3E1614

Roll No.

Total No of Pages: 4

3E1614

B. Tech III Sem. (Main/Back) Exam. Jan. 2016
Electrical & Electronics Engineering
3EX2A Circuit Analysis & Synthesis
EC, EI, EX, BM, AI

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 24

Instructions to Candidates:

Attempt any ***five questions,*** *selecting* ***one question*** *from* ***each unit.*** *All questions carry* ***equal*** *marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT-I

Q.1 (a) State and verify the reciprocity theorem with the help of a suitable example and also write its limitations. [8]

(b) In the circuit of fig (1), find the power loss in the 1Ω resistor by Thevenin's theorem. [8]

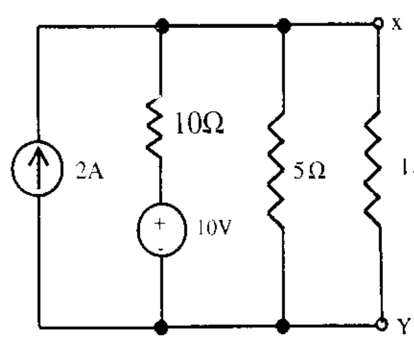

fig. (1)

OR

Q.1 (a) Define and calculate the expression of coefficient of coupling. [8]

(b) In the network shown in fig (2), find the value of R_L to which the maximum power can be delivered. Hence find the voltages across the R_L [8]

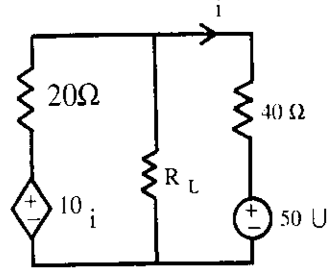

fig. (2)

UNIT-II

Q.2 (a) Find the transient responses of series RLC circuit with sinusoidal excitation. [8]

(b) A direct voltage of 200V is suddenly applied to a series L-R circuit having R = 20Ω and inductance 0.2H. Determine the voltage drop across the inductor at the instant of switching on and at 0.02 sec. later. [8]

OR

Q.2 (a) In fig (3), find the expression for currents and voltages through the inductor L and resistances R_1 and R_2 after the switch is opened. Assume steady state initial condition with the switch closed at t = O (-). [L = 1H, $R_1 = R_2 = 10\Omega$] [8]

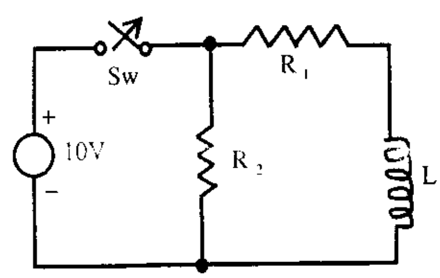

fig. (3)

(b) In the circuit of figure (4), a steady state is reached, and $t = 0$, the switch S is opened. Find the voltage across the switch,, v_S at $t = 0^+$ [8]

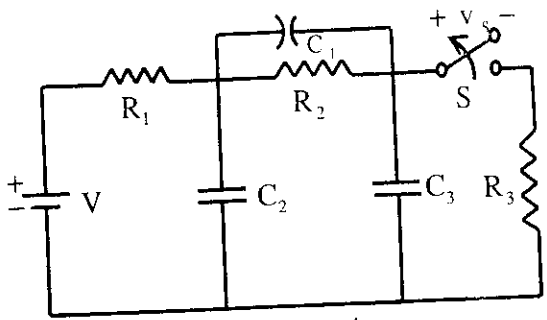

fig.4

UNIT-III

Q.3 (a) For the circuit shown in fig 5, determine the network transfer function. [8]

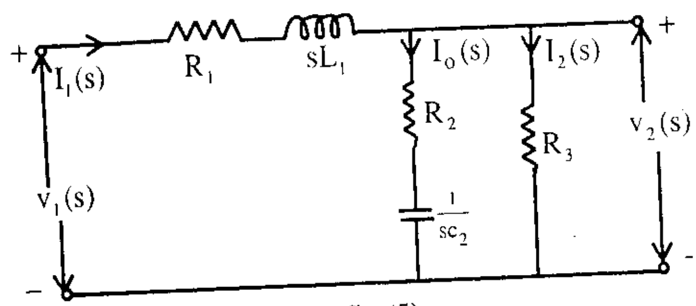

fig.(5)

(b) Write the necessary conditions for transfer function. [8]

OR

Q.3 (a) Explain the relationship between pole positions and stability. [8]

(b) Check the stability of the system with characteristics equation - [8]
$s^5 + 4s^4 + 8s^3 + 8s^2 + 7s + 4 = 0$

UNIT-IV

Q.4 (a) Derive the condition for reciprocity and symmetry in case of - [8]

(i) T-parameters

(ii) H- parameters

(b) Explain T-π transformation for two port networks. [8]

OR

Q.4 (a) Calculate the Z- parameter for the network shown in fig. (6) [8]

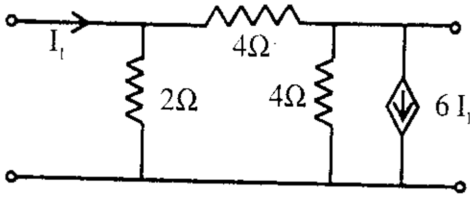

fig.(6)

(b) Determine the image parameters of the T-network shown in fig (7) [8]

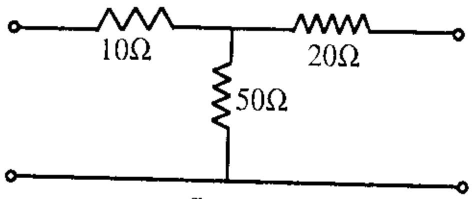

fig.(7)

UNIT-V

Q.5 (a) Realize the R-C admittance in Cauer- I and Forster-II forms. [8]

$$Y(s)=\frac{s^2+7s+6}{s+2}$$

(b) Realise the function $Z(s)=\frac{s(s^2+4)}{2(s^2+1)(s^2+9)}$ in both Foster forms LC network. [8]

OR

Q.5 (a) Realise $Z(s)=\frac{s(s^2+2)(s^2+4)}{(s^4+1)(s^2+3)(s^2+5)}$ in first Cauer form. [8]

(b) An impedance is given by [8]

$$Z(s)=\frac{8(s^2+1)(s^2+3)}{s(s^2+2)(s^2+4)}$$

Realize the network in

(i) Foster- I form, and

(ii) Cauer- II form.

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3E1615

B. Tech III Sem. (Main) Exam. Jan. 2016
Electronic Instrumentation & Control
3EI5 Electromagnetic Properties of Materials
Common for EC & EIC

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

Attempt any ***five questions,*** *selecting* ***one question*** *from* ***each unit.*** *All questions carry* ***equal*** *marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. NIL 2. NIL

UNIT-I

Q.1 (a) Define polarization. Explain the different types of polarization and their frequency dependence. [8]

(b) The polarizability of argon is 1.8×10^{-40} Fm^2. Calculate the dielectric constant of argon at NTP, when the volume of argon is $2.2\times10^{3}m^{3}$. [4]

(c) Derive the temperature-independent condition -

$$\frac{1}{L}\frac{dL}{dT}+\frac{1}{C}\frac{dC}{dT}=0$$

for a resonant tank circuit. [4]

OR

Q.1 (a) Prove the Clausis-Morolt: relation [8]

$$\frac{\varepsilon_r - 1}{\varepsilon_r + 2} = \frac{1}{3\varepsilon_0} N(\alpha_c + \alpha_i)$$

(b) What are ferroelectric and piezoelectric behavior solids? Explain along with the applications. [8]

UNIT-II

Q.2 (a) Give the classification of magnetic materials and their applications. [8]

(b) A paramagnetic material with susceptibility 3.7×10^{-3} has a magnetic field integrity of 10^4 amp/m. Calculate magnetization and flux density in the material. [8]

OR

Q.2 (a) What is magnetostriction effect? Describe giant magnetostriction resistor and its applications. [8]

(b) A paramagnetic system of electric spin magnetic dipole moment is placed in an external field of 10^5 amp/m. Calculate the average magnetic moment per dipole at 300k. Also, calculate the fractional number of spins which are parallel to the field. [8]

UNIT-III

Q.3 (a) Explain the direct and indirect band gap semiconductors used for electronic devices. [8]

(b) Differentiate between drift current and diffusion current in semiconductor. Also write equation for the total current in a semiconductor crystal and explain the various terms. [8]

OR

Q.3 (a) Find the relaxation time of conduction electrons in a metal of sensitivity $1.54\times 10^{-8}\ \Omega$-m, if the metal has 5.8×10^{28} conduction electron per m^3. [4]

(b) Describe Czochralski method of crystal growth for growing single crystal of silicon. Draw necessary diagrams. [8]

(c) Explain the working of thermistors with their application. [4]

UNIT-IV

Q.4 Write important properties and applications of the following materials - [4×4=16]

(a) Copper

(b) Tin

(c) Mercury

(d) Aluminum

OR

Q.4 (a) Write is Meissener effect? Describe type-I and type-II superconductor and their applications. [8]

(b) Explain the classical theory of conductor materials what are it's achievementes and limitations. [8]

UNIT-V

Q.5 (a) What are nano-materials? How nano-materials can be classified? [8]

(b) Explain the bottom-up techniques with examples. [8]

OR

Q.5 (a) Explain five major areas of technology where nano technology can play important roles. [8]

(b) Write short note on following - [4×2=8]

(i) Carbon nanotubes.

(ii) Scanning electron microscopy

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3E1616

B. Tech III Sem. (Main/Back) Exam. Jan. 2016
Petroleum Engineering
3PE6 Advanced Engineering Mathematics - I
EC, EIC, BM, AI, CR, PE, PC

Time: 3 Hours | **Maximum Marks: 80**
Min. Passing Marks: 24

Instructions to Candidates:

Attempt any ***five questions,*** *selecting* **one question** *from* **each unit.** *All questions carry* **equal** *marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT-I

Q.1 (a) Find the Laplace transform of $\sin\sqrt{t}$. [5+3=8]

Hence show that:

$$L\left(\frac{\cos\sqrt{t}}{\sqrt{t}}\right)=\left(\frac{\pi}{s}\right)^{1/2} e^{\left(-1/4s\right)}$$

(b) Prove that: [5+3=8]

$$\int_0^\infty \frac{\sin t}{t}\,dt=\frac{\pi}{2}$$

Hence show that:

$$\int_0^\infty \frac{e^{-t}\sin t}{t}\,dt=\frac{\pi}{4}$$

OR

Q.1 (a) Find the inverse Laplace transform of the following functions: [4+4=8]

(i) $\dfrac{1}{(s+1)(s^2+1)}$

(ii) $\log\left(1+\dfrac{1}{s^2}\right)$

(b) Use the Laplace transform technique and solve the following: [8]

$\dfrac{\partial u}{\partial t} = 2\dfrac{\partial^2 u}{\partial x^2}$, where $u = u(x, t)$

Boundary conditions:

$u(0, t) = 0 = u(5, t)$ and $u(x, 0) = 10 \sin 4\pi x$

UNIT-II

Q.2 (a) Find the Fourier series for the function $f(x) = x^2$ in the interval $-\pi < x < \pi$ and deduce the following: [6+2=8]

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots\dots\dots\dots = \frac{\pi^2}{12}$$

(b) Find the cosine series of sin x in the interval $o < x < \pi$. [8]

OR

Q.2 (a) Obtain the Fourier series for the following data:

x:	0	$\pi/3$	$2\pi/3$	π	$4\pi/3$	$5\pi/3$	2π
y:	1.98	2.15	2.77	-0.22	-0.31	1.43	1.98

Express y in a Fourier series up to second harmonic. [8]

(b) (i) Find the Z- transform of $\langle u_n \rangle = \langle na^n \rangle$ [4]

(ii) Find the inverse Z- transform of [4]

$$\frac{1}{(z-3)(z-2)} \quad \text{for } |z| < 2.$$

UNIT-III

Q.3 (a) Find the Fourier cosine transform of e^{-x^2}. [8]

(b) Find f (x) if its Fourier sine transform is- [8]

$$\frac{s}{1+s^2}$$

OR

Q.3 (a) Find the Fourier sine transform of $\frac{x}{1+x^2}$. [8]

(b) Using Fourier transfer theory, solve the following partial differential equation:

$$\frac{\partial v}{\partial t}=\frac{\partial^2 v}{\partial x^2} \quad , \quad x>0,\ t>0$$ [8]

Subject to the conditions:

(i) $v = 0$ when $x = 0, t > 0$

(ii) $v = \begin{cases} 1, & 0<x<1 \text{ when } t=0 \\ 0, & x \geq 1 \end{cases}$

(iii) $v (x, t)$ is bounded $x > 0,\ t > 0$.

UNIT-IV

Q.4 (a) Examine the nature of the function

$$f(z)=\frac{x^2y^5(x+iy)}{x^4+y^{10}},\ z\neq 0,\ f(0)=0$$

in the region including the origin. [8]

(b) Determine the region in the w - plane into which the rectangular region bounded by the lines x = 0, y = 0, x = 1, y = 2 in the z – plane is mapped under the transformation.

$w = (1 + i) z + (2-i)$

Discuss also magnification, rotation and translation. [5+3=8]

OR

Q.4 (a) State Cauchy's integral theorem. Verity Cauchy's integral theorem for the function $f(z) = z^3 - iz^2$, if the closed contour c is the circle $|z-1| = 3$. [2+6=8]

(b) State Cauchy's integral formula. Evaluate the following integral by using it.

$$\int_C \frac{3z^2+z}{z^2-1}\,dz, \quad \text{Where c is the circle } |z| = 2$$ [8]

UNIT-V

Q.5 (a) Expand [8]

$$f(z) = \frac{1}{(z+1)(z+3)}$$

in a Laurent's series valid for

(i) $1 < |z| < 3$

(ii) $|z| > 3$

(iii) $0 < |z+1| < 2$

(b) Find the poles of $\frac{1}{1+z^4}$. [4+4=8]

Also evaluate the following by using residue theory:

$$\int_C \frac{z^2}{(z-1)^2(z-2)}\,dz \;, \quad c: |z| = 2.5$$

OR

Q.5 (a) State the Cauchy's residue theorem. Find the residue of [2+6=8]

$$f(z) = \frac{z^2 - 2z}{(z+1)^2(z^2+4)}$$ at all the poles in the finite part of z - plane.

(b) Use contour integration to prove - [8]

$$\int_0^{2\pi} \frac{d\theta}{a + b\sin\theta} = \frac{2\pi}{\sqrt{a^2 - b^2}} \text{ for } a > b.$$

3E1494

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3E1494

B. Tech III Sem. (Main/Back) Exam. Jan. 2016
3EC4 Electronic Measurements & Instrumentation

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks (Main): 26
Min. Passing Marks (Back): 24

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No.205)

1. NIL 2. NIL

UNIT-I

Q.1 (a) Explain the following errors with suitable examples - [8]

(i) Gaussian error analysis

(ii) Limiting errors

(b) What is meant by standard deviation of mean? Explain with suitable example. [8]

OR

Q.1 (a) Explain the following: - [8]

(i) Repeatability

(ii) Accuracy and precision

(b) Systematic errors can be classified as:- [8]

(i) Instrumental errors

(ii) Environmental errors

Discuss the above type of errors giving suitable examples. Explain the measures taken to minimize these errors.

UNIT-II

Q.2 (a) Explain the operation and functional block diagram of vector impedance meter. Discuss how phase angle measurements are carried out with it. [8]

(b) Describe the methods of measurement of voltage and power at radio frequencies. [8]

OR

Q.2 Write short note on the following:-

(a) Shielding and grounding [8]

(b) Digital voltmeter [8]

UNIT-III

Q.3 (a) An electrically deflected CRT has a final anode voltage of 1600V and parallel defecting plates 1.4cm long and 4.6mm apart. If the screen is 50cm from the centre of deflecting plates, find- [8]

(i) The deflection sensitivity of the tube

(ii) The deflection factor of the tube

(b) Define the following of the CRO: - [8]

(i) Blanking circuit

(ii) Z-axis modulation

OR

Q.3 (a) A CRT has an anode voltage of 1400V and parallel deflecting plates 2.8cm long and 4.6mm apart. The screen is 30cm from the centre of the plates. Find the input voltage required to deflect the beam through 3.5cm. The input voltage is applied to the deflecting plates through amplifiers having an overall gain of 100. [8]

(b) Explain the construction and operation of following CRO probes:- [8]

(i) Isolation Probe

(ii) Direct Probe

UNIT-IV

Q.4 (a) Explain what do you understand by distortion? What are the various types of distortion? Explain the principle of working of a distortion meter. [8]

(b) Explain the block diagram and operation of frequency synthesized signal generations. [8]

OR

Q.4 (a) Explain the construction and working of sweep frequency generators. [8]

(b) What are the various applications spectrum analyser in an electronic laboratory? Explain in brief. [8]

UNIT-V

Q.5 (a) A platinum thermometer has a resistance of 100Ω at 25°C. [8]

(i) Find its resistance at 65°C, if the platinum has a resistance temperature co-efficient of 0.00392°C.

(ii) If the thermometer has a resistance of 150Ω, calculate the temperature.

(b) What do you mean by Gauge factor? Explain its importance and derive the expression for Gauge factor of strain gauge. [8]

OR

Q.5 (a) Explain the following: - [8]

(i) Seismic accelerometers

(ii) RVDT

(b) Discuss about the configurations and applications of Rosette gauges. [8]

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Total No of Pages: 3

3E1471

3E1471

B. Tech III Sem. (Back) Exam. Jan. 2016
Electronic Instrumentation & Control Engineering
3EI4 (O) Electrical Measurements

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 24

Instructions to Candidates:

Attempt any ***five questions,*** *selecting* ***one question*** *from* ***each unit.*** *All questions carry* ***equal*** *marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT-I

Q.1 (a) Describe the construction of a quadrant type of electrostatic voltmeter. Describe the expression for deflection when Idiostatic type of connections are used. The meter is spring controlled. [10]

(b) A split phase induction voltmeter gives a full scale deflection of 300° with a voltage of 240V. The resistances and inductances of resistive and inductive coils are 1000Ω and 1.0μH and 10Ω and 100mH respectively. Determine the voltage when deflection is 180° if the frequency remains the same i.e. 50Hz. [6]

OR

Q.1 (a) An electrostatic voltmeter has two parallel has two parallel plates. The movable plate is 10cm in dia. With 10KV between the plates, the pull is 0.005N. Find the change in capacitance for a movement of 1mm of the moveable plate. [6]

(b) Explain with the help of a neat sketch the construction of an electro dynamic type moving coil ammeter. Derive the equation for torque of the ammeter and state the causes of change of accuracy with change of temperature and frequency. [10]

UNIT-II

Q.2 Write the short note on the followings

(a) CRO Probes [8]

(b) Techniques of measurement of frequency, phase angle and time delay with the help of CRO. [8]

OR

Q.2 Write the short note on the followings.

(a) Basic CRO circuits [8]

(b) Storage oscilloscope [8]

UNIT-III

Q.3 Describe the loss of charge method of measuring high resistance. Prove the formula used and mention the possible errors and suggest methods to minimize them. [16]

OR

Q.3 Explain the following;

(a) What do you mean by low, medium and high resistances?

(b) Why is the voltmeter-ammeter method unsuitable for the precise measurement of the low resistance?

(c) How the effects of contact resistance and resistance of the connecting loads are eliminated in the measurement of resistances by Kelvin's double bridge?

(d) Why is the Kelvin's double bridge superior to the wheatstone bridge for the purpose of low resistance measurement? [4×4=16]

UNIT-IV

Q.4 (a) Explain with connection and phasor diagram, Hay's bridge for the measurement of inductance. Give the advantages and disadvantages [8]

(b) Prove that in Wein Bridge, the value of resistance of the capacitor at balance is given by $R_1 = \frac{R_3\left(1 + W^2 R_2{}^2 C_2{}^2\right)}{W^2 R_2 R_4 C_2{}^2}$

Where w, C_2, R_2 and R_4 are known values with usual notation. What are the uses of the above bridge in electrical engineering [8]

OR

Q.4 Describe the method of measuring the dielectric loss of the capacitor at high voltage and high frequency. Derive the condition of balance for the bridge. Discuss also the precautions to be taken to ensure accuracy. [16]

UNIT-V

Q.5 Describe the construction and working of coordinate type potentiometer and describe also that how this potentiometer can be used for

(a) Measurement of self inductance of the coil

(b) Calibration of a wattmeter and AC energy meter. [16]

OR

Q.5 Write a short notes on the followings;

(a) Classification of A. C. potentiometer

(b) Difficulties associated with A.C. potentiometer. [8×2=16]

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3E1653

B. Tech III Sem. (Main) Exam. Jan. 2016
Electronic Instrumentation & Control
3EI3 Digital Electronics
Common to EC & EIC

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. ______________ 2. ______________

UNIT-I

Q.1 (a) Convert the following - [4×1=4]

(i) $(2F\,9A)_{16} = (\quad)_2$

(ii) $(1100100)_2 = (\quad)_8$

(iii) $(247.05)_{10} = (\quad)_2$

(iv) $(1010.011)_2 = (\quad)_{10}$

(b) Represent decimal no $(190)_{10}$ in following - [3×2=6]

(i) Excess – 3 code

(ii) Gray code

(iii) BCD code

(c) Perform the following operations - [3×2=6]

(i) $(11.1001)_2 - (01.110)_2$ using 2's complement

(ii) $(2AC)_{16} + (10F)_{16}$

(iii) $(32)_8 + (67)_8$

OR

Q.1 (a) Define the following with one example - [4×2=8]

(i) Error correcting codes

(ii) Gray code

(iii) Hamming distance

(iv) Even and odd parity code.

(b) Consider following codes - [4×2=8]

Code A	Code B	Code C	Code D
0001	000	01011	000000
0010	001	01100	001111
0100	011	10010	110011
1000	010	10101	
	110		
	111		
	101		
	100		

Deform which of the following properties is satisfied by each above codes.

(i) Detects single error

(ii) Detects double error

(iii) Corrects single error

(iv) Corrects single error and detects double error.

UNIT-II

Q.2 (a) Define the following of logic families - [4×2=8]

(i) Fan – out

(ii) Figure of merit

(iii) Noise Immunity

(iv) Wired – logic.

(b) A DTL NAND gate is shown in fig – 2. Calculate its - [4×2=8]

(i) Fan out

(ii) Noise margin

(iii) Average power dissipated by the gate.

(iv) Logic levels v (0) & v (1)

Assume diode parameter $V_D \approx 0.7$ V (diode on voltage)

V_Y (cut in voltage) = 0.6V

Transistor parameter Cut in voltage $V_y = 0.5$V

$V_{BESat} \approx 0.8$volt.

$V_{CESat} \approx 0.2$volt

hFE = 50 $V_{CC} = 9$v

$R = 10K\Omega$

$R_B = 50K\Omega$

$R_C = 3K\Omega$.

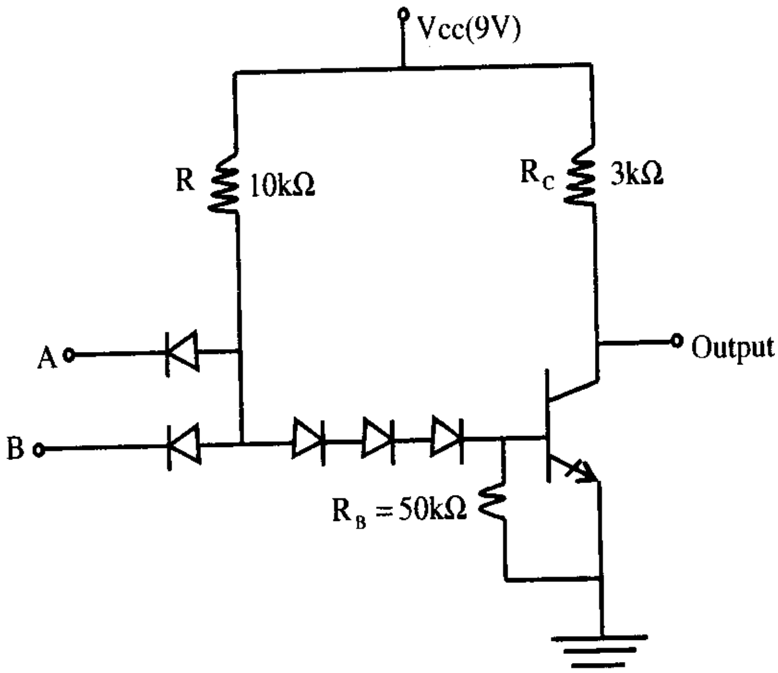

Fig = 2

OR

Q.2 (a) Explain the use of following in logic families - [4×2=8]

(i) Clamping diodes.

(ii) Open collector & open emitter outputs

(iii) Schottky diode

(iv) Totem pole output.

(b) Draw the circuit diagram of following - [4×2=8]

(i) 2 input HTL NAND gate

(ii) 2 input ECL OR gate

(iii) I^2L inverter

(iv) Q input NMOS OR gate (with Active load)

UNIT-III

Q.3 (a) minimize the logic expression with K – map [4×2=8]

(i) F (A, B, CD) = Σm (1, 2, 3, 7, 11, 15) fd (0, 4, 5)

(ii) F (AB, CD) πm (1, 4, 6, 9, 10, 11) * d (13, 14, 15)

(b) What is Qvine – McCluskey minimization technique? Explain for minimize the function. [8]

y (A, B, CD) = Σm (0, 1, 3, 4, 5, 7, 8, 9, 11, 15)

OR

Q.3 (a) minimize the following logic using K – map. [3×4=12]

(i) $y = AB(D + \overline{C}) + DC(\overline{A} + \overline{B}) + \overline{A}CD$

(ii) y = Σm (0, 1, 3, 5, 6)

(iii) $\overline{y} = A \oplus B \oplus \overline{A}$

(b) What is multilevel K – map? Draw two – level K – map for five variable and show the group formation of 16 – adjacent ones in it. [4]

UNIT-IV

Q.4 Implement the following expression - [4×4=16]

(i) $y = A\overline{B}C$ using 2 input NAND only.

(ii) y = Σm (0, 2, 3, 6, 8, 9, 12, 14) using multiplexer

(iii) y = Σm (2, 3, 9, 11) using 4 to 16 line decoder.

(iv) 16×1 mux using 2×1 mux.

OR

Q.4 Draw the logic diagram of and show all implementation steps. [4×4=16]

(i) BCD to excess – 3encoder

(ii) 4 bit binary serial adders

(iii) 2 bit multiplier

(iv) Parity Generator 2 checkers (4bit)

UNIT-V

Q.5 (a) Draw the excitation table of - [2×2=4]

(i) JK FE

(ii) T – EF

(b) Design a 4bit synchronous counter [6]

(c) Obtain the output for the sequential circuit shown in Fig – 5 (a) [6]

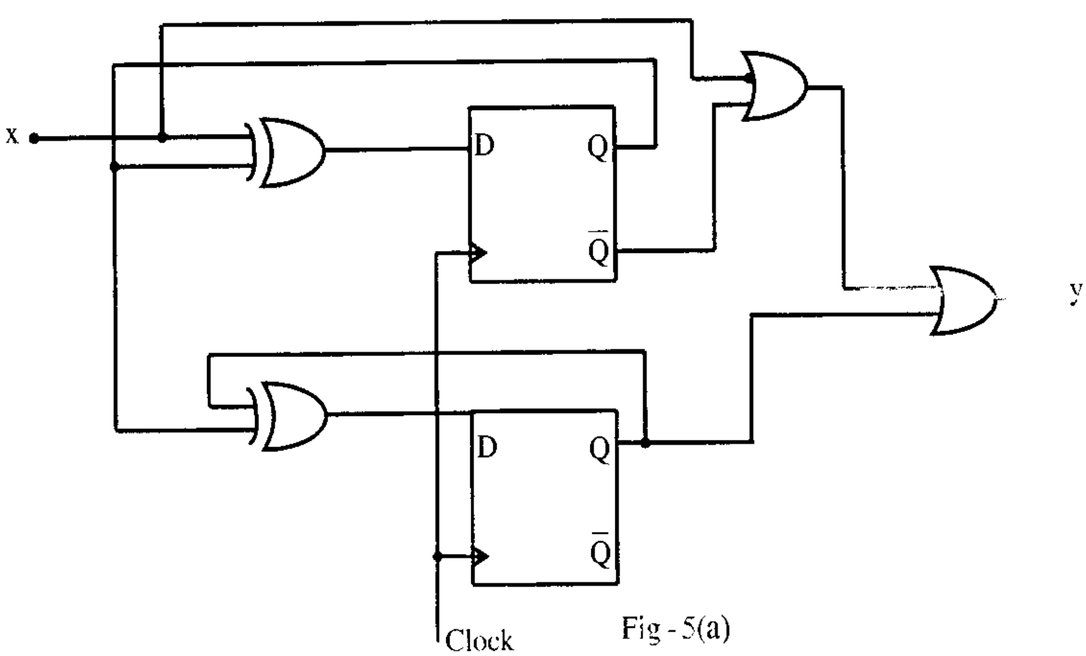

Fig - 5(a)

OR

Q.5 (a) Draw the state diagram of logic circuit shown fig – 5(a). **[8]**

(b) Design a logic circuit for the state diagram show in fig – 5(b). **[8]**

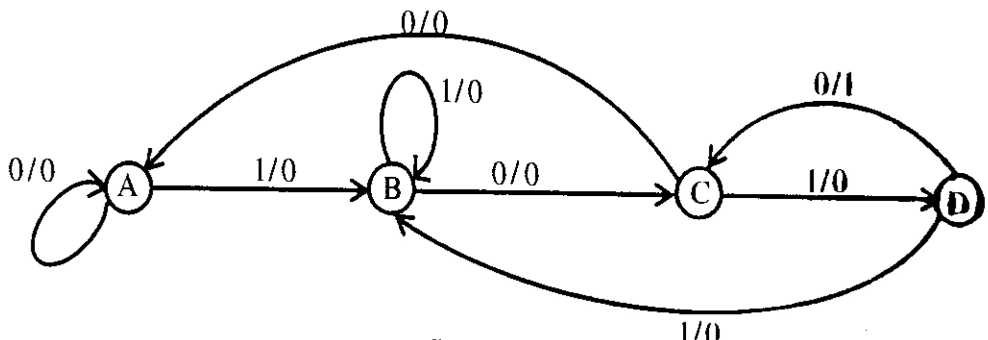

fig - 5(b)
