G 6777 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Third Semester

Branch : Information Technology

DIGITAL ELECTRONICS (T)

(2002 admission onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are self complementing codes ? Illustrate with suitable examples.
2. Find the dual of the following :
   (a) $f_1 = a\,b\,c\,d + \bar{a}\,c\,\bar{d}$.
   (b) $f_2 = (a + \bar{b})\,c + \bar{a}\,b\,\bar{c}$.
3. Explain the circuit of a BCD to decimal decoder.
4. Realise half subtractor using only basic logic gates.
5. What is active pull down in a TTL circuit ? Explain the performance improvements obtained by using active pull down.
6. Draw and explain an inverter using CMOS logic.
7. Draw the logic diagram, to convert a JK flip-flop into (i) D-flip-flop ; (ii) T-flip-flop and explain.
8. What are the differences between EPROM and EEPROM ?
9. What is presettable counter ? What are its advantages ?
10. Explain the applications of Johnson counter.

(10 × 4 = 40 marks)

Part B

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

Module 1

11. (a) (i) Design an excess-3 to BCD code converter using NAND gates only. Draw the circuit.

(8 marks)

(ii) Using De Morgan's theorem, simplify :

1 $X = \overline{(A + B\bar{C})} \cdot \overline{(\bar{A} + \bar{B}C)}$

2 $Y = \overline{(A + \bar{B}) \cdot (B\bar{A} + B) \cdot}$

(4 marks)

Or

Turn over

(b) Reduce using K-map and draw the minimal circuits using basic logic gates :

(i) $f_1 = \bar{a}\,\bar{b}\,d + b\,c\,d + a\,\bar{b}\,d + b\,\bar{c}\,\bar{d}$. (6 marks)

(ii) $f_2 = \Sigma m\,(1, 3, 4, 5, 10, 12, 13)$. (6 marks)

Module 2

12. (a) (i) What is a multiplexer ? Derive logic diagram for 8 : 1 multiplexer. (6 marks)

(ii) What is decoder ? Derive logic diagram for 4 to 10 line decoder. (6 marks)

Or

(b) (i) What is a full adder ? Design a logical full adder using basic logic gates. (6 marks)

(ii) Explain one-digit BCD adder using block diagram. (6 marks)

Module 3

13. (a) (i) Draw the circuit diagram of an OR/NOR emitter coupled logic and explain its working. (6 marks)

(ii) With neat circuit diagrams, describe the working of NAND gates using (1) NMOS and (2) PMOS.

(3 + 3 = 6 marks)

Or

(b) (i) With a neat circuit diagram, explain how a Low power Schottky NAND gate can give low propagation delay.

(6 marks)

(ii) Describe the following types of output stages of TTL family, with necessary circuit diagrams :

1 Open collector. 2 Tristate.

(3 + 3 = 6 marks)

Module 4

14. (a) Draw and explain the circuit diagram of D flip-flop using only NAND gates and with the help of its truth table and excitation table.

Or

(b) Implement the following functions using 4 × 4 × 2 PLA with both true and uncomplemented outputs. Write PLA table.

(i) $f_1 = \Sigma m\,(2, 4, 5, 10, 12, 13, 14)$. (6 marks)

(ii) $f_2 = \Sigma m\,(2, 9, 10, 11, 13, 14, 15)$. (6 marks

Module 5

15. (a) Design and implement synchronous counter having the following repeated binary sequence, using JK flip-flops : $0 \rightarrow 1 \rightarrow 4 \rightarrow 6 \rightarrow 7 \rightarrow 6 \rightarrow 4 \rightarrow 1 \rightarrow 0$.

Or

(b) Draw the circuit of a PISO using JK flip-flops for 4 bit binary. Explain the working with the help of timing diagrams.

[5 × 12 = 60 marks]

G 6784 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Third Semester

Branch : Computer Science/Information Technology

ENGINEERING MATHEMATICS—II (R,T)

(2002 Admission onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

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

Module 1

1. (a) Determine the truth value of each of the following statements :
   (i) Copenhagen is in Denmark or 1 + 5 = 8 and 3 + 3 = 6.
   (ii) Goa is in India, and 3 + 4 = 7 or 2 + 6 = 8.

   (b) Let p be "It is cold" and let q be "It is raining". Give a simple verbal sentence which describes each of the following statements :
   (i) $\sim p$. (ii) $p \wedge q$.
   (iii) $p \vee q$. (iv) $q \vee -p$.

   (*Or*)

   (c) Find the truth tables of (i) $p \vee \sim q$. (ii) $\sim p \wedge \sim q$.

   (d) Verify that the proposition $(p \wedge q) \wedge \sim (p \vee q)$ is a contradiction.

Module 2

2. (a) Let $S = \{(a,b)/a,b, \in N\}$ and define $(a,b) \sim (c,d)$ if and only if $ad = bc$. Prove that $\sim$ is an equivalence relation on S.

   (b) Let $S = \{1, 2, 3, 4, 5\}$ have a partition consisting of the sets $\{1, 3, 5\}$ and $\{2, 4\}$. Show that this partition determines an equivalence relation.

   (*Or*)

   (c) State and explain Euclidean algorithm. Use it to find the *gcd* of 1575 and 728.

   (d) Given $f : A \to B$ and $g : B \to C$. Show that if *gof* is one-to-one, then *f* is one-to-one.

Module 3

3. (a) Suppose N is ordered by divisibility. Determine whether or not A is an ordered subset of N where
   (i) $N = \{2, 3, 4, 5, 6\}$ with the usual order and
   (ii) $A = \{2, 4, 8, 32\}$ with the usual order.

   (b) Suppose $A = \{2, 3, 6, 8, 9, 18\}$ is ordered by divisibility. Identify the noncomparable pairs of elements of A.

Or

(c) Let L be a lattice. Then prove $a \wedge b = a$ if and only if $a \vee b = b$.

(d) Consider the lattice L shown in fig. 1. Determine whether or not each of the following is a sublattice of L.

$L_1 = \{x, a, b, y\}$. $L_2 = \{x, a, e, y\}$.

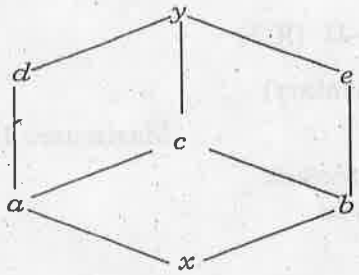

Fig 1.

Module 4

4. (a) Determine the discrete numeric function corresponding to the generating function $A(Z) = \frac{1}{1-Z^3}$.

(b) Find the particular solution for the difference equation $a_r + 5a_{r-1} + 6a_{r-2} = 3r^2 - 2r + 1$.

Or

(c) The solution of the recurrence relation $C_0 a_r + C_1 a_{r-1} + C_2 a_{r-2} = f(r)$ is $3^r + 4^r + 2$. If $f(r) = 6$ for all r, find C_0, C_1, and C_2.

Module 5

5. (a) Draw the diagram of the following multigraphs $G(V,E)$ where $V = \{P_1, P_2, P_3, P_4, P_5\}$ and

(i) $E = [\{P_1,P_5\}, \{P_3,P_4\}, \{P_2,P_3\}, \{P_2,P_5\}, \{P_1,P_5\}]$.

(ii) $E = [\{P_2,P_4\}, \{P_2,P_3\}, \{P_5,P_1\}]$.

(b) Find the connected components of G where V (G) = {A, B, C, X, Y, Z} and E (G) = [{A, Y}, {B, C}, {Z, Y}, {X, Z}].

Or

(c) The labelled graph G in Fig. 2 has three spanning trees. (i) Find the spanning trees of G and their lengths. (ii) Which is the minimum spanning tree of G ?

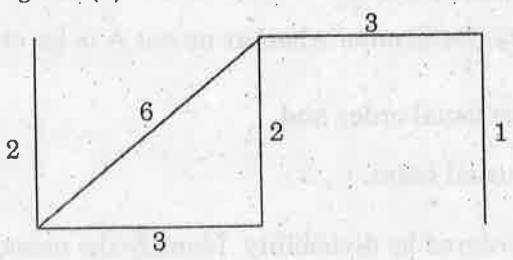

Fig. 2

(5 × 20 = 100 marks)

G 6769 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Third Semester

Branch : Computer Science and Engineering/Information Technology

HUMANITIES (R,T)

(2002 admission onwards)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Answer Part A and Part B in **separate** *answer books.*
Part A and Part B each carries 50 *marks.*
All full questions carry equal marks.

Part A (Principles of Management)

Answer **either** (a) **or** (b) *section of each question.*

Module 1

1. (a) Define span of control. Differentiate between narrow and wide spans of control. Explain the major factors determining span of control.

Or

(b) (i) Explain matrix organisation. Compare with the other structures.

(ii) Define job evaluation. Explain the stages and methods of job evaluation.

Module 2

2. (a) (i) Explain the role of leadership in TQM.

(ii) What is Big 'Q' concept of quality ? Explain the significance of feedback in this approach.

Or

(b) (i) Discuss the benefits of ISO 9000 certification.

(ii) Explain the three important quality concepts : quality control, quality assurance and quality management.

Part B (Engineering Economics)

Answer **either** (a) **or** (b) *section of each question.*

Module 3

3. (a) (i) How does a Reserve Bank regulate the volume of credit with the help of Bank-Rate and Open-Market operations ?

(ii) Describe the role of public and private insurance agencies in India.

Or

Turn over

(b) (i) State and explain in brief the major financial institutions in India providing finance to industries.

(ii) Describe the aims and objectives of I.C.I.C.I.

Module 4

4. (a) Discuss the need for industrialisation. Critically evaluate the development of various Industries since independence. What is the future ?

Or

(b) (i) Discuss the role of small scale industries to the development of the country.

(ii) Critically evaluate the influence of trade unions in Indian Industries.

Module 5

5. (a) (i) Distinguish between progressive tax and a regressive tax. Which of the two is better and why ?

(ii) Explain incidence of a tax. Distinguish it from the effect of the tax.

Or

(b) (i) What is the difference between a tax on income and a tax on a commodity ? Why is a tax on income preferred in modern times ?

(ii) Explain the problems associated with deficit financing.

G 6762 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Third Semester

Branch : Computer Science and Engineering/Information Technology

PROBLEM SOLVING AND COMPUTER PROGRAMMING (R, T)

(2002 admission onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

Write neat and efficient C programs wherever necessary.

Part A

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

1. With an example, explain what is meant by a flow chart.
2. Discuss the bottom up design approach with an example.
3. How do variables and symbolic names differ ? Explain with suitable examples.
4. Describe the precedence and associativity of operators in C.
5. Explain the use of break and continue with examples.
6. What is recursion ? Write a recursive function to find the n^{th} power of x.
7. How does array definition differ from that of an ordinary variable ? How are individual array elements identified ?
8. Can structure declarations appear inside functions. Explain with an example.
9. How do we check for errors upon opening a file and output the correct error message ?
10. What are the command line arguments ? Explain.

(10 × 4 = 40 marks)

Part B

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

Module 1

11. (a) Write an algorithm and draw a neat flow chart to find the sum $S = 1 - \frac{x^2}{2} + \frac{x^4}{\lfloor 4} - \frac{x^6}{\lfloor 6} + \ldots$

Or

(b) (i) What is a pseudocode ? What are the advantages and limitations of pseudocode ?

(6 marks)

(ii) Explain (1) procedure oriented programming (2) object oriented programming. Compare and contrast them.

(6 marks)

Turn over

Module 2

12. (a) (i) For the printf ( ) function, what are the format specifiers for specifying the types of argument, the position and the precision of the output ? Illustrate with suitable examples.

(8 marks)

(ii) What are the differences between scanf ( ) and gets ( ), with respect to data input with embedded white space characters ?

(4 marks)

Or

(b) Write a C program to compute the real and complex roots of a quadratic equation.

Module 3

13. (a) Write a C program to input a number and print the digits in the number in words.

Or

(b) Explain with program examples the different methods of passing arguments to a function.

Module 4

14. (a) Write a C program which reads a matrix and checks whether it is orthogonal or not.

Or

(b) Write a C program to read details of 300 students using structures with fields (regno, name, branch, semester, mark 1, mark 2, mark 3, mark 4, mark 5, mark 6) and display the total marks and average.

Module 5

15. (a) Write a program that will receive a file name and a line of test as command line arguments and write the test to the file.

Or

(b) Write a C program to copy a string in reverse order to another string variable using pointers. For example st = "RAMA" is copied as rst = "AMAR".

($5 \times 12 = 60$ marks)

G 6754 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Third Semester

Branch : Computer Science/Information Technology

SOLID STATE ELECTRONICS (R T)

(2002 admission onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Name the different operating regions of a transistor amplifier. Define how it is biased on these regions.
2. What is a Darlington pair ? List its important properties.
3. Explain with a neat diagram how JFET can be used as an analog switch.
4. Give at least four differences between JFET and MOSFET.
5. Why LC oscillators are usually preferred at high frequencies and RC oscillators at low frequencies ?
6. Determine the oscillation frequency of a Colpitts oscillator if R_1 = 18 K, R_2 = 100 K, R_E = 1 K, C_E = 0.1 μF, C_{c_1} = 0.001 μF, C_{c_2} = 0.001μF , L = 1 mH, C_1 = 10 pF and C_2 = 22 pF.
7. What are the two important conditions to be maintained in a good clamping circuit ?
8. List the various applications of an astable multivibrator.
9. What is a seven segment display ? Describe its connection diagram.
10. Define intrinsic stand-off ratio ? What is its significance and range of value ?

(10 × 4 = 40 marks)

Part B

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

Module I

11. (a) Draw the circuit of a two-stage RC coupled BJT amplifier and explain what happens to its (i) current gain ; (ii) voltage gain ; (iii) input resistance with cascading. (12 marks)

Or

(b) (i) Sketch the frequency response of a RC coupled amplifier and label the important regions. Account for the shape of the curve. (8 marks)

(ii) Define the three stability factors. Which one is considered in practical design ? Why ? (4 marks)

Module 2

12. (a) In an experimental set up, the following readings were observed :

$V_{GS} = 0$, and $V_{DS} = 7.0$ V $\rightarrow I_D = 10$ mA

$V_{GS} = 0$, and $V_{DS} = 15.0$ V $\rightarrow I_D = 10.25$ mA

$V_{GS} = -0.2$ V and $V_{DS} = 15.0$ V $\rightarrow I_D = 9.65$ mA

Plot the characteristics. Also determine :

(i) the type of the JFET ; (ii) its dynamic drain resistance ; (iii) amplification factor ; (iv) transconductance.

Or

(b) Draw the constructional diagram of an enhancement type MOSFET ? Explain its working with the help of the drain and transconductance characteristics. (12 marks)

Module 3

13. (a) With a neat circuit diagram, describe the working of a transistorised RC phase-shift oscillator. Explain its conditions for sustained oscillation.

Or

(b) What is a Hartley oscillator ? Draw its circuit and explain its working. (12 marks)

Module 4

14. (a) Draw the circuit diagram of a transistorised monostable multivibrator and design it to generate a delay of 20 msec. Use base trigger.

Or

(b) Draw the circuit of a limiter to pass voltages beween + 6V and – 4 V only, using (i) external bias batteries ; (ii) Zener diodes. Explain their working. (12 marks)

Module 5

15. (a) (i) Using 7805 and 7905 draw the circuit diagram of a ± 5 V dual power supply. (6 marks)

(ii) Draw the constructional details of a TRIAC and describe its working. (6 marks)

Or

(b) (i) Compare and contrast LED and LCD. (6 marks)

(ii) What is an optocoupler ? Explain its principle and applications. (6 marks)

[5 × 12 = 60 marks]

G 6741 (Pages : 3) Reg. No.....17

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Third Semester

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

ENGINEERING MATHEMATICS—II (CMEPLANSUF)

(2002 admission onwards—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 a unit vector normal to the surface $z = x^2 + y^2$ at the point (1, 3, 4). (5 marks)

(b) Find the directional derivative of the function $\phi = xy + yz + zx$ at (2, 1, 3) along $3\vec{i} + 4\vec{j} + 5\vec{k}$. (6 marks)

(c) Prove that curl curl $\vec{F}$ = grad div $\vec{F} - \nabla^2\vec{F}$ and hence deduce that curl curl curl curl $\vec{F} = \nabla^4 \vec{F}$, if $\vec{F}$ is solenoidal. (9 marks)

Or

(d) If $\phi = \phi(r)$ show that div $\{\phi(r)\vec{r}\} = 3\phi(r) + r\phi'(r)$ Hence evaluate div $(\phi(r)\hat{r})$. (8 marks)

(e) Find the constants a and b so that $\vec{F} = (axy + x^3)\hat{i} + (3x^2 - z)\hat{j} + (bxz^2 - y)\hat{k}$ is irrotational and find ϕ such that $\vec{F} = \nabla\phi$. (7 marks)

(f) Define the gradient of a scalar function. Show that $\nabla\phi$ is a vector normal to the surface $\phi(x, y, z) = c$. (5 marks)

Module 2

2. (a) Find the circulation $\vec{F}$ around the closed curve C, where $\vec{F} = y\vec{i} + z\vec{j} + x\vec{k}$ and C : curve $x^2 + y^2 = 1, z = 0$. (5 marks)

(b) State Gauss theorem and use it to evaluate $\iint_S \vec{F} \cdot \hat{n} ds$ where $\vec{F} = x^2\hat{i} + y\hat{j} + z\hat{k}$ and S is the surface of the cube bounded by the planes $x = 0, x = a, y = 0, y = a$ and $z = 0, z = a$. (8 marks)

(c) Find the work done in moving a particle once round a circle (in the xy plane) which has centre at the origin and radius = 2. Given that the force field is $\vec{F} = (2x - y + 2z)\hat{i} + (x + y - z^2)\hat{j} + (3x - 2y - 5z)\hat{k}$. (7 marks)

Turn over

(d) Using Green's theorem, evaluate $\int_C (x^2+xy)\,dx+(x^2-y^2)\,dy$ where C is the square formed by the lines $x=\pm 1, y=\pm 1$.

(10 marks)

(e) Verify divergence theorem for $\vec{F}=(x^2-y^2)\,\hat{i}+(y^2-2x)\,\hat{j}+(z^2-xy)\hat{k}$ taken over the rectangular parallelopiped $0\le x\le a, 0\le y\le b, 0\le z\le c$.

(10 marks)

Module 3

3. (a) Construct the analytic function whose real part is $r^2\cos 2\theta$. (5 marks)

(b) (i) Does the function $f(z)=\begin{cases} e^{-(1/z^4)}, & z\neq 0 \\ 0, & z=0 \end{cases}$ satisfy the Cauchy-Riemann equations at $z=0$?

(5 marks)

(ii) For what values of z is $f(z)$ analytic? (5 marks)

(iii) Show that f is continuous at $z=0$. (5 marks)

Or

(c) If $\phi+i\psi$ represents the complex potential of an electrostatic field where $\psi=(x^2-y^2)+\dfrac{x}{x^2+y^2}$, find the complex potential as a function of the complex variable z and hence determine ϕ.

(8 marks)

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

(7 marks)

(e) If $f(z)=u+iv$ is analytic, show that $u=c$, and $v=c_2$ cut orthogonally..

(5 marks)

Module 4

4. (a) Prove that $e^x=\left[\dfrac{\Delta^2}{E}\right]e^x\cdot\dfrac{Ee^x}{\Delta^2 e^x}$, the interval of differencing being h. (5 marks)

(b) Prove the identify :

$$u_1x+u_2x^2+u_3x^3+\ldots=\frac{x}{1-x}u_1+\frac{x^2}{(1-x)^2}\Delta u_1+\frac{x^2}{(1-x)^3}\Delta^2 u_1.$$

(7 marks)

(c) Employ Stirling's formula to compute $u_{12.2}$ from the table : ($u_x = 1 + \log \sin x$) :

x° :	10	11	12	13	14
$10^5 u_x$:	23967	28060	31755	35201	38638

(8 marks)

Or

(d) Given the values :

x :	5	7	11	13	17
$f(x)$:	150	392	1452	2388	5201

Evaluate $f(9)$, using Lagrange's and Newton's divided difference formula.

(10 marks)

(e) Given

θ :	0°	5°	10°	15°	20°	25°	30°
$\tan\theta$:	0	0.0875	0.1763	0.2679	0.364	0.4663	0.5774

Using Stirling's formula, show that $\tan 16^\circ = 0.2867$.

(10 marks)

Module 5

5. (a) Evaluate $\int_0^1 \frac{dx}{1+x}$ with $h = 0.25$ and $h = 0.5$ using trapezoidal and Simpson's 1/3rd rule and compare the values.

(10 marks)

(b) A rocket is launched from the ground. Its acceleration is registered during the first 80 seconds and is given in the table below. Using Simpson's 1/3 rd rule, find the velocity of the rocket at $t = 80$ seconds.

t(sec) :	0	10	20	30	40	50	60	70	80
$f(\text{cm/sec}^2)$:	30	31.63	33.34	35.47	37.75	40.33	43.25	46.69	50.67

(10 marks)

Or

(c) A river is 80 ft wide. The depth d in feet at a distance x ft. From one bank is given by the following table :

x :	0	10	20	30	40	50	60	70	80
d :	0	4	7	9	12	15	14	8	3

Find approximately the area of the cross-section.

(10 marks)

(d) Evaluate $\int_0^4 e^x dx$ Simpson's rule, given that $e = 2.72$, $e^2 = 7.39$, $e^3 = 20.09$, $e^4 = 54.6$ and compare it with the actual value.

(10 marks)

(5 × 20 = 100 marks)

G 6748 (Pages : 5) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, APRIL 2011

Third Semester

Branch : Information Technology

ELECTRICAL CIRCUITS AND SYSTEMS (T)

(2002 admission onwards—Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Distinguish between active and passive components giving two examples for each type.
2. Write the duals of (i) resistance ; (ii) inductance ; (iii) current source ; (iv) KCL.
3. Show the initial conditions in L and C elements. Explain.
4. Show the transformed equivalents of inductance in L and capacitance considering initial conditions.
5. Find the Laplace Transforms of :
   (a) step function. (b) ramp function.
6. Consider the circuit shown in fig. 1. The switch S is closed at $t = 0$. Determine the initial values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$.

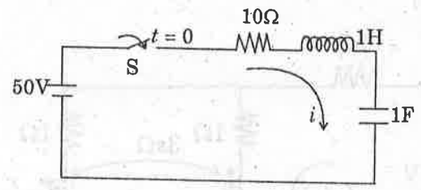

Fig. 1

7. State and explain Thevenin's theorem. Illustrate with a general example. Show how will you obtain the Norton's equivalent from the Thevenin's equivalent.
8. State and explain reciprocity theorem with the help of a circuit example.
9. Determine Z_{11} (s), Y_{11} (s) G_{21} (s) and Z_{21} (s) for the network shown in fig. 2.

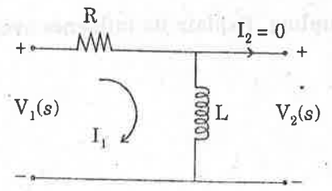

Fig. 2

10. The Z-parameters of a two-port network are $Z_{11} = 20\,\Omega$, $Z_{22} = 30\,\Omega$, $Z_{12} = Z_{21} = 10\,\Omega$. Find the *y*-parameters of the network.

(10 × 4 = 40 marks)

Part B

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

Module 1

11. (a) Write all the independent KCL and KVL equations for the network shown in fig. 3.

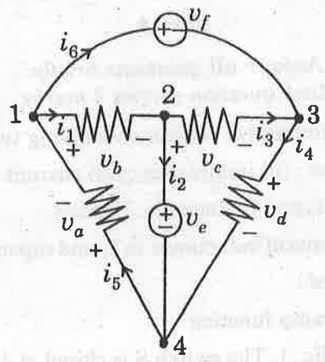

Fig. 3

Or

(b) (i) Write mesh equations for the network in fig 4.

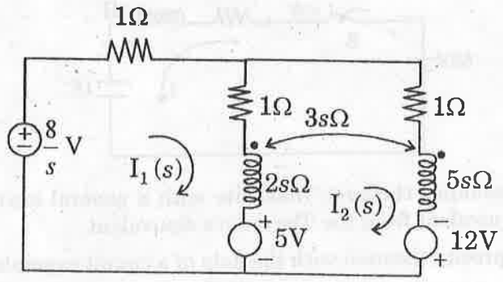

Fig. 4

(8 marks)

(ii) Define coefficient of coupling. Explain its influence over the impedance of the coil.

(4 marks)

Module 2

12. (a) The switch in the circuit in fig. 5 has been closed for a long time and is opened at $t = 0$. Find :

(i) The initial value of $V_o(t)$.

(ii) The time constant for $t > 0$.

(iii) The numerical expression for $V_o(t)$ after the switch has been opened.

(iv) The initial energy stored in the capacitor.

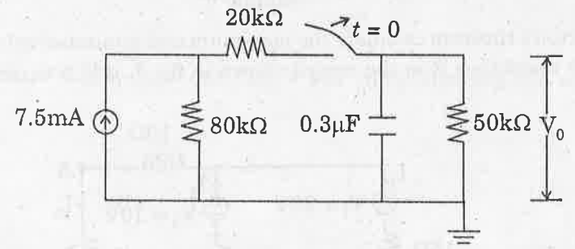

Fig. 5

Or

(b) (i) In the circuit shown in fig. 6, the switch is closed at $t = 0$. Find the expression for current supplied by battery and the current through 3 Ω resistance.

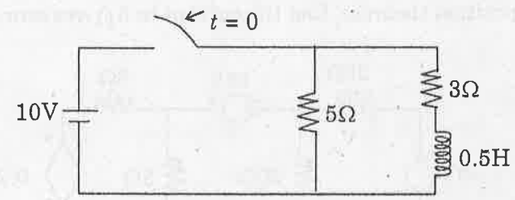

Fig. 6

(8 marks)

(ii) A series RL circuit with R = 10 Ω and L = 0.1 H is energized by a source V = 50 sin (100 t + 45°). Calculate the resulting current and its value when t = 0.01 sec.

(4 marks)

Module 3

13. (a) A RL series network has :

(i) a step input of E_1 volt.

(ii) a ramp input of 1 volt/sec, applied across it. Use Laplace transform to develop expressions for the voltage across the inductance L in each case. Assume that at the time $t = 0$, current $i = 0$.

Or

(b) (i) A unit impulse voltage $\delta(t-2)$ is applied in a series RL circuit where L = 1H and R = 2 Ω. If the impulse voltage is applied at $t = 0$ while the initial condition of the circuit is $i(0 = 0$, find $i(t)$.

(6 marks)

(ii) A ramp voltage $r(t-1)$ is applied in series RL circuit at $t = 0$. Assuming zero initial conditions and R = 2 Ω, C = 0.5 F, find $i(t)$.

(6 marks)

Module 4

14. (a) Using Norton's theorem calculate the maximum and minimum values of the potential difference across the resistance R in the circuit shown in fig. 7, if R is varied from 10 Ω to 100 Ω.

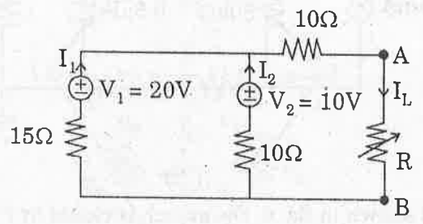

Fig. 7

Or

(b) Using superposition theorem, find the current in 8 Ω resistor shown in fig. 8.

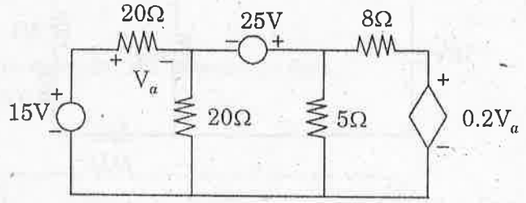

Fig. 8

Module 5

15. (a) (i) Obtain the condition for reciprocity for ABCD parameters.

(ii) Find the *h*–parameters of the network shown in fig 9.

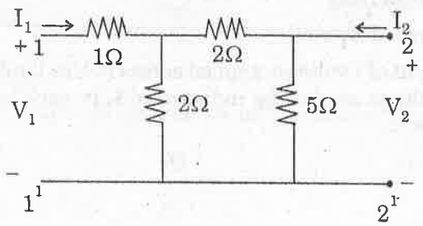

Fig. 9

Or

(b) Two identical amplifiers are connected in cascade as shown in fig. 10. Each amplifier is with the following *h* parameters :

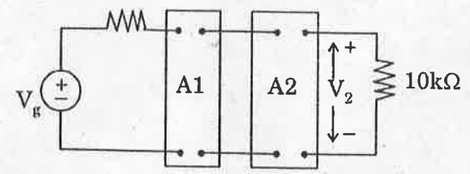

Fig. 10

$h_{11} = 1000\,\Omega$, $h_{12} = 0.001$, $h_{21} = 100$, $h_{22} = 100\ \mu\mho$. Calculate the voltage gain $\frac{V_2}{V_g}$.

(5 × 12 = 60 marks)