F 9307 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Third Semester

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

AI 010 305/EC 010 305—ANALOG CIRCUITS—I (AI, EC)

(Regular)

Time : Three Hours Maximum : 100 Marks

Part A

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

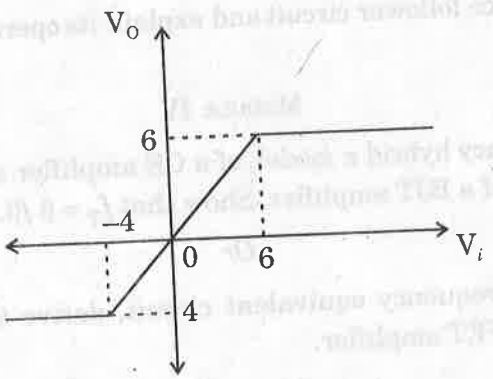
1. What type of filter gives ripple factor independent of the load ? Give reason.
2. Define the three stability factors of a BJT amplifier.
3. Why the enhancement MOSFET is called sometimes normally-off MOSFET ?
4. What is base-spreading resistance ? Why it is called so ?
5. What is cross-over distortion ? Which class of amplifier possesses it ?

(5 × 3 = 15 marks)

Part B

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

6. Draw a silicon diode clipper to obtain the following voltage transfer characteristics. Design the values.



7. What is thermal runaway ? Explain two distinct methods to eliminate the same.
8. Draw the small signal equivalent circuit for a MOSFET and describe its parameters.
9. Explain the significance of Miller effect in the HF amplifier operations.
10. Derive the expression for the gain of the amplifier with feedback and show that the gain is stabilised as well as reduced, with the application of negative feedback.

(5 × 5 = 25 marks)

Turn over

Part C

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

Module I

11. With necessary waveforms and circuit diagram describe the working of a bridge rectifier with capacitance filter. Derive expression for its ripple factor.

Or

12. Draw the circuit diagram of a series pass voltage with feedback and explain the line and load regulation in the circuit. Design the circuit for $V_0 = 10$ Volt and $I_L = 100$ mA.

Module II

13. Starting from fundamentals, derive the low frequency small signal *h*-parameter model fr a CE amplifier. Use it to derive its R_i and A_i.

Or

14. Draw the circuit of a voltage divider bias CE amplifier and derive the expression for its three stability factors.

Module III

15. With a neat circuit diagram, explain the potential divider bias circuit of Enhancement types MOSFET in CS configuration. Determine V_{GS}, I_D, V_{DS} in the above circuit if $R_{D1} = 60$ K, $R_{D2} = 40$ K, $R_D = 6$K $V_{DD} = 15$ V $I_D = 60$ K, $R_{D2} = 40$ K, $R_D = 6$K, $V_{DD} = 15$ V, $I_{D(ON)} = 4$ mA at $V_{GS\,(ON)} = 8$ V, $V_{GST} = 4$V, $g_m = 2$mV.

Or

16. Design a MOSFET source follower circuit and explain its operation. Derive expressions for its R_i, R_o and A_v.

Module IV

17. Explain the high frequency hybrid π model, of a CE amplifier and derive expression for the short circuit CE current gain of a BJT amplifier. Show that $f_T = \beta f\beta$.

Or

18. With the help of high frequency equivalent circuit, derive the expressions for the gain and bandwidth of CG—MOSFET amplifier.

Module V

19. With a neat circuit diagram, explain the working of a transformer coupled push pull class B power Amplifier. Derive the expression for its maximum efficiency.

Or

20. Draw the circuit of a voltage follower using BJT. Establish the type of feedback in it and deduce the expressions for gain and input resistance with the feedback.

(5 × 12 = 60 marks)

F 9316 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

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 and IC)

(Regular)

Time : Three Hours Maximum : 100 Marks

Write neat and efficient C programs whenever necessary.

Part A

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

1. Write the syntax of the conditional operator and give an example.
2. What is recursion ? What are its advantages ?
3. Show how 1D and 2D arrays are initialised ?
4. What is a pointer ? State its uses.
5. Distinguish between scanf and fscanf functions.

(5 × 3 = 15 marks)

Part B

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

6. List all the arithmetic operators in C and explain their precedence.
7. Explain the syntax and use of the "switch" statement with an example.
8. Define a function and explain the uses of functions.
9. Explain pointer arithmetic with an example.
10. What are preprocessors ? Give *two* examples of any preprocessor directives and their purpose.

(5 × 5 = 25 marks)

Turn over

Part C

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

Module 1

11. Define and distinguish between algorithm and flow chart. Draw the flow chart to find the sum of digits of a five digit integer.

Or

12. Write a C program to read three sides of a triangle, calculate and print the perimeter and area, using formatted I/O statements.

Module 2

13. Write a C program to find the number of Thousands, Five Hundreds, Hundreds, Fifties, Twenties, Tens, Fives, Twos and Ones in a given amount, using "while" loop.

Or

14. Write a program to find the factorial of a given integer using recursion.

Module 3

15. Write a C program to determine if two given matrices are conformable for multiplication, and if so, multiply them.

Or

16. Define a structure called STUDENT that will descirbe the following information :

student_name, class, reg_no, subject_marks and total. Using STUDENT, declare an array stu_list with 60 elements. Write a program in C to read the information about all the 60 students and to display the informatin.

Module 4

17. Using pointers, write a C program to find the biggest of N numbers in an array.

Or

18. Write a C progrm to count the number of vowels in an array of characters using pointers.

Module 5

19. Write a C program to merge two files and to store the contents of the two files in an another file.

Or

20. What is a macro ? Write a macro to convert a character to uppercase if it is a lowercase letter and leave it unchanged otherwise.

(5 × 12 = 60 marks)

F 9297 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Third Semester

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

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

(Regular)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Draw the energy band diagram for (i) intrinsic ; (ii) *n*-type ; and (iii) *p*-type semiconductors and label their Fermi levels.
2. What is ideality factor of a *pn* junction diode ? Give its value at room temperature for Si and Ge diodes ?
3. What is a varactor diode ? In which bias condition it is used ? Why ?
4. The base current of a transistor is 10 μA when its collector current is 1.42 mA. Calculate its emitter current, α and β.
5. Sketch the VI characteristics of SCR and label it.

(5 × 3 = 15 marks)

Part B

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

6. Explain Fermi-Dirac distribution function. Plot it as a function of energy for different temperatures and explain.
7. Sketch the profiles for distribution of (i) charge density ; (ii) electric field ; (iii) potential across a *p-n* junction diode at open circuit equilibrium condition and explain.
8. Clearly explain the Avalanche and Zener breakdown mechanisms and distinguish between them.
9. Sketch the minority carrier distribution profiles of a *pnp* transistor when biased in forward active mode operation and explain.
10. Draw the cross-section of an *n*-channel MOSFET showing the channel and deflection regions under (i) strong inversion ; (ii) pinch-off and (iii) cut-off ; Explain.

(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. Draw the energy and diagram of a *pn* junction under open circuit equilibrium condition and label the important energy levels in it. Derive expression for E_0, the potential energy of the electrons at the junction.

Or

12. (a) With neat graphs, explain the effect of temperature and doping on the mobility of charge carriers in an intrinsic semiconductor.

(b) Show that the gradient in Fermi level is zero under thermal equilibrium.

(7 + 5 = 12 marks)

Module II

13. (a) How is minority carrier mobility and diffusion constant measured ? Explain with neat diagrams.

(b) Explain life time of mobile charge carriers. Show that the life time is the average time a charge carrier survives without recombination after it is generated.

Or

14. State the assumptions made while deriving the diode current equation. Derive the equation starting from fundamentals.

Module III

15. Derive expressions for the capacitances at the *pn* junction under (i) forward biased and (ii) reverse biased conditions.

Or

16. (a) Compare the forward and reverse characteristics of a pn junction diode and Schottky diode made of the same semiconductor material.

(b) Explain the principle of operation of LED. Explain what are the materials used for the fabrication of LED's ?

Module IV

17. Draw and explain the energy band diagram of a *pnp* transistor with uniform doping in all regions under (i) equilibrium ; (ii) forward active ; and (iii) saturation.

Or

18. Derive expression for the equilibrium conductance of the channel of a JFET ?

Module V

19. Draw and explain the energy band diagram and distribution of charge density of ideal MOS capacitor under (i) accumulation ; (ii) depletion ; and (iii) inversion conditions.

Or

20. Draw neat cross-section of enhancement and depletion type MOSFET and explain the operation with their-drain characteristics.

F 9289 (Pages : 2) Reg. No.....12 صفر

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Third Semester

EN 010 302—ECONOMICS AND COMMUNICATION SKILLS (AI, AN, AU, CE, CS, EC, EE, EI, IC, IT, ME, PE and PO)

(Regular)

[Common to all Branches]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Name three Commercial banks. Describe their main functions.
2. Explain the meaning of Globalisation.
3. What is incidence of tax ? Explain.
4. What are the causes of inflation ?
5. List any *six* arguments in support of protectionism.

(5 × 3 = 15 marks)

Part B

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

6. Explain how Commercial banks aid Economic Development of a country.
7. Discuss the various effects and defects of privatisation.
8. What is meant by direct and indirect taxes ? Give *four* examples each with your reasons.
9. Define National Income and per capita income and account for the low level of per capita income in under-developed countries.
10. Why is international trade distinguished from domestic or inter-regional trade ?

(5 × 5 = 25 marks)

Part C

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

Module I

11. State and explain the major financial institutions in India providing financial assistance to industries.

Or

Turn over

12. Explain the various credit control methods ? What are the methods used by the RBI to control the creation of credit by Commercial banks.

Module II

13. Discuss the impact of multinational companies in Indian economy.

Or

14. Describe the growth and development of Information Technology industries in India.

Module III

15. Explain clearly the characteristics of good tax system.

Or

16. Define tax and explain its features. Distinguish between incidence and shifting of a tax. What are the factors influencing the shifting of a tax ?

Module IV

17. How is National Income estimated ? Bring out the difficulties involved in National Income estimation in under-developed countries.

Or

18. Define inflation and explain the types of inflation. What are the effects of inflation ? How is inflation controlled ?

Module V

19. What is free trade ? What are its advantages ? What is the case against free trade ?

Or

20. Distinguish between Balance of Trade and Balance of Payments. Why must the balance of payments balance in the long run ?

(5 × 12 = 60 marks)

F 9282 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Third Semester

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

COMPUTER PROGRAMMING (LAS)

(2009 Admissions—Improvement)

[2004 – 2009 admissions—Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are the rules to be followed while writing variables ? Give examples.
2. Explain the logical and relational operators and give their precedence
3. Differentiate between break and continue statements.
4. What are function prototypes ? Explain with examples.
5. With an appropriate example show how unions, structures and arrays can be intermixed.
6. How can an entire structure be passed to a function ?
7. Under what conditions can a pointer variable be compared ? Under what conditions are such comparisons useful ?
8. How can a one dimensional array of pointers be used to represent a collection of strings ?
9. How do we check for errors on opening a file and output the correct error message ?
10. What is macro ? What are its advantages ?

(10 × 4 = 40 marks)

Part B

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

Module 1

11. Explain with examples, all the data types used in C.

Or

12. With suitable examples, describe all types of operators used in C. Show their associativity and precedence of operation.

Turn over

Module 2

13. Write a C program to find the sum of the following series by adding n terms of the series

$$e^{-x} = 1 - x + \frac{x^2}{2} - \frac{x^3}{6} + \ldots$$

Or

14. (a) Bring out the difference between parameter passing by value and passing by reference. (4 marks)

(b) Write a Boolean function to find whether a number is divisible by 5 or not ? (8 marks)

Module 3

15. Write a program to find the determinant of a 3 × 3 matrix.

Or

16. Write a program to read a n × m matrix and find :

(a) the average of each row.

(b) the average of each column and

(c) the average of all the *mn* entries.

Module 4

17. Write C program to find the largest word of a given sentence, using pointers.

Or

18. Using pointers, write a C program to multiply two square matrices.

Module 5

19. Explain how do you create, open a file. Write a program to read from a keyboard and write to a file and display its contents. Give examples.

Or

20. Explain the syntax of different bit-level operators used in bit-level manipulations. Illustrate with one example for each operator.

(5 × 12 = 60 marks)

F 9266 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Third Semester

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

SOLID STATE DEVICES (LAS)

(2009 admissions—Improvement ; 2004—2009 admissions—Supplementary)

Time : Three Hours Maximum :.100 Marks

Part A

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

1. With neat energy diagram, explain the location of Fermi level in intrinsic, *n* type and *p* type semiconductors.
2. Explain direct and indirect band gap semiconductors with examples.
3. Explain drift and diffusion currents in semiconductor. Write down expressions for the same.
4. Explain why silicon, germanium and gallium arsenide diodes having the same areas, the same life times and the same doping concentrations have differences in their characteristics.
5. Explain the tunnelling phenomena in a *pn* junction with the help of energy band diagrams.
6. What are photodiodes ? How they are different from LEDs, ? Explain.
7. Sketch and mention all the current components in a *pnp* transistor.
8. Why *npn* transistors are preferred over *pnp* transistors ? Explain.
9. Distinguish between Enhancement and Depletion mode MOSFET.
10. Explain pinch-off voltage and saturation of JFET.

(10 × 4 = 40 marks)

Part B

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

Module 1

11. (a) Derive the expressions for the Fermi level, minority and majority concentrations of an *n*-type semiconductor.

Or

(b) In *p*-type silicon, the acceptor concentration corresponds to 1 atom per 10^8 silicon atoms. Assume that $m_p = 0.6$ m. At room temperature, how far from the edge of the valence band is the Fermi level. Is E_F above or below E_V ? Under what conditions will E_F coincide with E_V ?

Turn over

Module 2

12. (a) (i) Explain transition capacitance and storage capacitance of a *pn* junction. Derive equation for the same. (8 marks)

(ii) Calculate the contact potential of *pn* junction diode having $N_A = 10^{16}$/cc, $N_D = 10^{13}$/cc at T = 300 K. Given $n_i = 1.5 \times 10^{10}$/cc. (4 marks)

Or

(b) Sketch and explain formation of space charge region in *pn* junction. Also plot charge density, electric field, barrier potential and energy band diagram under thermal equilibrium conditions, with the help of equations.

Module 3

13. (a) With the help of neat energy band diagrams explain the working of a Zener diode. Sketch and explain its forward and reverse characteristics and applications.

Or

(b) Starting from the VI characteristic of a diode, explain all the parameters of the diode, their temperature dependence and deduce equivalent circuits for both type of bias.

Module 4

14. (a) (i) Derive the relationship between I_{CBO} and I_{CEO} and explain which is greater and why. (4 marks)

(ii) Explain the four operating modes of an *npn* transistor and show the distribution of the minority carrier in different operating modes. (8 marks)

Or

(b) (i) Derive expression for the ratio of the I_C to I_B and hence prove that the BJT in the CE configuration is a linear current amplifier. (6 marks)

(ii) Compute δ, α, β I_{CBO} and I_{CEO} of a *pnp* BJT with the following parameters : $I_{Ep} = 2$ mA, $I_{En} = 0.02$ mA, $I_{CP} = 1.98$ mA and $I_{Cn} = 0.002$ mA. (6 marks)

Module 5

15. (a) Draw the (i) transfer and (ii) drain characteristic curves of (1) *n*-channel DEMOSFET and (2) *n*-channel EMOSFET and justify for the differences.

Or

(b) (i) Explain how the transconductance of a JFET varies with drain current and gate source voltage. (6 marks)

(ii) Find the maximum width of the depletion region for an ideal MOS capacitor on *p*-type silicon with $N_A = 10^{16}$/cc. The relative dielectric constant of silicon is 11.5 and $n_i = 1.5 \times 10^{10}$/cc. (6 marks)

[5 × 12 = 60 marks]

Module IV

17. In a series RC circuit, the resistance is of 2Ω while the capacitor is 0.25F. Find the transfer function of voltage and the drop across the capacitor assuming the supply voltage to be V $(t) = t\ u\ (t)$. Use Laplace Transform method.

Or

18. Find $\frac{V_2}{V_1}$ and $\frac{V_2}{I_1}$ for the network shown in Fig. 8.

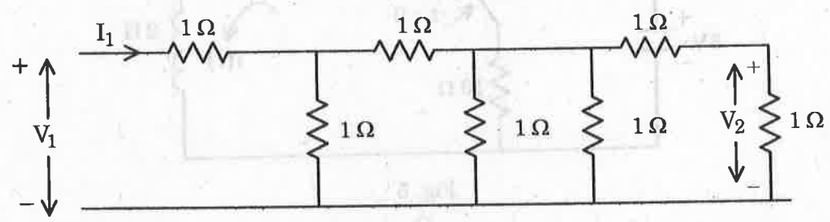


Fig. 8

Module V

19. Draw the Bode plot for $H(s) = \frac{20{,}000S}{(s+100)(s+400)}$.

Or

20. Find the *z*-parameters of the following network in Fig. 9 and find whether the network is reciprocal.

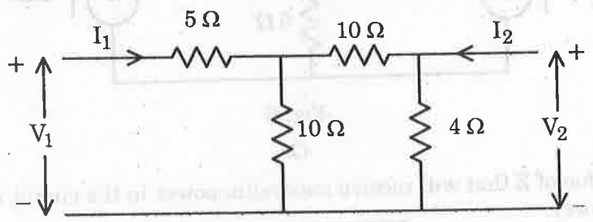


Fig. 9

(5 × 12 = 60 marks)

F 9290 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

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)

(Regular)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define ideal current and ideal voltage sources.
2. What is the significance of time constants of RC and RL circuits ?
3. Where and why maximum power transfer theorem is applied ?
4. State initial value and final value theorems in Laplace Transforms.
5. Define the *h*-parameters of a two-port network.

(5 × 3 = 15 marks)

Part B

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

6. A battery has an internal resistance of 0.5 ohm and open circuit voltage of 12 volt. What is the power lost within the battery and the terminal voltage on full load if a resistance of 3 ohms is connected across the terminals of the battery ?
7. With an example, describe the procedure for evaluating initial conditions in an RC circuit.
8. Find the Thevenin equivalent circuit for the network shown in fig. 1.

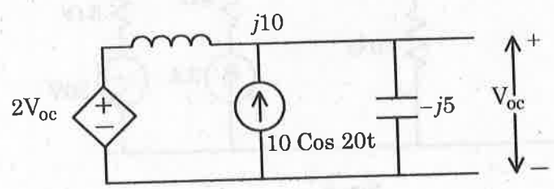


Fig. 1

9. Find the Laplace Transform of $x(t) = \frac{\sin^2 wt}{t}$.

10. Determine the transmission parameters in the s -domain for the network shown in fig.2.

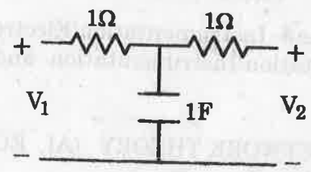


Fig. 2

(5 × 5 = 25 marks)

Part C

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

Module I

11. Using nodal analysis, calculate the values of current i through the 5 Ω resistor and the voltage drop V_x across the 1Ω resistor in the network shown in Fig. 3.

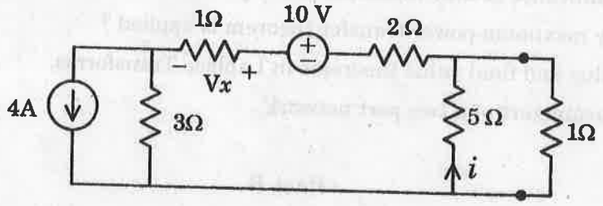


Fig. 3

Or

12. Calculate the voltage across the 2Ω resistor in the Fig. 4, using superposition theorem.

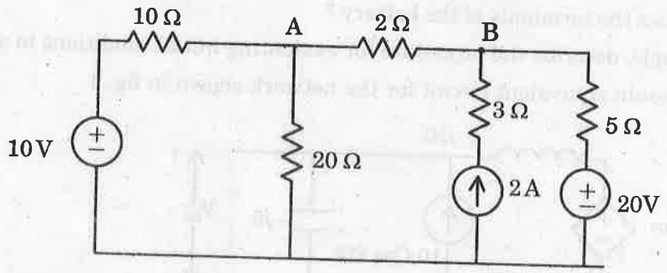


Fig. 4

Module II

13. In the circuit of Fig 5, the switch S was open and the circuit is in the steady state before $t = 0$. The switch S is closed at time $t = 0$. Find the current in the inductor for $t > 0$.

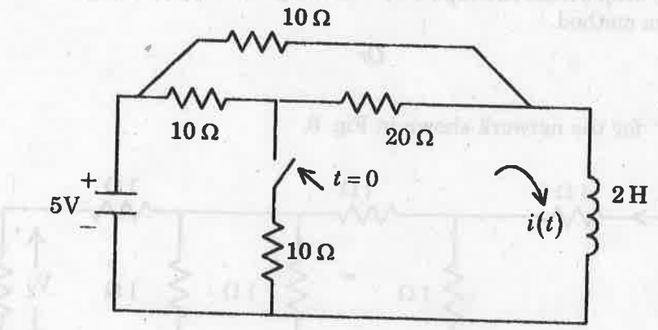


Fig. 5

Or

14. The step voltage applied to a series RL circuit is 36 volt with R = 15 Ω. Determine the value of inductance required to make the current of 1.0 A at 250 μ sec. Assume the initial current is zero.

Module III

15. For the circuit shown in Fig. 6, calculate the load current using Norton's theorem.

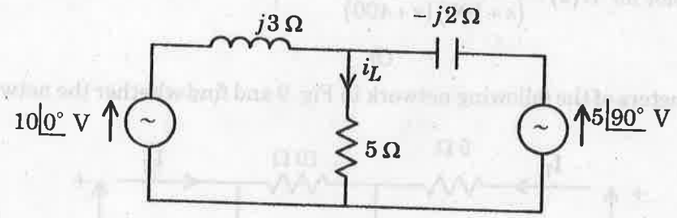


Fig. 6

Or

16. Calculate the value of Z that will receive maximum power in the circuit in Fig. 7. Also determine the maximum power.

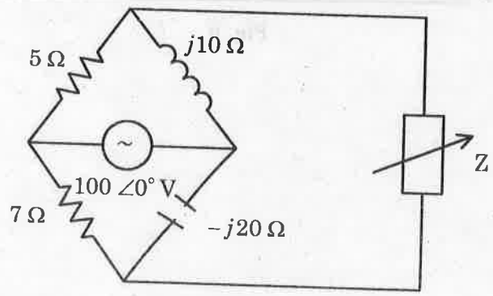


Fig. 7

Turn over

F 9287 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Third Semester

Branch : Civil/Mechanical/Electrical and Electronics/Automobile/Aeronautical/Electronics and Communication/Applied Electronics and Instrumentation/Electronics and Instrumentation/Instrumentation and Control Engineering/Production Engineering/Polymer Engineering

EN 010 301 A—ENGINEERING MATHEMATICS—II (CE, ME, EE, AU, AN, EC, AI, EI, IC, PE AND PO)

(Regular)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Find a unit vector normal to the surface $xy^3z^2 = 4$ at the point $(-1, -1, 2)$.
2. If S is any closed surface, prove that $\int_S \text{curl } \bar{F} \cdot d\bar{S} = 0$.
3. Evaluate $\Delta^2 \cos 2x$.
4. What is Simpson's one-third rule ? How it is related to Newton-Cote's formula ?
5. Find the inverse transform of $\frac{2z^2+3z}{(z+2)(z-4)}$.

(5 × 3 = 15 marks)

Part B

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

6. Find div $\bar{F}$ and curl $\bar{F}$, where $\bar{F} = \text{grad}\left(x^3 + y^3 + z^3 - 3xyz\right)$.
7. Find the work done in moving a particle in the force field $\bar{F} = 3x^2\hat{i} + (2xz - y)\,\hat{j} + z\hat{k}$ along the curve defined by $x^2 = 4y$, $3x^3 = 8z$ from $x = 0$ to $x = 2$.
8. Prove that $e^x = \left(\frac{\Delta^2}{E}\right) e^x \cdot \frac{Ee^x}{\Delta^2 e^x}$, the interval of differencing is h.

Turn over

9. A solid of revolution is formed by rotating about the x-axis, the area between the x-axis, the lines $x = 0$ and $x = 1$ and a curve through the points with the following co-ordinates :

x :	0.00	0.25	0.50	0.75	1.00
y :	1.0000	0.9898	0.9589	0.9089	0.8415

Estimate the volume of the solid formed using Simpson's rule.

10. Solve $y_{n+2} - 4y_{n+1} + 3y_n = 5^n$.

(5 × 5 = 25 marks)

Part C

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

Module 1

11. (a) If $r = \sqrt{x^2 + y^2 + z^2}$, show that $\nabla^2\left(r^n\right) = n(n+1)r^{n-2}$ and hence deduce that $\nabla^2\left(\frac{1}{r}\right) = 0$, except at $r = 0$.

(6 marks)

(b) Show that curl $\left(\phi\bar{A}\right) = \text{grad}\,\phi \times \bar{A} + \phi\,\text{curl}\,\bar{A}$. (6 marks)

Or

12. (a) Find the directional derivative of $\nabla\cdot(\nabla\phi)$ at the point $(1, -2, 1)$ in the direction of the normal to the surface $xy^2z = 3x + z^2$, where $\phi = 2x^3y^2z^4$.

(6 marks)

(b) Show that curl $\left(\bar{u}\times\bar{v}\right) = \left(\bar{v}\cdot\nabla\right)\bar{u} - \left(\bar{u}\cdot\nabla\right)\bar{v} + \bar{u}\,\text{div}\,\bar{v} - \bar{v}\,\text{div}\,\bar{u}$. (6 marks)

Module 2

13. Verify divergence theorem for $\bar{F} = (2xy + z)\,\hat{i} + y^2\hat{j} - (x + 3y)\,\hat{k}$ when the surface S is that of the region bounded by the plane $2x + 2y + z = 6$ in the first octant.

Or

14. Use Stoke's theorem to calculate $\oint_C (ydx + zdy + xdz)$, where C is the curve of intersection of $x + y = 2$ and $x^2 + y^2 + z^2 - 2x - 2y = 0$.

Module 3

15. Using Newton's forward interpolation formula, estimate the number of students who scored marks between 40 and 45 :

Marks :	30—40	40—50	50—60	60—70	70—80
No. of students :	31	42	51	35	31

Or

16. Use Lagrange's formula to find the form of $f(x)$, given :

x :	0	2	3	6
$f(x)$:	648	704	729	792

Module 4

17. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using (i) trapezoidal rule ; (ii) Simpson's 1/3rd rule ; and (iii) Simpson's 3/8th rule. Compare their accuracies.

Or

18. Find the first and second derivatives of the function from the following table at point $x = 1.1$:

x :	1.0	1.2	1.4	1.6	1.8	2.0
$f(x)$:	0.0	0.128	0.544	1.296	2.423	4.01

Module 5

19. (a) If $\bar{u}(z) = \frac{2z^2 + 5z + 14}{(z-1)^4}$, evaluate u_2 and u_3. (6 marks)

(b) Using the z-transform, solve $u_{n+2} + 4u_{n+1} + 3u_n = 2^n$ with $u_0 = 0$, $u_1 = 1$. (6 marks)

Or

20. (a) Show that $z\left(\frac{1}{n+1}\right) = z\log\left(\frac{z}{z+1}\right)$. (6 marks)

(b) Using Convolution theorem, evaluate $z^{-1}\left[\frac{z^2}{(z-1)(z-3)}\right]$. (6 marks)

[5 × 12 = 60 marks]

F 9274 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Third Semester

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

ELECTRONIC CIRCUITS—I (LAS)

(2009 Admissions—Improvements)

(2004—2009 Admissions—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Calculate the dc output voltage and ripple factor of a centre tapped FWR using 12–0–12 transformer, 2200 μF filter capacitor and 100 Ω load resistance.
2. Draw and briefly explain the block diagram of a series pass voltage regulator using feedback.
3. Why *h*-parameters are called so ? Define the *h*-parameters of CE configuration.
4. Label and explain the operating regions of JFET in its drain characteristics.
5. With a neat circuit diagram, explain the method of compensation for I_{co}.
6. Compare the fixed bias, collector-to-base feedback bias, emitter feedback bias and potential divider bias circuits on account of their stability factors.
7. Draw and explain the working of a self bias JFET circuit.
8. Calculate the operating point of an RC-coupled CE amplifier with V_{cc} = 12V, R_c = 4.7K, R_E = 1K, R_1 = 18K, R_2 = 100K. C_1 = 10μF, C_2 = 10μF, C_E = 220μF using a *npn* transistor having β = 120.
9. Explain the switching characteristics of a CE amplifier.
10. Define intrinsic stand-off ratio of UJT. Give its typical value.

(10 × 4 = 40 marks)

Part B

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

Module 1

11. Show how a zener diode can be used as a voltage regulator. Draw and design a zener diode series pass voltage regulator circuit having feedback and short circuit protection. Explain the functioning of the same.

Or

Turn over

12. Draw and explain a bridge rectifier with C filter. Design the circuit for an output voltage of 10 Volt with 0.001% ripple.

Module 2

13. For the emitter follower with $R_s = 500\,\Omega, R_L = 5\,k\Omega, h_{ie} = 1\,k\Omega, \quad h_{fe} = 100, h_{re} = 2\times10^{-4}$, $h_{oe} = 25\,\mu\text{v}$ calculate A_i, A_v, R_i and R_o.

Or

14. Design a CB amplifier with input resistance $22\,\Omega$, output resistance 1.7 $\text{m}\Omega$. For the amplifier designed, calculate A_v, A_i, A_{vs} and A_{is}. Assume $h_{ib} = 21.6\,\Omega, h_{rb} = 2.9\times10^{-4}, h_{fb} = 0.98$ and $h_{ob} = 0.49\,\mu\text{v}$.

Module 3

15. For the circuit shown in fig. 1, find R_1, R_2 and R_E given that V_{CE} = 10 volt, I_C = 2mA, β = 100, V_{BE} = 0.7V, S_I = 10, $h_{ie} = 1\,k\Omega$. Derive the formula for S_I used.

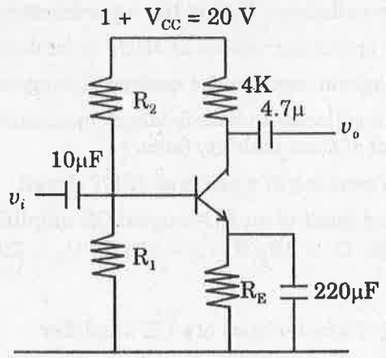


fig. 1.

Or

16. Distinguish between bias stabilization and bias compensation. With a circuit diagram and equations, explain how compensation for the V_{BE} can be made using

(a) diode.

(b) thermistor.

Module 4

17. Derive the ac equivalent circuit of the RC coupled CE amplifier with voltage divider bias and obtain the expressions for A_i, A_v, R_i and R_o.

Or

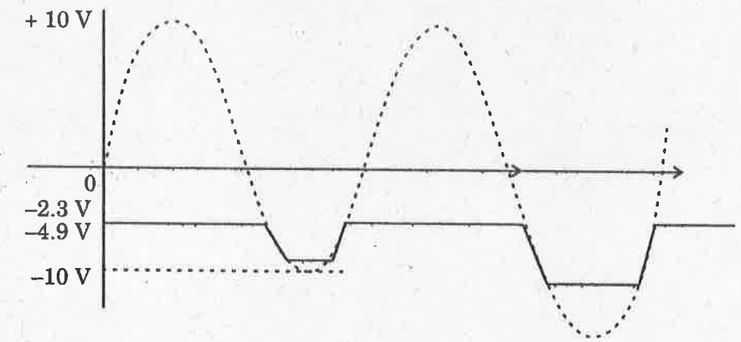
18. Draw the circuit of a RC coupled JFET source follower amplifier and derive the expressions for R_i, R_o and A_v. Hence calculate the same if I_{DSS} = 16 mA, V_p = –4 volt, $r_d = 40\,\text{k}\Omega$, V_{GS} = –2.86 volt, R_G = 1 $\text{M}\Omega$, R_S = 2.2 $\text{k}\Omega$.

Module 5

19. Explain RC circuit as integrator and differentiator using their pulse responses and frequency responses. Bring out the differences between the two.

Or

20. (a) Design and draw the circuit to obtain the following output.



(b) Design and draw a circuit to clamp the given 5V peak to peak sinusoidal signal of frequency 1 kHz for a dc shift of 8 volt.

(5 × 12 = 60 marks)

F 9257 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Third Semester

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

ELECTRICAL TECHNOLOGY (LAS)

(2009 admissions—Improvement ; 2004—2009 admissions—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Sketch OCC of a d.c. generator and account for the shape of the curve.
2. Discuss the various types of excitation in a d.c. generator.
3. Explain back e.m.f. and its significance in a d.c. motor.
4. Explain speed versus armature current characteristics of a d.c. shunt motor.
5. What do you mean by conducted power and transformed power in an autotransformer ?
6. Draw the phasor diagram of real transformer supplying lagging power factor load.
7. How torque is produced in a 3-phase induction motor ? Explain.
8. What is synchronous reactance ? Explain.
9. Explain the working principle of tachogenerator.
10. List the features of universal motor. What are its applications ?

(10 × 4 = 40 marks)

Part B

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

Module I

11. (a) (i) Why the terminal voltage of a d.c. generator falls as the current supplied by it increases ? Explain.

(4 marks)

(ii) A 4-pole, lap-wound, d.c. shunt generator has a useful flux per pole of 0.08 Wb. The armature winding consists of 220 turns each of 0.004 Ω resistance. Calculate the terminal voltage when the generator runs at 900 r.p.m., the armature current being 50 A.

(8 marks)

Or

(b) (i) Plot the no-load curve of a d.c. generator, hence find the critical field resistance and critical speed.

(4 marks)

(ii) A 110 V, d.c. shunt generator delivers a load of 50 A. The armature and field circuit resistances are 0.2 Ω and 50 Ω respectively. The generator is rotating at 1800 r.p.m., has 6 poles, lap-wound and a total of 360 conductors. Calculate the flux per pole and the no-load voltage at the armature.

(8 marks)

Module II

12. (a) (i) With a neat sketch, describe how the efficiency of a d.c. machine can be determined using Hopkinson's test.

(6 marks)

(ii) Calculate the torque exerted by a 4-pole series motor whose armature has 1200 conductors connected up in a 2 circuit winding. The motor current is 10 A and the flux per pole is 0.02 Wb.

(6 marks)

Or

(b) (i) A 440 V shunt motor runs at its normal speed of 220 r.p.m. when the armature current is 200 A. The resistance of armature is 0.12 Ω. Calculate the speed when a resistance is inserted in the field reducing the shunt field to 80 % of normal value and the armature curernt is 100 A.

(4 marks)

(ii) Explain the necessity of a starter for a d.c. motor with a neat diagram. Explain the principle of operation of 3-point starter. Show how under-voltage and overload protection are provided in the starter.

(8 marks)

Module III

13. (a) (i) Show that the maximum efficiency in a transformer occurs when its variable loss is equal to constant loss.

(4 marks)

(ii) A 440 V/110 V single phase transformer has a primary resistance of 0.3 Ω and a secondary resistance of 0.02 Ω. Its iron loss at normal voltage and frequency is 150 W. Calculate the secondary curernt at which maximum efficiency occurs and the value of maximum efficiency at 0.8 p.f. leading.

(8 marks)

Or

(b) (i) Why is open circuit test conducted with rated voltage of the transformer ? **(4 marks)**

(ii) The efficiency of a 220 kVA single-phase transformer is 98.5 % when delivering full-load at 0.8 p.f. and 99 % at 80 % of full-load at 0.9 p.f. calculate :

(1) Iron losses ; and

(2) Full-load copper losses.

(8 marks)

Module IV

14. (a) (i) Explain clearly how a rotating magnetic field in set up around the stator of a 3-phase induction motor when a 3-phase supply is given to it.

(6 marks)

(ii) In an 8-pole, 50 Hz, induction motor, the rotor resistance per phase is 0.04 Ω and the maximum torque occurs at a speed of 645 r.p.m. Assuming that the air-gap flux is constant at all the loads, determine the percentage of maximum torque (1) at starting ; (2) when the slip is 3 %.

(6 marks)

Or

(b) (i) Derive an expression for the e.m.f. induced in an alternator in terms of frequency, flux per pole and number of conductors.

(6 marks)

(ii) A 4-pole, 50 Hz induction motor has a full-load slip of 5 %. Each rotor phase has a resistnace of 0.3 Ω and a standstill reactance of 1.2 Ω. Find the ratio of maximum torque to full-load torque and the speed at which maximum torque occurs.

(6 marks)

Module V

15. (a) (i) Write explanatory note on control of permanent magnet stepper motors. **(6 marks)**

(ii) With neat cosntructional diagram, describe the working of an a.c. servo motor. **(6 marks)**

Or

(b) (i) Explain the working of synchro and mention its applications. **(6 marks)**

(ii) What are the different types of contactors ? Describe any *one* type with neat constructional diagram.

(6 marks)

[5 × 12 = 60 marks]

(c) A curve is given by the table :

x :	0	1	2	3	4	5	6
y :	0	2	2.5	2.3	2	1.7	1.5

The x-co-ordinate of the centre of gravity of the area bounded by the curve, the end ordinates and the x-axis is given by $A\bar{x} = \int_0^6 xy\,dx$, where A is the area. Find $\bar{x}$ by using Simpson's rule.

(12 marks)

(d) Find the missing value using backward difference formula :

x :	0	1	2	3	4
y :	1	3	9	—	81

Explain why the result differs from $3^3 = 27$.

(8 marks)

[5 × 20 = 100 marks]

F 9243 (Pages : 4) Reg. No.....ECE.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Third Semester

Branches : Civil, Mechanical, Electrical and Electronics, Electronics and Communication, Polymer, Applied Electronics and Instrumentation, Instrumentation and Control, Electronics and Instrumentation, Automobile Engineering, Aeronautical Engineering

ENGINEERING MATHEMATICS—II (CMEPLANSUF)

(2009 admissions—Improvement ; 2004—2009 admissions—Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer any **one** *full question from each module.*
Each full question carries 20 *marks.*

Module 1

1. (a) Find the directional derivation of $4xz^3 - 3x^2y^2$ at (2, – 1, 1) in the direction of $2\vec{i} - 3\vec{j} + 6\vec{k}$.

(5 marks)

(b) Expand $\nabla \cdot (\vec{A} \times \vec{B})$. Deduce that if ϕ and ψ are differentiable scalar functions then $\nabla\phi \times \nabla\psi$ is solenoidal.

(9 marks)

(c) If $\vec{A} = (4xy - 3x^2z^2)\vec{i} + 2x^2\vec{j} - 2x^3z\vec{k}$ show that $\int_C \vec{A} \cdot d\vec{r}$ is independent of the path C and find the scalar potential for $\vec{A}$.

(6 marks)

Or

(d) Find div $\vec{F}$ and curl $\vec{F}$ if $\vec{F}$ = grad $(x^3 + y^3 + z^3 - 3xyz)$. (7 marks)

(e) Find the directional derivation of $f(x, y, z) = x^2y^2z^2$ at the point (1, 1, – 1) in the direction of the tangent to the curve $x = e^t$, $y = 1 + 2 \sin t$ and $z = t - \cos t$, where $-1 \le t \le 1$. (8 marks)

(f) If $\vec{f} = (x + y + 1)\vec{i} + \vec{j} - (x + y)\vec{k}$ show that $\vec{f} \cdot \text{curl } \vec{f} = 0$. (5 marks)

Module 2

2. (a) Using Green's theorem show that the area enclosed by any closed curve C is given by $\frac{1}{2}\oint (x\,dy - y\,dx)$.

(5 marks)

(b) Verify Stoke's theorem for the function $\vec{F} = x^2\hat{i} + xy\hat{j}$ integrated round the square in the plane $z = 0$ whose sides are $x = 0$, $y = 0$, $x = a$, $y = a$.

(8 marks)

(c) Evaluate $\int_C \vec{F} \cdot d\vec{r}$ if $\vec{F} = xy\hat{i} + \left(x^2 + y^2\right)\hat{j}$ and C is the arc of $y = x^2 - 4$ from (2, 0) to (4, 12).

(7 marks)

Or

(d) Verify Green's theorem for $\int_C \left[\left[xy + y^2\right]dx + x^2 dy\right]$, where C is bounded by $y = x$ and $y = x^2$.

(10 marks)

(e) Evaluate $\int_C \vec{F} \cdot d\vec{r}$ where $\vec{F} = xy\hat{i} + \left(x^2 + y^2\right)\hat{j}$ along the path of the straight line from (0, 0) to (1, 0) and then to (1, 1).

(5 marks)

(f) Find the total work done in moving a particle in a force field $\vec{f} = 3xy\,\vec{i} - y\vec{j} + 2zx\vec{k}$ once round the circle in xy plane whose centre is at origin and radius equal to 2 units.

(5 marks)

Module 3

3. (a) Define an analytic function. Derive the Cauchy Riemann equations for an analytic function $f(z)$.

(7 marks)

(b) If an analytic function $f(z) = u(x, y) + iv(x, y)$ is expressed in terms of the polar co-ordinates r and θ, show that $f'(z) = (\cos\theta - i\sin\theta)\frac{\partial f}{\partial r} = -\frac{\sin\theta + i\cos\theta}{r}\frac{\partial f}{\partial \theta}$.

(8 marks)

(c) State and prove CR equation in polar form. (5 marks)

Or

(d) Define Bilinear transformation and show that the cross ratio of four points is unaltered by bilinear transformation.

(8 marks)

(e) Discuss the transformation $w = z + \frac{1}{z}$. (7 marks)

(f) Show that the real and imaginary parts of an analytic function are harmonic (in the Cartesian form.)

(5 marks)

Module 4

4. (a) Construct the table of differences for the data below :

x :	0	1	2	3	4
$f(x)$:	1.0	1.5	2.2	3.1	4.6

Evaluate $\Delta^3 f(2)$.

(10 marks)

(b) The following table gives the values of x and y :

x :	1.2	2.1	2.8	4.1	4.9	6.2
y :	4.2	6.8	9.8	13.4	15.5	19.6

Find the value of corresponding to $x = 3.5$, using Lagrange's technique.

(10 marks)

Or

(c) Certain corresponding values of x and $\log_{10} x$ are given below :

x :	300	304	305	307
$f(x)$:	2.4771	2.4829	2.4843	2.4871

Find $\log_{10} 310$ by Newton's divided difference formula.

(10 marks)

(d) Given the table :

x :	310	320	330	340	350	360
$\log x$:	2.4914	2.5052	2.5185	2.5315	2.5441	2.5563

Find the value of log 337.5 by Stirling's formula.

(10 marks)

Module 5

5. (a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using (i) Trapezoidal rule ; (ii) Simpson's $\frac{1}{3}$ rule ; and (iii) Simpson's 3/8 rule and compare the results with actual value.

(12 marks)

(b) From the following table estimate the number of students who obtained marks more than 55 :—

Marks :	31—40	41—50	51—60	61—70	71—80
Number of students :	31	41	51	35	31

(8 marks)

Or

(b) Find the $v_c(t)$ and $i_L(t)$ in the circuit of Fig. 10, assuming zero initial conditions. Use Laplace Transforms.

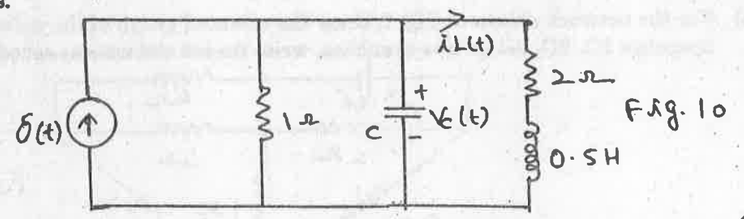


Fig. 10

(7 marks)

Module 4

17. Find the short circuit and open circuit impedances of the network shown in Fig. 11 and hence obtain its π equivalent.

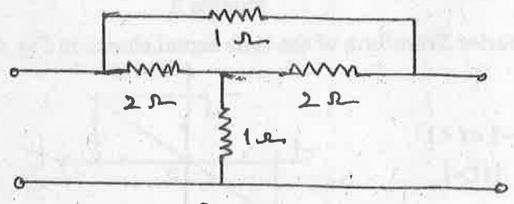


Fig-11

Or

18. (a) Find the component values of π-network constant K high pass filter having cut-off frequency of 8 kHz and nominal characteristic impedance of 600 Ω. Hence, find its characteristic impedance and phase constant at $f = 12$ kHz, and attenuation at $f = 0.8$ kHz.

(7 marks)

(b) Design T network of *m*-derived high pass fitler having nominal characteristic imepdance $R_0 = 900\ \Omega$, cut-off frequency $f_c = 2$ kHz and resonant frequency $f_\infty = 1.8$ kHz.

(5 marks)

Module 5

19. Synthesize the given function $F(s) = \dfrac{3(s+2)(s+4)}{s(s+3)}$ in a Foster and Cauer forms, if :

(i) $F(s)$ is an impedance function.

(ii) $F(s)$ is an admittance function.

Or

20. (a) Determine the range of β such that the polynomial $P(s) = s^4 + s^3 + 4s^2 + \beta s + 3$ is Hurwitz.

(5 marks)

(b) Which of the following function is R-L driving point impedance ? Why ? Synthesize the realizable impedanc in Foster's first form $[F_1]$.

(i) $F_1(s) = \dfrac{(s+1)(s+8)}{(s+2)(s+4)}$. (ii) $F_1(s) = \dfrac{(s+2)(s+4)}{(s+3)(s+5)}$.

(7 marks)

[5 × 12 = 60 marks]

F 9248 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2011

Third Semester

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

NETWORK THEORY (LAS)

(2009 admissions—Improvement ; 2004—2009 admissions—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Determine the expression for the energy in a pair of mutually coupled inductors.
2. Explain the mesh analysis of solving electrical network with a suitable example.
3. Derive the inter-relationship between various matrices.
4. State and explain Tellegen's theorem, with an appropriate example.
5. What are the Dirichlet conditions for the Fourier Transform ? Explain their signifiance.
6. Find the Laplace transform of $t^2 e^{-at}$.
7. Draw the equivalent circuit of a 2-port network in terms of (a) *z*-parameters ; (b) *h*-parameters.
8. Draw the ideal and real frequency response characteristics of (i) low-pass ; (ii) band pass ; (iii) high pass ; and (iv) band stop filters.
9. Test whether $P(s) = s^3 + 2s^2 + s + 2$ is Hurwitz or not.
10. Write the properties of :
    (i) LC immittance functions. (ii) RC impedance functions.

(10 × 4 = 40 marks)

Part B

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

Module 1

11. (a) Calculate the total (net) inductance of the network shown in Fig. 1.

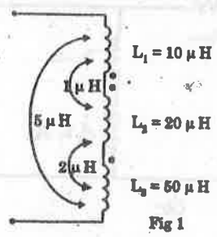


Fig 1

(b) Calculate V_0 for the circuit in Fig. 2 shown below :

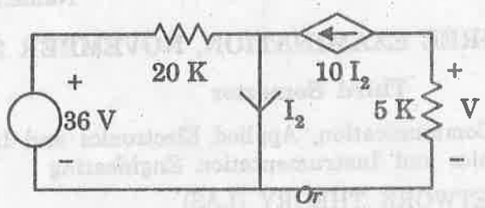


Fig 2

Or

12. (a) Find the voltagers across the impedances in the circuit shown in Fig. 3. Then transform the voltage source and $10\angle 30°\Omega$ impedance to an equivalent current source and again find the votlages. Compare the results.

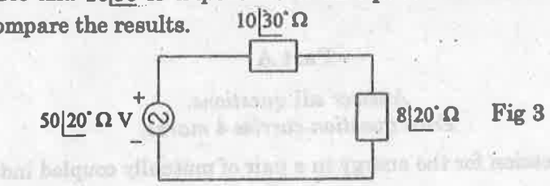


Fig 3

(b) Find the equivalent circuit of the magnetically coupled circuit as shown in Fig. 4

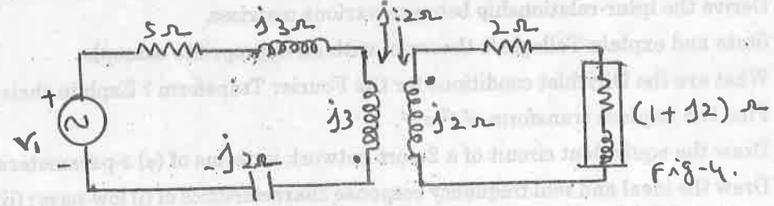


Fig-4.

Module 2

13. (a) Using superposition theorem, calculate the current I in the circuit shown in Fig. 5.

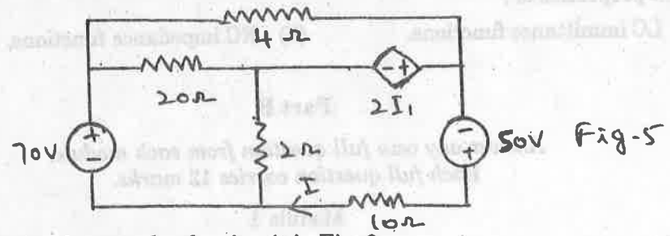


Fig-5

(b) Verify reciprocity theorem for the circuit in Fig. 6.

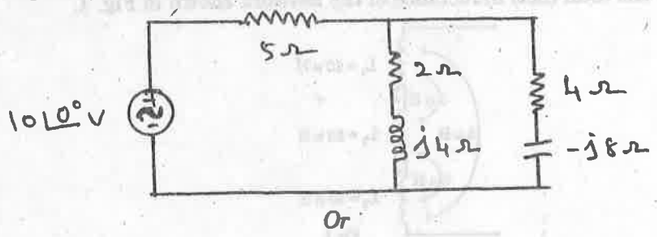


Fig-6.

Or

14. (a) Explain (i) Complete incidence matrix ; (ii) reduced incidence matrix. (4 marks)

(b) For the network shown in Fig. 7, draw the oriented graph of the network. Select a tree with branches 1Ω, 2Ω, 3Ω as tree branches, write tie-set and cut-set schedule.

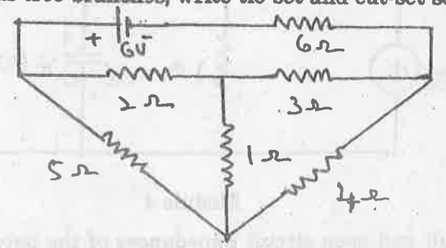


Fig-7

(8 marks)

Module 3

15. (a) Find the Fourier Transform of the time signal shown in Fig. 8.

$$x(t)=\begin{cases} t; & -1<t<1 \\ 0; & |t|>1 \end{cases}$$

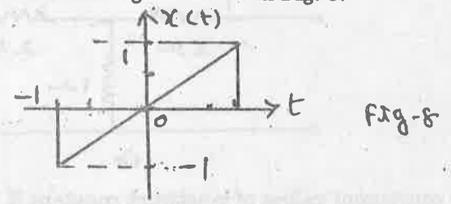


Fig-8

(b) Find the inverse Fourier Transform of X (*jw*) as shown in Fig. 9.

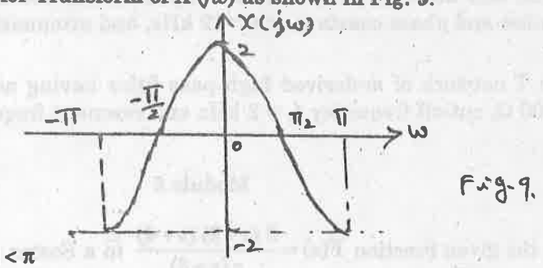


Fig-9.

$$X(jw)=\begin{cases} 2\cos w; & |w|<\pi \\ 0; & |w|>\pi \end{cases}$$

Or

16. (a) The current in a circuit is periodic. Two values of current are $i(0+)=1, i\left(\frac{\pi}{2}\right)=-1$. Using Laplace transforms, find $i(t)$ if it is governed by $\frac{d^2i(t)}{dt^2}+9i(t)=\cos 2t$.

(5 marks)