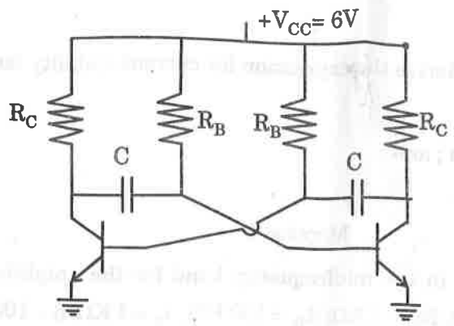
MODULE 5

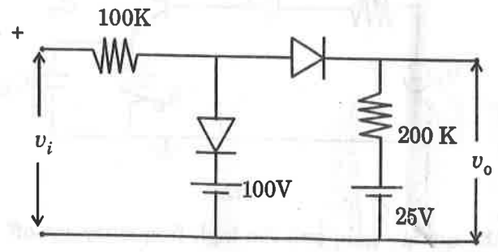
19. Calculate and plot ...ile, the waveforms at the base and collector of one of the transistors in the circuit shown b... Derive an expression for the time period



$R_C = 560\ \Omega$
$R_B = 5.6\ K$
$C = 50\ pF$

Or

20. The input voltage v_i to the two - level clipper shown varies linearly from 0 to 150 V. Sketch the output voltage v_o to the same time scale as the input voltage v_i. Assume ideal diodes



(5 × 12 = 60 marks)

F 6324 (Pages : 4) **Reg. No**.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2013

Third Semester

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

ELECTRONIC CIRCUITS—I (LAS)

(Old Scheme—Supplementary / Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Derive the expressions and values of :
   (a) Ripple factor.
   (b) Rectification efficiency of half wave rectifier.
2. Draw the complete circuit diagram of a bridge rectifier using C filter ?
3. Why does the CE configuration provide large current amplification while the CB configuration does not ?
4. Sketch the characteristics to show how the h_{ob} is determined ?
5. Draw the fixed bias circuit and derive expression for its current stability factor.
6. Explain the factors to be considered for selecting the operating point Q of an amplifier ?
7. What factors determine the lower cut-off and upper cut-off frequencies in a RC coupled amplifier ?
8. Describe how FET can be used as a voltage amplifier ?
9. What is a two-level clipper ? Explain with an example circuit diagram.
10. Compare and contrast the Miller sweep circuit and Bootstrap sweep circuits.

(10 × 4 = 40 marks)

Part B

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

MODULE 1

11. In a full-wave centre taped rectifier, the load resistance is $1\ K\Omega$. Each diode has a resistance of $10\ \Omega$. The voltage across half the secondary winding is 220 sin 314 t.

Calculate :

(a) The peak value of current.

(b) r.m.s. value of current.

(c) Average value of current.

(d) Ripple factor.

(e) efficiency.

(f) TUF.

Or

12. What are regulated power supplies ? With neat circuit diagram, describe the working of a series pass voltage regulator with feedback. Explain the following for the circuit :

(a) Output resistance.

(b) Input regulation factor ; and

(c) Temperature Coefficient.

MODULE 2

13. Define *h*-parameters for a two-port network. Derive the *h*-parameter model for CB configuration and deduce the equivalent circuit.

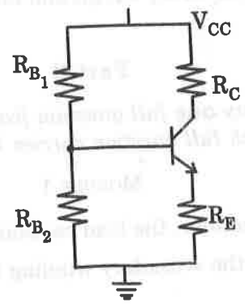
Or

14. With the help of neat constructional diagram and drain characteristics, describe how the drain current in a JFET is controlled by :

(a) Gate voltage.d (b) Drain voltage.

MODULE 3

15. For the circuit shown below, the transistor has a nominal $\beta = 100$ and is to operate at $I_c = 4$ mA and $V_{CE} = 8$ V.



(a) For $R_C = 4\,K\Omega$ and $R_E = 2\,K\Omega$, specify V_{CC}.

(b) For $R_{B_2} = 24\,K\Omega$, calculate R_{B_1}, V_{BB} and R_B (for the Thevenin ...

(c) If β is actually 40, estimate the actual value of I_C, assume $V_{BE} = 0.7$ volt.

Or

16. Starting from fundamentals, derive the expression for current stability factor of :

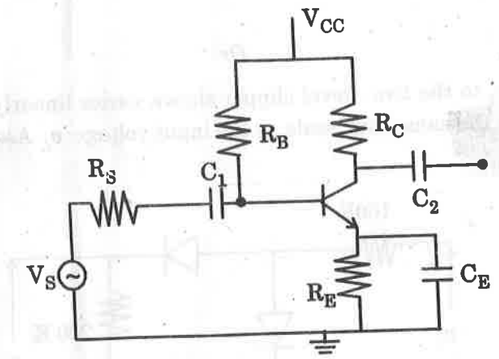
(a) Base bias ; (2 marks)

(b) Emitter feedback bias ; and (5 marks)

(c) Potential divider bias. (5 marks)

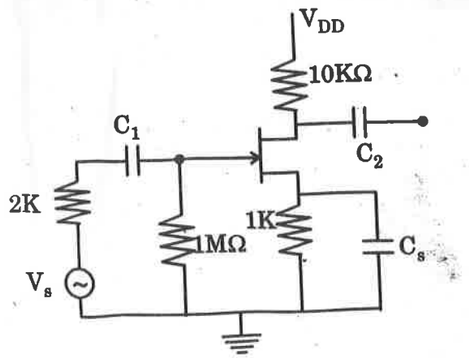
MODULE 4

17. Calculate A_{vo}, A_{io}, Z_i and Z_o in the midfrequency band for the amplifier circuit shown below. (Given : $R_S = 50\Omega$, $R_C = 5\,K\Omega$, $R_E = 1\,K\Omega$, $R_B = 100\,K\Omega$, $r_\pi = 1\,K\Omega$, $\beta = 100$)



Or

18. Determine the midfrequency gain and the high frequency cut-off for the amplifier circuit of the following FET amplifier. Given $\mu = 50$, $r_d = 10\,K\Omega$, $C_{gs} = 5$ pF, $C_{gd} = 2$pF, $C_W + C_L = 2$ pF



F 6298 (Pages : 5) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2013

Third Semester

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

NETWORK THEORY (LAS)

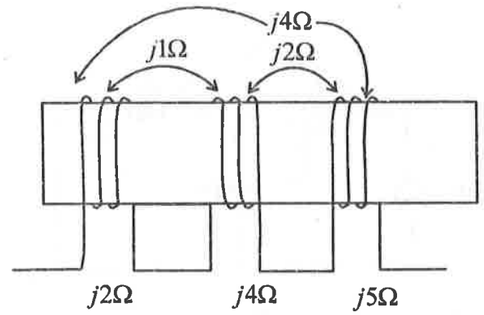
(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Distinguish between ideal and practical voltage and current sources, giving neat sketches.
2. Draw the dotted equivalent of the circuit shown below and find the equivalent inductive reactance.



3. State and explain Tellegen's theorem.
4. Write any *four* properties of a graph.
5. Find the value of final current at 0.1 sec after breaking the circuit of a series RL circuit with $R = 100\ \Omega$, $L = 10$ H and battery voltage of 10V.
6. Explain the reasons for development from Fourier series to Fourier Transform to Laplace Transform.
7. The impedance parameters of a T network are $Z_{11} = 50\ \Omega$, $Z_{12} = Z_{21} = 25\ \Omega$, $Z_{22} = 100\ \Omega$. Find the parameters of the network.

Turn over

8. What are constant K filters ? Where do we use them ?

9. What are positive real functions ? Give examples.

10. List the properties of Hurwitz polynomials.

(10 × 4 = 40 marks)

Part B

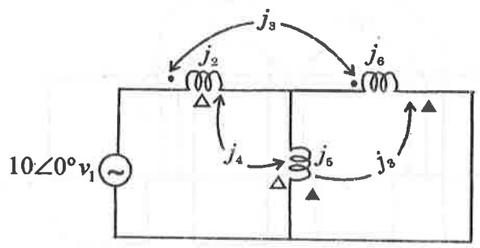
Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

MODULE 1

11. (a) The inductance matrix for the circuit of a three series connected coupled coils is given below : Find the inductances and indicate the dots for the coils :

$$L = \begin{bmatrix} 8 & -2 & 1 \\ -2 & 4 & -6 \\ 1 & -6 & 6 \end{bmatrix}.$$

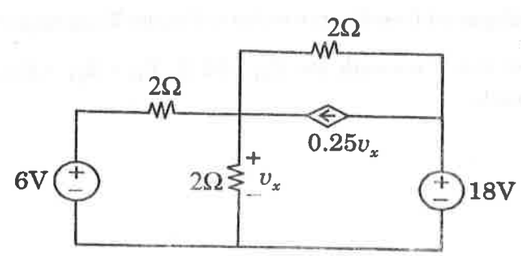
(b) For the following circuit, write the mesh equations



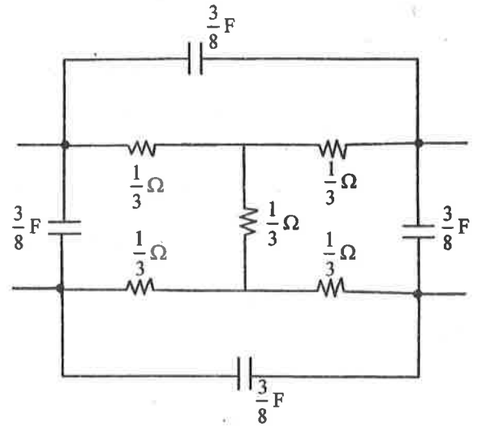
Or

12. (a) Two identical circuits resonant at 1 MHz having Q = 100 and inductances of 140 μH are coupled together. Calculate the critical co-efficient of coupling. Also, calculate and plot the secondary current at the resonant frequency for 1V applied to the primary, as the mutual inductance is varied from zero to twice the critical value.

(b) Use source transformation theorem to find v_x in the following circuit :



18. Find the Y-parameters of the network shown below :



MODULE 5

19. What are the properties of RC impedance functions ? Realise the following RC driving point impedance $Z(s) = \frac{s^2 + 7s + 10}{s^2 + 4s + 3}$ in Foster II form and Cauer II form.

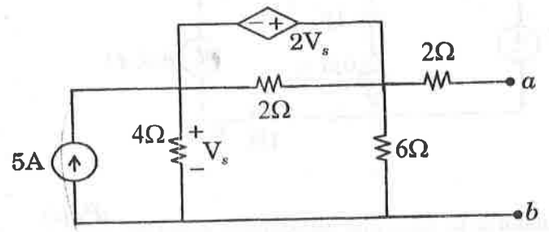
Or

20. After carrying Foster preamble, obtain Brune's network for the function $F(s) = \frac{s^2 + s + 1}{s^2 + s + 2}$.

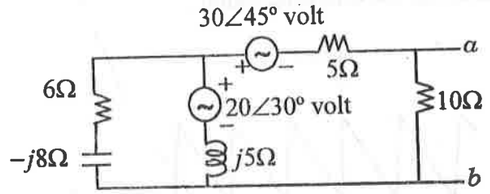
(5 × 12 = 60 marks)

MODULE 2

13. (a) Find the Thevenin and Norton equivalents of the circuit shown below. Also find the maximum power that can be delivered to a resistive load connected to $a - b$.

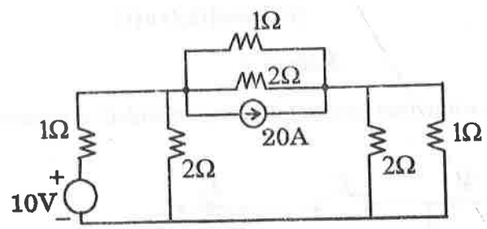


(b) Apply superposition theorem to the network shown below to find the power in 10 Ω resistor.



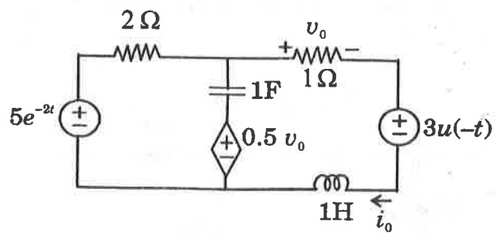
Or

14. Draw the graph of the network shown in the figure below. Write the cut-set schedule and calculate all branch voltages and branch currents.



MODULE 3

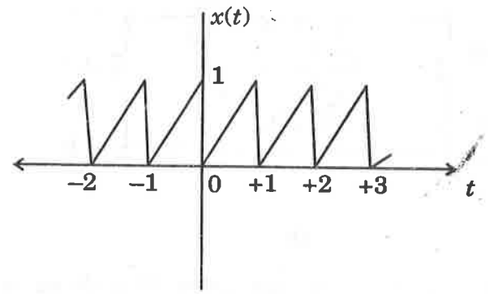
15. (a) Find $i_0(t)$ for $t > 0$ in the following circuit :



(b) Use Laplace Transform to solve the differential equation $\frac{d^2v(t)}{dt^2} + 5\frac{dv(t)}{dt} + 8v(t) = 2u(t)$, subject to $v(0) = 1, v'(0) = -2$.

Or

16. (a) Find the Fourier series for the following signal :

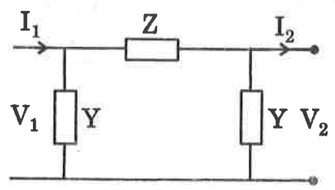


(b) Find the Fourier Transform of the following signals :

(i) $e^{j\Omega t}\, u(t)$. (ii) $\cos(\Omega_0 t)\, u(t)$.

MODULE 4

17. Obtain the transmission parameters for the following cascaded π network :



Or

F 6316 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2013

Third Semester

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

SOLID STATE DEVICES (L A S)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define effective mass of electron and hole. Compare them.
2. State and explain Fermi-Dirac distribution function as applied to an intrinsic semiconductor.
3. Neatly sketch the energy distribution profile along the length of a pn diode and account for its shape.
4. What is meant by carrier lifetime ? How does it affect the performance of a device ?
5. What is a varactor diode ? How is it formed ? What is its use ?
6. Draw the equivalent circuits for a forward and reverse biased diode and label the values.
7. With a neat sketch of carrier profile, describe the minority carrier distribution in a transistor.
8. Define the active region bias of a BJT. What are its applications ?
9. Distinguish between Enhancement and depletion mode MOSFET, with regard to their construction and application.
10. Indicate pinch-off region in JFET characteristics and describe what happens during pinch-off.

(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) Starting from fundamentals, derive expressions for the majority and minority carrier concentrations in an *n*-type semiconductor.

Or

(b) (i) What is the temperature dependence of charge carriers ? What precautions are taken to make them independent ?

(8 marks)

(ii) Sketch the Fermi level in the energy band diagrams of intrinsic, *n* type and *p* type semiconductors and compare them.

(4 marks)

Module 2

12. (a) An abrupt Germanium pn junction has $N_A = 10^{16}$ atoms/cc, $N_D = 10^{15}$ atoms/cc at 300 K. (i) Calculate the Fermi levels, draw an equilibrium band diagram and find V_0 from the diagram ; (ii) Compare the result with calculated V_0.

Or

(b) (i) Derive an expression for the penetration of the depletion region into the p region of a diode.

(8 marks)

(ii) Distinguish between avalanche and zener breakdown mechanisms. (4 marks)

Module 3

13. (a) With neat constructional diagram, energy band diagram and characteristics, explain the working of a tunnel diode ? What are its applications ?

Or

(b) (i) Sketch and explain forward and reverse characteristics of the Zener diode. (7 marks)

(ii) Describe the construction and working of LED. (5 marks)

Module 4

14. (a) Explain the minority and majority carrier current components in a pnp transistor with the carrier profile sketches.

Or

(b) (i) What is a Schottky transistor ? Explain its properties and applications. (8 marks)

(ii) Calculate α and β of a transistor if the collector current is 5 mA with 30 μA base current.

(4 marks)

Module 5

15. (a) Define the parameters of a JFET. Derive the relationship between them and show how they can be estimated from its characteristics.

Or

(b) Explain with the help of neat constructional diagrams and drain characteristics, the working of a depletion type MOSFET.

(5 × 12 = 60 marks)

F 6267 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2013

Third Semester

Branch : Applied Electronics and Instrumentation/Electronics and Communication Engineering

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

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Explain the need for adding impurities in a semiconductor.
2. Define diffusion length.
3. What is avalanche breakdown ?
4. Explain base width modulation.
5. Draw the physical structure of SCR.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Explain temperature and doping dependence of mobility.
7. What do you mean by contact potential ? Explain its relevance.
8. Explain the principle of operation of LED.
9. What are the different modes of operation of a BJT ?
10. What is meant by threshold voltage of a MOSFET ?

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. What is effective mass ? Derive the expression for it.

Or

12. Derive the expression for carrier concentration in a semiconductor and explain.

Turn over

13. Derive the expression for current flow through a junction. Discuss the reverse bias current.

Or

14. Derive Einstein relation.

15. Explain about Schottky barrier. What are its advantages over *p-n* junction ?

Or

16. What are photo detectors ? Explain the function of laser diodes.

17. Calculate emitter efficiency and base transport factor of BJT.

Or

18. Explain in detail the construction, characteristics and principles of operation of JFET. Discuss its advantages and applications.

19. What is the value of surface potential of a MOS capacitor under (a) at the onset of inversion ; (b) strong inversion ?

Or

20. Discuss briefly, the construction working characteristics and applications of silicon controlled rectifier.

(5 × 12 = 60 marks)

F 6277 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2013

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—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Define rise time. What is its significance ?
2. What is thermal runaway ? Explain.
3. Sketch and briefly explain V-I characteristics of a MOSFET.
4. State and explain Miller effect.
5. List different properties of -ve feedback amplifiers.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Explain response of low-pass RC circuit to various input signals.
7. Sketch the block diagram of a two-port network and define different network parameters.
8. With diagram, explain drain-to-gate bias circuit of enhancement MOSFET.
9. With suitable diagram, explain the working of two types of MOSFET.
10. Name four different distortions present in power amplifiers. Briefly explain each.

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. Explain the following :—

    (a) Small signal diode high frequency model.

    (b) A combination clipper circuit.

Or

12. With diagram, explain the working of a full-wave rectifier using diodes and derive equation of efficiency and ripple factor.

13. Sketch hybrid models of a transistor in CE and CB configurations. Make a comparison table for the parameters h_i, h_r, h_f and h_o.

Or

14. Analyse a common collector amplifier using suitable approximation model and derive mathematical expression for all parameters.

15. Sketch small signal equivalent circuit of an *n*-channel MOSFET and derive its parameters.

Or

16. With neat diagram, explain the working of common gate amplifier.

17. Draw the common emitter high frequency equivalent circuit and derive high frequency parameters.

Or

18. Sketch and explain the structure and working of a common gate MOSFET amplifier.

19. Explain the working of a class-A power amplifier. Derive equations of efficiency and power output.

Or

20. Sketch voltage series and voltage shunt topologies and explain its working.

(5 × 12 = 60 marks)

F 6286 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2013

Third Semester

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

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. What is an algorithm ? Explain with an example.
2. Explain the uses of comma operator.
3. What are automatic variables ?
4. How is a pointer initialized ?
5. What are command line parameters ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Explain with examples identifiers and keywords in C.
7. What is a function ? Discuss the structure of a function.
8. How are arrays defined and initialized ?
9. Explain the operations on pointers.
10. Discuss the methods of opening a data file.

(5 × 5 = 25 marks)

Turn over

Part C

Each question carries 12 *marks.*

11. Draw a flow chart to find the prime numbers between 1 and 1000. Write an algorithm also.

Or

12. Explain with examples the data types used in C.

13. Write a program to find all Pythagorean triplets in the range 100 to 1000.

Or

14. Write a program to find the sum of the series $x - \frac{x^2}{2!} + \frac{x^3}{3!} - \frac{x^4}{4!} + \frac{x^5}{5!} - \frac{x^6}{6!}$.

15. Write a program to multiply two matrices A and B which are conformable for multiplication.

Or

16. Declare a structure to represent a complex number. Write a program to add, subtract, multiply and divide two complex numbers.

17. Write a program using pointers to read in an array of integers and point its elements in reverse order.

Or

18. Explain with examples the operations on pointers.

19. Write a program to copy the contents one file into another.

Or

20. What precautions one should take when using macros with arguments ?

(5 × 12 = 60 marks)

F 6307 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2013

Third Semester

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

ELECTRICAL TECHNOLOGY (L A S)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Distinguish between Self-excited and separately excited dc generator.
2. What is the critical field resistance of a d.c. shunt generator ? What is its significance ?
3. What are the different methods of speed control of dc motors ?
4. Explain why a d.c. series motor should never run unloaded.
5. Define an autotransformer. How does the current flow in different parts of its windings ?
6. What are the advantages of a transformer bank of three single-phase transformers over a unit three-phase transformer of the same kVA rating ?
7. What is meant by slip in an induction motor ? Why must slip be present for motor action ?
8. Explain clearly the meaning of (i) distribution factor and (ii) coil-span factor of an alternator.
9. What are the main features of stepper motor which are responsible for its widespread use ?
10. What are the advantages of servomotors over large industrial motors ?

(10 × 4 = 40 marks)

Part B

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

Module 1

11. (a) What is commutation in D.C. generator ? Explain the methods of improving commutation.

    (b) A lap-wound D.C. shunt generator having 80 slots with 10 conductors per slot generates at no-load an e.m.f. of 400 V when running at 1000 r.p.m. At what speed should it be rotated to generate a voltage of 220 V on open circuit ?

Or

12. (a) With neat sketches, explain the load characteristics of a D.C. generator.

(b) A 22.38 kW, 440 V, 4 pole, wave-wound D.C. shunt motor has 840 armature conductors and 140 commutator segments. Its full-load efficiency is 86 % and the shunt field current is 1.8 A. If brushes are shifted backwards through 1.5 segments from the geometrical neutral axis, find the demagnetising and distorting amp-turns per pole.

Module 2

13. (a) Why differentially compound D.C. motors are not generally used ? (4 marks)

(b) A 75 kW, 500 V D.C. shunt motor has 4 poles and wave connected armature winding with 492 conductors. The flux per pole is 0.04 Wb and the full-load efficiency is 92 %. The armature and commutating pole windings have a total resistance of 0.08 ohm and the shunt field resistance is 200 ohm. Calculate for full-load

(i) the speed ;

(ii) useful torque delivered to the load ; and

(iii) the torque developed.

Or

14. (a) Describe Swinburne's test to determine the efficiency as motor as well as generator. What are its limitations ?

(b) A shunt generator delivers 50 kW at 250 V when running at 400 r.p.m. The armature and field resistances are 0.02 Ω and and 50 Ω respectively. Calculate the speed of the machine when running as a shunt motor and taking 50 kW input at 250 V. Allow 1V per brush for contact drop.

Module 3

15. (a) Draw the equivalent circuit of a single-phase transformer referred to primary side. Explain the parameters.

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

Or

16. (a) Draw and explain the phasor diagram of a single-phase transformer supplying lagging load.

(b) With neat diagrams, explain the 3-phase transformer connections.

Module 4

17. (a) Explain double field revolving theory for single-phase induction motor.

(b) If a field excitation of 10 A in a certain alternator gives a current of 150 A on short circuit and terminal voltage of 900 V (phase value) on open circuit, calculate the internal voltage drop with a load current of 50 A.

Or

18. (a) Explain the starting methods of a synchronous motor.

(b) A 3-phase, 6-pole, 400 V, 50 Hz induction motor has a speed of 950 r.p.m. on full-load. Calculate the slip. How many complete alternations will the rotor voltage make per minute ?

Module 5

19. (a) Describe the working of servo motor and mention its applications.

(b) Name the most popular types of stepper motor. Describe the operation of a permanent magnet type stepper motor.

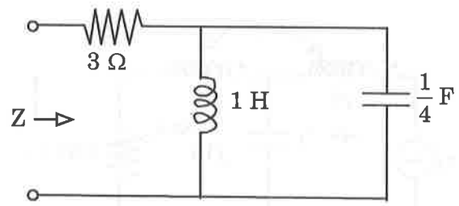
Or

20. (a) What are universal motors ? Explain their principle of working and applications.

(b) With a neat diagram, explain the working of an electromagnetic relay.

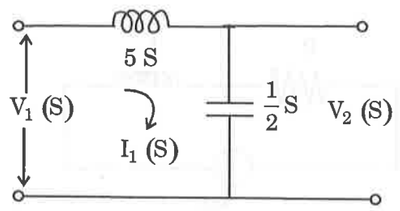
(5 × 12 = 60 marks)

(b) Obtain the transform impedance Z(*s*) for the circuit shown in figure.



Or

18. For the network shown determine the Transfer function G_{21} (*s*) and Transfer Impedance Z_{21} (*s*) and driving point admittance Y_{11} (*s*).



19. The impedance parameters of a two port network are $Z_{11} = 6\ \Omega$, $Z_{22} = 4\ \Omega$, $Z_{12} = Z_{21} = 3\ \Omega$, Compute the Y parameters and ABCD parameters and write the describing equations.

Or

20. Determien the frequency response in terms of Magnitude and phase response of a system having the close loop transfer function $C(s) = \frac{(s+5)}{s(s+2)}$.

(5 × 12 = 60 marks)

F 6260 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2013

Third Semester

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

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

(New Scheme—Regular / Improvement / Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Explain the source Transformations.
2. Define self inductance, mutual inductance and coupling coefficient.
3. State Maximaum Power Transfer Theorem and its significance.
4. What are poles and zeroes ?
5. What is meant by frequency Response ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. State and explain Superposition theorem.
7. Explain the terms zero input response and zero state response.
8. Define real, reactive and apparent powers.
9. State and explain Initial and Final value theorem.
10. Obtain the relationship between Y and T parameters.

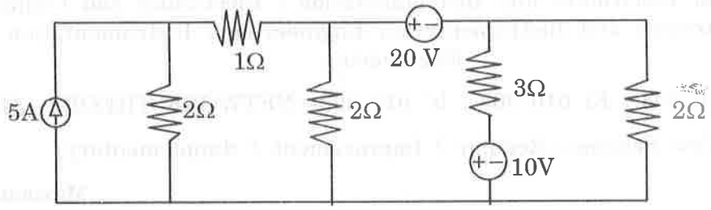
(5 × 5 = 25 marks)

Turn over

Part C

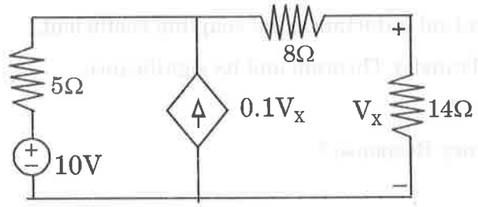
Each full question carries 12 marks.

11. Calculate the current in 3Ω resistor in the circuit shown using KCL.

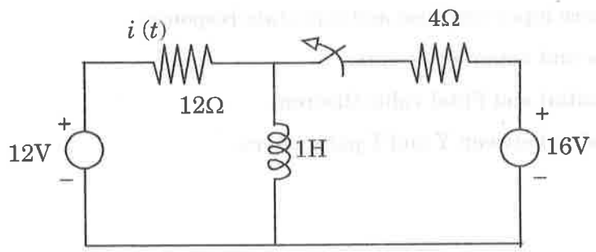


Or

12. Find the curent in the 14 Ω resistor by Thevenin's Theorem.

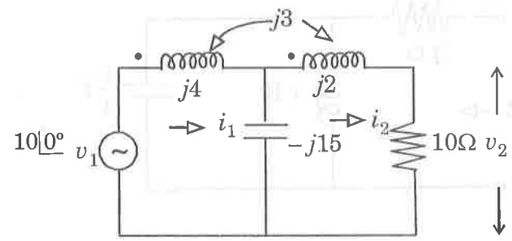


13. Find $i\,(t)$ for $t > 0$ in the circuit shown. The switch is opened at $t = 0$.

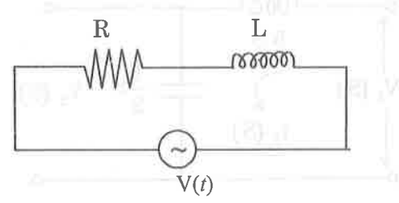


Or

14. Find the voltage across the 10 Ω resistor for the network shown in Figure.

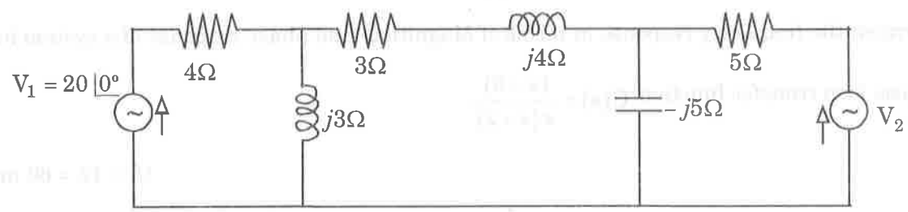


15. Determine the circuit constants in the circuit shown if the applied voltage is $v(t) = 100 \sin (50t + 20°)$. The true power in the circuit is 200 w and pf is 0.⌉o⌉ lagging.



Or

16. For the circuit shown, determine the value of V_2 so that current in $(3 + j4)\,\Omega$ impedance is zero.



17. (a) Verify initial and final value theorem for the function $f(t) = e^{-t} (\sin 3t + \cos 5t)$.

F 6293 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2013

Third Semester

Branch : Common to all branches except R and T

ENGINEERING MATHEMATICS—II (CMEPLANSUF)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

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

Module 1

1. (a) Prove that $\frac{d}{dt}\left[\vec{a}\cdot\frac{d\vec{b}}{dt}-\frac{d\vec{a}}{dt}\cdot\vec{b}\right]=\vec{a}\cdot\frac{d^2\vec{b}}{dt^2}-\frac{d^2\vec{a}}{dt^2}\cdot\vec{b}$.

(b) Find the angle between the tangents to the curve $x=t, y=t^2, z=t^3$, at $t=\pm 1$.

(c) Show that $\vec{E}=\frac{\vec{r}}{r^2}$ is irrotational.

Or

2. (a) If $\vec{r}=x\hat{i}+y\hat{j}+z\hat{k}$, prove that $\nabla\cdot\left\{r\nabla\left(\frac{1}{r^3}\right)\right\}=\frac{3}{r^4}$.

(b) In what direction from $(3,1,-2)$ is the directional derivative of $\phi=x^2y^2z^4$ maximum and what is its magnitude ?

Module 2

3. (a) Find the value of $\vec{r}$ satisfying the equation $\frac{d^2\vec{r}}{dt^2}=6t\hat{i}-24t^2\hat{j}+4\sin t\,\hat{k}$, given that $\vec{r}=2\hat{i}+\hat{j}$ and $\frac{d\vec{r}}{dt}=-\hat{i}-3\hat{k}$ at $t=0$.

(b) Evaluate by stoke's theorem, $\oint_C(\sin z\,dx-\cos x\,dy+\sin y\,dz)$ where C is the boundary of the rectangle $0\le x\le\pi$, $0\le y\le 1, z=3$.

Or

Turn over

4. (a) Apply Green's theorem to evaluate $\oint_C [(y - \sin x)\,dx + \cos x\,dy]$ where C is the plane triangle enclosed by the lines $y = 0, x = \pi/2$ and $y = \frac{2}{\pi}x$.

(b) If $\vec{F} = (2x^2 - 3z)\hat{i} - 2xy\hat{j} - 4x\hat{k}$, then evaluate $\iiint_V \nabla \times \vec{F}\,dV$ where V is the closed region bounded by the planes $x = 0, y = 0, z = 0$ and $2x + 2y + z = 4$.

Module 3

5. (a) Find the bilinear transformation which maps $1, i, -1$ to $2, i, -2$ respectively. Find the critical and fixed points of the transformation.

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

(c) Show that under the transformation $W = \frac{Z - i}{Z + i}$, real axis in the Z-plane is mapped into the circle $|W| = 1$. Which portion of the Z-plane corresponds to the interior of the circle ?

Or

6. (a) If $f(z)$ is an analytic function, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|Rf(z)|^2 = 2|f'(z)|^2$.

(b) If the potential function is $\log(x^2 + y^2)$, find the flux function and the complex potential function.

(c) Find the image of the circle $|z| = 3$ under the transformation $w = z + 4 + 3i$.

Module 4

7. (a) Evaluate $\Delta(\sin 2x \cos 4x)$. Assume the interval of differencing as h.

(b) Express $f(u) = u^4 - 3u^2 + 2u + 6$ in terms of factorial polynomials. Hence show that $\Delta^4 f(u) = 24$.

(c) If $u_0 = 1, u_1 = 0, u_2 = 5, u_3 = 22, u_4 = 57$, find the $u_{0.5}$ by Newton's formula.

Or

8. (a) Use Lagrange's interpolation formula and find the value at $x = 4.5$ with the following data :

x :	1	3	5
y :	1.5706	1.5712	1.5728

(b) Use Newton's divided difference formula to find $f(x)$ from the following data :

x :	0	1	2	4	5	6
y :	1	14	15	5	6	18

Module 5

9. (a) From the following table, calculate $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.25$.

x :	1.1	1.2	1.3	1.4	1.5	1.6
y :	–1.6263	0.1558	2.4526	5.3917	9.1250	13.8307

(b) Estimate the length of the arc of the curve $3y = x^3$ from (0, 0) to (1, 3) using Simpson's $\frac{1}{3}$ rule taking 8 sub-intervals.

Or

10. (a) Apply (i) trapezoidal rule ; (ii) Simpson's $\frac{1}{3}$ rule, to find an approximate value of $\int_{-3}^{3} x^4\,dx$ by taking six equal sub-intervals. Compare them with the exact values.

(b) From the table below, for what values of x, y is minimum ? Also find this value of y.

x :	3	4	5	6	7	8
y :	0.205	0.240	0.266	0.260	0.251	0.222

(5 × 20 = 100 marks)

F 6257 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2013

Third Semester

Branch : Common to all Branches except C.S. and I.T.

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

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Find the directional derivative of $\phi(x, y, z) = x y^2 + y z^3$ at the point (2, –1, +1) in the direction of the vector $\bar{i} + 2\bar{j} + 2\bar{k}$.

2. Find the work done in moving a particle once around the circle $x^2 + y^2 = 4$ in the xy–plane and if the force field is given by $\bar{F} = (2x - y + 2z)\bar{i} + (x + y - z)\bar{j} + (3x - 2y + 5z)\bar{k}$.

3. Prove that $\Delta = \mu\delta + \frac{1}{2}\delta^2$.

4. Derive Simpson's $\frac{1}{3}^{rd}$ rule from Newton Cote's quadrature formula.

5. Prove that $z\{n^p\} = -z\frac{d}{dz}\{z(n^{p-1})\}$, p being a +ve integer.

(5 × 3 = 15 marks)

Part B

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

6. Find the angle between the surfaces $y = x^2 + z^2 - 5$ and $x^2 + y^2 + z^2 = 7$ at (2, –1, 2).

7. Evaluate $\int_S \bar{F} \cdot \bar{n}\, dS$ where $\bar{F} = yz\,\bar{i} + zx\,\bar{j} + xy\,\bar{k}$ and S is the part of the sphere $x^2 + y^2 + z^2 = 1$ which lies in the first octant.

8. Given that $u_0 = 3$, $u_1 = 12$, $u_2 = 81$, $u_3 = 200$, $u_4 = 100$ and $u_5 = 8$. Find $\Delta^5 u_0$.

Turn over

9. Solve $y_{n+2} - 4\,y_{n+1} + 3\,y_n = 2^n + 3^n + 7$.

10. If $z\{u_n\} = \frac{z}{z-1} + \frac{z}{z^2+1}$ find the z transform of u_{n+2}.

(5 × 5 = 25 marks)

Part C

Each full question carries 12 marks.

Module I

11. (a) If $r = |\bar{r}|$ where $\bar{r} = x\,\bar{i} + y\,\bar{j} + z\,\bar{k}$ then evaluate :

(i) ∇r^n ; and (ii) $\nabla \log r$.

(6 marks)

(b) Show that $r^n\,\bar{r}$ is an irrotational vector for any value of 'n' but is solenoidal only if $n = -3$.

(6 marks)

Or

12. (a) Find div $\bar{f}$ and curl $\bar{f}$ where curl $\bar{f}$ = grad $(x^3 + y^3 + z^3 - 3\,xyz)$. (6 marks)

(b) Prove that $\nabla \times (\phi\,\bar{f}) = (\nabla\,\phi) \times \bar{f} + \phi(\nabla \times \bar{f})$. (6 marks)

Module II

13. Verify Green's theorem in the plane for $\oint_C \left[(xy + y^2)\,dx + x^2 dy\right]$ where C is the closed curve of the region bounded by $y = x$ and $y = x^2$.

(12 marks)

Or

14. Verify Stoke's theorem for the function $\bar{F} = x^2\,\bar{i} + xy\,\bar{j}$ integrated round the square in $z = 0$ plane whose sides are along the lines $x = 0, y = 0, x = a, y = a$.

(12 marks)

Module III

15. The following table gives the population in loss of a town during the last six censuses. Estimate the population during 1947 and 1987.

x :	1941	1951	1961	1971	1981	1991
y :	12	15	20	27	39	52

(12 marks)

Or

16. Evaluate u_{28}, given $u_{20} = 49225$, $u_{25} = 48316$, $u_{30} = 47236$, $u_{35} = 45926$ and $u_{40} = 44306$.

(12 marks)

Module IV

17. From the following data find the first and second order derivatives at the point $x = 1.1$.

x :	1.0	1.2	1.4	1.6	1.8	2
$f(x)$:	0	0.128	0.544	1.296	2.432	4

(12 marks)

Or

18. Evaluate $\int_0^{\pi} \sin^4 x\,dx$ correct to four places of decimals using Trapezoidal rule by dividing $(0, \pi)$ into 10 equal parts.

(12 marks)

Module V

19. Using convolution theorem find the inverse z transform of $\left(\frac{z}{z-1}\right)^3$. (12 marks)

Or

20. Using z transform solve :

$u_{n+2} + 4\,u_{n+1} + 3\,u_n = 3^n$ with $u_0 = 0$ and $u_1 = 1$.

(12 marks)

[5 × 12 = 60 marks]

F 6332 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2013

Third Semester

Electronics and Communication/Applied Electronics and Instrumentation/ Electronics and Instrumentation Engineering

COMPUTER PROGRAMMING (LAS)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Write neat and efficient C programs wherever neccessary.

Part A

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

1. Describe the character set in C.
2. What are the differences between the output of the following statements ?
   (a) print f ("computer programming\n") ;
   (b) puts ("computer programming").
3. Write the output of the following :

```
for (i = 5 ; i ++ ; i < 10)
    print f ("% d\n", i);
```

4. What is the purpose of the comma operator ? Within which control statement does the comma operator usually appear ?
5. Mention the keywords used in defining the storage class of a variable and explain the significance of each.
6. How do we initialize structures during declaration ? Give an example.
7. Explain the differences between the address operator '&' and bitwise operator '&' with the help of examples.
8. Why do you think a void pointer needs to be explicitly typecast before being deferenced ?

Turn over

9. Explain command line arguments.

10. Write the statements needed for file operations in C, and show how a sequential file can be opened and read ?

(10 × 4 = 40 marks)

Part B

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

Module 1

11. Write a C program to convert a decimal number into its equivalent octal and hexadecimal numbers using formatted I/O.

Or

12. (a) Distinguish between constants and operators. Give examples for unary and binary operators.

(b) List the rules to be followed while declaring variables. Explain with valid and invalid examples.

Module 2

13. Write a C program that calculates and prints a table of trigonometric values for $\sin\theta$, $\cos\theta$ and $\tan\theta$. The angles in your table should go from 0 to 2π in 20 steps.

Or

14. Write a function to accept 10 characters and to display whether each input character is a digit, or a lowercase alphabet, or an upper case alphabet or a special symbol (punctuation mark).

Module 3

15. Write a C program that determines the number of times a particular character is found in a string.

Or

16. Write a C program using structure to accept empcode, empname, basic salary of the employees and compute their gross salary. The gross salary is computed using the formula :

Gross salary = Basic salary + DA + HRA. Prepare a print out of the pay roll in the order of the empcode.

Module 4

17. Write a program, using pointers, to count the number of vowels in an array of characters.

Or

18. Using pointers, write a C program to find the difference of two matrices and to print the resultant matrix.

Module 5

19. Write a C program to count the number of characters in a text file.

Or

20. A structure contains electricity consumer's information and units consumed. This information is stored in a sequential file. If the rate per unit is Rs. 2.50, write a C program to open the file, read the units information and other consumer information, to compute the electricity bill, and to output the result, for all the consumers in the input file.

(5 × 12 = 60 marks)