar with cross-sectional area of 0.5 cm.^{2} and $N_A = 10^{17}$/cc, holes are injected such that steady-state excess hole concentration is 6×10^{16}/cc at $x = 0$. What is the steady-state separation between F_P and E_C at 1000 Å ? What is the hole current there ? How much is the excess stored hole charge ? Take $\mu_p = 500$ cm.^{2}/V-S and $\tau_p = 10^{-10}$ S.

15. With a neat constructional diagram, explain the working of a Zener diode. Sketch the VI characteristics in forward and reverse bias and account for the dynamic resistance in various portions in it.

Or

16. Explain the operation of a Schottky barrier diode with the help of energy band diagram at equilibrium, under forward bias and under reverse bias conditions.

17. For a p-n-p transistor $I_{Ep} = 2$ mA, $I_{En} = 0.01$ mA, $I_{Cp} = 1.98$ mA and $I_{Cn} = 0.01$ mA. Determine :

(i) the base transport factor ;

(ii) the injection efficiency ;

(iii) α and β ;

(iv) I_B, I_{CBO} and I_{CEO} ; and

(v) Repeat the part (iii) for $I_{CP} = 1.99$ mA.

Or

18. An *n*-channel silicon JFET has $N_A = 10^{18}$/cc, $N_D = 5 \times 10^5$/cc, L = 28 μm, Z = 300 μm, $a = 1.3$ μm. Assume $\mu_n = 1350$ cm.^{2}/V-s. Determine (i) the built-in voltage ; (ii) pinch-off voltage ; (iii) the channel conductance ; (iv) drain current at $V_{GS} = 0$, $V_{DS} = 4$V ; and (v) g_m at $V_{GS} = -2$ V.

19. A MOS capacitor with silicon substrate of doping $N_A = 10^{16}$/cc has oxide thickness of 100 Å. Calculate the applied voltage, the electric field intensity at the interface and the depletion layer width (i) to make semiconductor surface intrinsic ; and (ii) for strong inversion.

Or

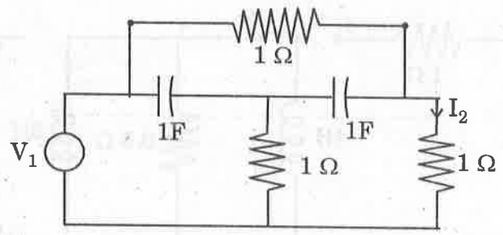
20. (a) With the help of constructional diagram, energy band diagram and VI characteristics, explain the principle of working of a tunnel diode.

(7 marks)

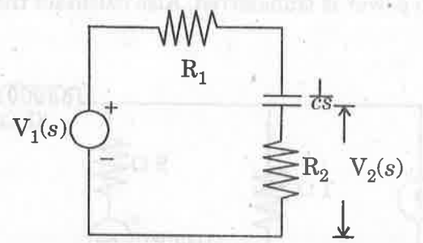
(b) What is threshold voltage of a MOSFET ? How it can be adjusted ? Explain. (5 marks)

[5 × 12 = 60 marks]

18. For the circuit shown, draw the transformed network and write the mesh equations and find the current I_2.

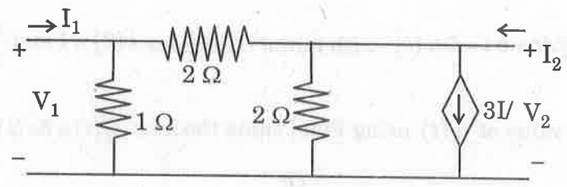


19. Figure shows an R-C circuit. Draw the magnitude and phase plots of $\frac{V_2(s)}{V_1(s)}$ as w is varied from 0 to ∞.



Or

20. Draw the Z-parameter equivalent circuit for the network shown :



(5 × 12 = 60 marks)

F 4724 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Third Semester

Branch : Applied Electronics and Instrumentation / Electronics and Communication/ Electronics and Instrumentation/Instrumentation and Control Engineering

AI 010 303 / EC 010 303 / EI 010 303 / IC 010 303—NETWORK THEORY (AI, EC, EI, IC)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Assume any missing data suitably.

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Explain the classification of sources.
2. Write the voltage and current relationships in a capacitor and Inductor.
3. Define the terms : Impedance, Admittance and Reactance.
4. What are poles and zeroes ?
5. What are the advantages of Bode Plots ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. State and explain Norton's theorem.
7. Obtain the Laplace transform of a step and Impulse functions.
8. Show that average power in a purely Inductive and purely capacitive circuit is zero.
9. State and prove the Shifting Theorem in Laplace Transform.
10. Explain the various interconnections of two port networks.

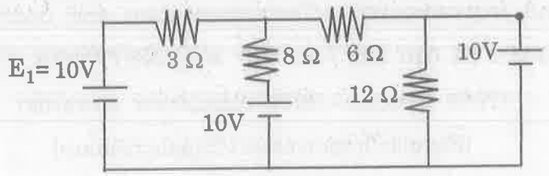
(5 × 5 = 25 marks)

Turn over

Part C

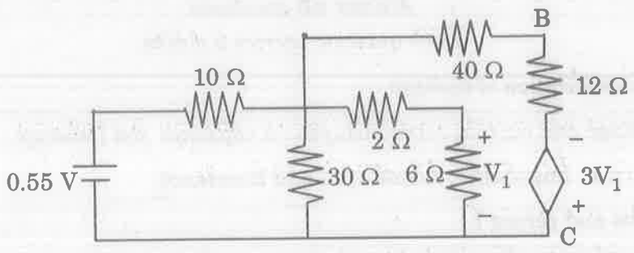
Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Using Superposition theorem find the current in the 6 Ω resistance.

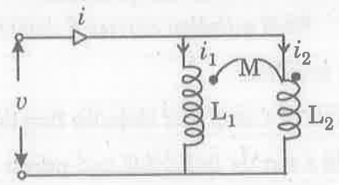


Or

12. Using Kirchhoff's current Law, determine the potential difference between points B and C.

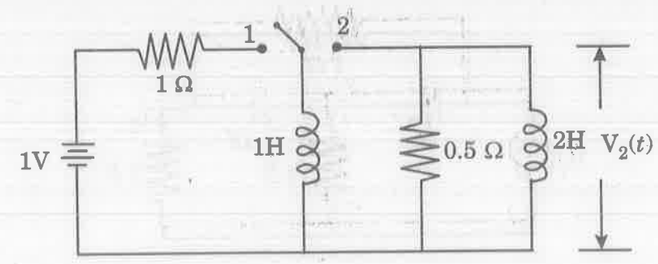


13. Two coupled coils are connected in parallel as shown. Find an expression for the equivalent inductance. If $L_1 = 0.3$ H, $L_2 = 0.8$ H and $k = 0.7$, find the equivalent inductance.



Or

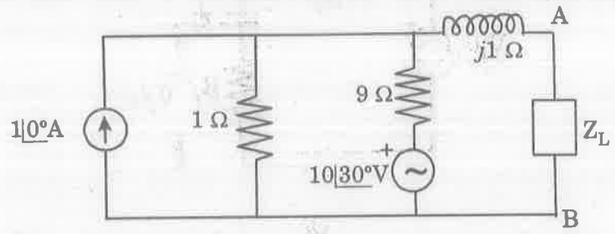
14. In the circuit shown, the switch has been in position 1 for a long time. At $t = 0$ switch is changed to position 2. Find $v_2(t)$.



15. A resistance of 10 Ω and a capacitance of 100 μF are connected in series across a 230 V, 50 Hz supply. Find the impedance, admittance, current, power factor, active, reactive and apparent power. Find the voltage across resistor and capacitance.

Or

16. Find Z_L so that maximum power is transferred. Also calculate the maximum power.



17. (a) Solve the differential equation :

$$\frac{d^2i}{dt^2} + 4di/dt + 5\,i = 5\,u\,(t) \quad \text{with initial conditions } i\,(0) = 1 \text{ and } \frac{di}{dt}\,(0) = 2.$$

(b) Find the final value of $i_2(t)$ using Final value theorem $i_2(t) = 5u\,(t) - 3e^{-2t}$.

Or

F 4746 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Third Semester

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

AI 010 305/EC 010 305—ANALOG CIRCUITS–I [AI, EC]

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What do you mean by 'Reverse Recovery Time' of a diode ? Explain.
2. Define stability factor with respect to transistor biasing. State the factors affecting the stability.
3. How is threshold voltage of a MOSFET adjusted ?
4. State and explain Miller effect.
5. What is meant by circuit efficiency of a power amplifier ? State the maximum values for the same for class A and B.

(5 × 3 = 15 marks)

Part B

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

6. Design a differentiating network to have 8V trigger pulse with a square wave input of 10 V amplitude, 50 % duty cycle and 100 Hz repetition rate. Source and load resistances may be taken equal to 50 Ω and 1000 Ω respectively.
7. Draw and explain a collector to base bias circuits and explain its important features.
8. Two MOSFETs having drain resistances γ_{d1} and γ_{d2} and amplification factors μ_1 and μ_2 respectively are connected in parallel. Show that : (i) $\frac{1}{\gamma_d} = \frac{1}{\gamma_{d1}} + \frac{1}{\gamma_{d2}}$ and (ii) $\mu = \frac{\mu_1 \gamma_{d1} + \mu_2 \gamma_{d2}}{\gamma_{d1} + \gamma_{d2}}$.

Turn over

9. Draw the high frequency equivalent circuit model for a CD amplifier.

10. Derive the expressions for the effective input and output resistances of a shunt-series negative feedback amplifier.

(5 × 5 = 25 marks)

Part C

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

11. (a) What is meant by a low-pass circuit ? What is the upper cut-off frequency of a low-pass RC circuit ? Derive an expression for the same.

(7 marks)

(b) A 1 kHz square-wave output from an amplifier has rise-time of 250 ns and tilt 10 %. Calculate the lower and upper cut-off frequencies.

(5 marks)

Or

12. Draw the circuit of a series pass voltage regulator with feedback and short circuit protection with foldback. Explain the working of the circuit. Design the circuit for V_o = 12 V, I_{Lmax} = 1 A and I_{sc} = 10 mA.

13. Design a potential divider bias CE amplifier to have a maximum sinusoidal symmetrical swing of 12 Volt peak to peak and voltage gain of 120. Make necessary assumptions stating them clearly.

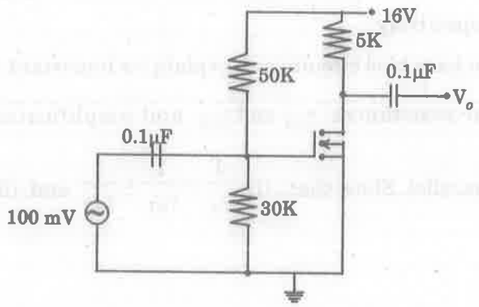
Or

14. Draw the *h*-parameter equivalent circuit of a CB amplifier and derive expressions for its R_i, R_o, A_i and A_v.

15. Sketch the cross-sectional view of an E-MOSFET. Explain its operation and characteristics and small-signal equivalent circuit.

Or

16. The E-MOSFET in the following circuit has $I_{D(ON)}$ = 4 mA at V_{GS} = 10 V, V_{GST} = 4 V and g_m = 5 ms. Calculate V_{GS}, I_D, V_{DS} and V_o.



17. Derive the Miller input and output impedance relations. Explain the same for the CE amplifier, at high frequencies.

Or

18. Draw the small signal equivalent circuit at high frequencies for a CS amplifier. Derive the expression for its R_i, R_o and A_v.

19. Draw the circuit of a push-pull class B power amplifier and derive expression for its efficiency. Determine the input power, output power and circuit efficiency if V_{CC} = 20 V, output signal swing 16 V peak to peak to a 16 Ω loud speaker.

Or

20. (a) An output signal displayed on a CRO provided maximum, minimum and quiescent values of I_C to be 240 mA, 24 mA and 120 mA respectively. Calculate the second harmonic distortion.

(6 marks)

(b) Explain the steps followed in the analysis of a negative feedback amplifier with the help of a circuit example.

(6 marks)

[5 × 12 = 60 marks]

F 4757

(Pages : 3)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2015

Third Semester

Branch : Applied Electronics and Instrumentation/Electronics and Communication/ Electronics and Instrumentation/Instrumentation and Control Engineering

AI 010 306
EC 010 306
EI 010 306
IC 010 306
} COMPUTER PROGRAMMING (AI, EC, EI, IC)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Write neat and efficient C programs wherever required.

Part A

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

1. What are library functions ? Give *two* examples.
2. What is a function ? State any two advantages of using the function.
3. Write any three string handling functions and state their uses.
4. What are the differences between arr [3] and *arr [3] ? Explain.
5. What is meant by "data files" in C ? Write a C statement to open a data file.

(5 × 3 = 15 marks)

Part B

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

6. Differentiate between scanf () and gets (), with respect to data input with embedded white space characters.
7. Differentiate between "break" and "continue" giving appropriate program examples.
8. Give an example to show how unions, structures and arrays can be intermixed.
9. What is the relationship between an array name and a pointer ? How is an array name interpreted when it appears as an argument to a function ? Write an example.
10. Explain any five file handling functions in C, giving examples.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. Given a set of 1000 integers. Write a single algorithm to find :

    (i) The total sum of all the even integers ; and

    (ii) The total sum of all integers divisible by 3.

    Also draw neat flow chart for your algorithm.

Or

12. Write an interactive C program using formatted I/O, that will read a positive integer and determine if it is a prime. If not, write any two of its factors.

13. Write a complete C program, using functions to evaluate ${}^{n}C_{r} = \frac{n!}{r!\,(n-r)!}$.

Or

14. The grading system for a university is framed as listed below :

Marks between	*Grade*
95 and 100	S
90 and 94	A+
85 and 89	A
80 and 84	B+
75 and 79	B
70 and 74	C+
65 and 69	C
60 and 64	D
Below 60	FAILED

Using "switch", write a C program to read the mark and give the print of marks and grades.

15. (a) When a multi-dimensional array is passed to a function, how are the formal argument declarations written ? Compare with one-dimensional array. (5 marks)

(b) Write a C program which reads in a matrix and checks whether it is orthogonal or not. (7 marks)

Or

16. Using structures, read the employee number, name and salary of 200 employees of a firm, prepare the pay roll in the descending order of the salaries, using C program.

17. Write a function "day-name" that receives a number n and returns a pointer to a character string containing the name of the corresponding day. The day names should be kept in a static table of character strings local to the function.

18. (a) Explain how arrays can be used to store pointers. Give one example. (5 marks)

(b) Write a C programs to sort N input integers using pointers. (7 marks)

19. Write a C program that reads characters from a standard input file until EOF is encountered. Use the variables digit-ent and other-ent to count the number of digits and the number of other characters, respectively.

Or

20. Two files A and B contain sorted lists of integers. Write a C program to prodcue a third file D which holds a single sorted, merged list of these two files. Use command line arguments to specify the file names.

(5 × 12 = 60 marks)