3E1222

Roll No. _____ [Total No. of Pages : 2

3E1222

B.Tech. III Sem. (Main) Examination, April / May - 2022
Electronic Inst. and Control Engg.
3EI4 - 04 Digital System Design
EC,EI

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**. All **five** questions from **Part B** and **three** questions out of **Five** questions from **Part C**.*

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

PART - A

(word limit 25) **(10×2=20)**

1. Determine the radix value (X) for the following equation.

   $(135)X + (144)X = (323)X$.

2. Explain various types of delays in VHDL.

3. Convert the given expression in standard POS form.

   $f(A,B,C) = (A+C)(A+\overline{C})(A+B)$.

4. Write the VHDL code of XNOR gate using Data flow modelling style.

5. Define.

   I. Fan - out.

   II. Figure of merit w.r.t. Logic families.

6. Implement 8×1 MUX using 2×1 MUX.

7. Simplify the Boolean algebra.

   $(A+\overline{B}+AB)(A+\overline{B})(\overline{A}B)$.

8. State the advantage of finite state machine.

9. Design the Half adder using minimum numer of NAND gates.

10. What is Race around condition in flip flops and how it is avoided.

150

PART - B

(word limit 100) **(5×4=20)**

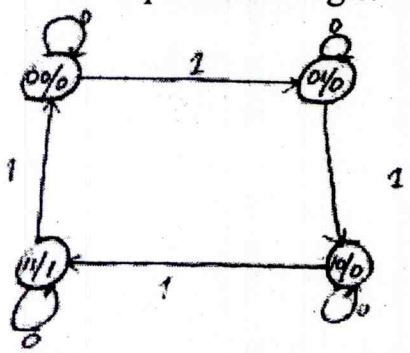
1. Reduce the following expression using k-map.

   $F(A,B,C,D) = \pi M(4,5,6,7,8,12) + d(1,2,3)$.

2. Implement the following expression using 8×1 MUX (Table A as input and B,C,D as selection lines)

   $F(A,B,C,D) = \sum m(0,1,2,4,6,9,12,14)$

3. Explain the procedure for conversion of SR flip flop into T flip flop.
4. The state diagram of the FSM is given below, design its logic. Show its state table, state assignment table and final implemented logic.



5. Explain process statement with respect to behavioral modelling? Also, write VHDL code of JKFF using behavioral modelling?

PART - C

(Any three) **(3×10=30)**

1. Design a binary counter with following binary sequence using JK flip flop.
   7,3,1,2,5,4,6,7,3,1,2,5,4,6.....
2. Simplify the Boolean function of five variable using KMAP.

   $F(A,B,C,D,E) = \sum m(0,2,3,4,6,7,8,11,12,13,16,18,19,20,22,23,24,27,28,29)$.

3. a) Find the Boolean function implemented by 4×1 MUX shown in figure. 1

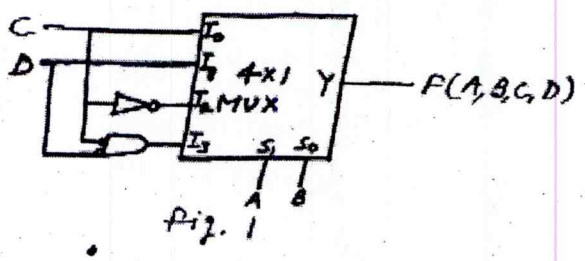


Fig. 1

   b) Design full adder using 4×1 Multiplexer.

4. Explain different types of modelling styles used in VHDL. Also, write the VHDL code for 4 - bit ripple carry adder using structural modelling.
5. Design a combinational circuit which generate output '1' if 4 - bit input contains even number of 1's and output zero otherwise.

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3E1225

3E1225

B.Tech. III Sem. (Main) Examination, April/May - 2022
Electronic Inst. & Control Engg.
3EI4 - 05 Signal & Systems
EC, EI

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**. All **five** questions from **Part B** and **three** questions out of **Five** questions from **Part C**.*

Schematic diagrams must be shown wherever necessary. Any data missing may 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)

PART - A

(word limit 25) **(10×2=20)**

1. State sampling theorem and Nyquist criteria.
2. What is a causal system. Why are non - casual systems unrealisable.
3. Discuss time shifting property.
4. Define continuous and discrete time signals.
5. What is the necessary and sufficient condition for stability.
6. Explain the time reversal of a sequence in DFT.
7. Give the difference between the DTFT and DFT.
8. Discuss, how a signal is reconstructed from sampled signals.
9. What are eigen functions.
10. What is the need of multirate signal processing.

PART - B

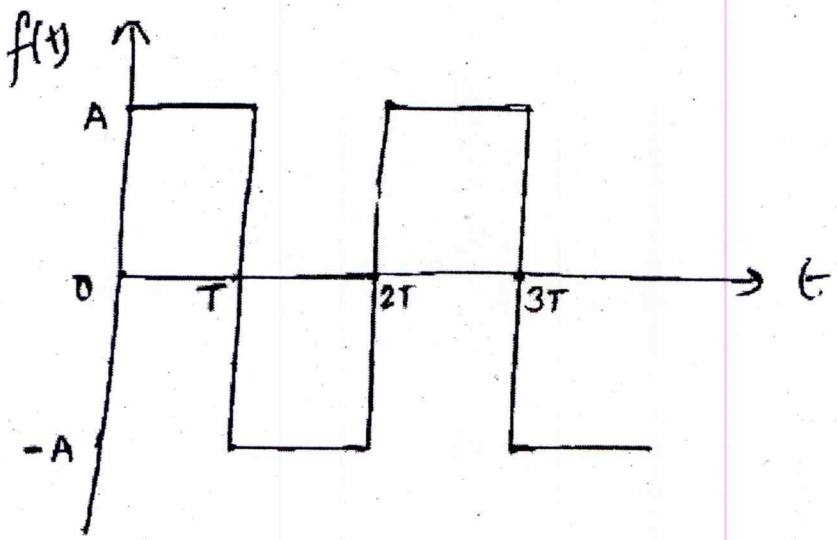
(word limit 100) **(5×4=20)**

1. a) Explain parseval's identity for fourier series.
   b) Explain linearity and additivity property.
2. Define the ROC for Z transform. List out all properties of ROC for the same.

3. Determine the casual sequence x(n) for X(z) given by -

$$\left[X(z)=\frac{1+2z^{-1}}{1-2z^{-1}+4z^{-2}}\right]$$

4. Find the laplace transform of the periodic rectangular waveform shown in figure.



5. a) Find the DTFT of the following finite duration sequence of length L

$$x(n)=\begin{cases}A, & \text{for } 0\le n\le L-1\\ 0, & \text{otherwise}\end{cases}$$

b) Also find the inverse DTFT to verify x(n) for L = 3 and A = 1V.

PART - C

(Any three) **(3×10=30)**

1. a) Explain the working of an Interpolator. **(5)**

b) What is zero - order hold and first order hold system. **(5)**

2. i) Check whether the following systems are linear and time invariant. **(6)**

a) $F[x(n)]=n[x(n)]^2$.

b) $F[x(n)]=a[x(n)]^2+bx(n)$.

ii) Determine H(z) and its poles and zeros if **(4)**

$$y(n)+\frac{3}{4}y(n-1)+\frac{1}{8}y(n-2)=x(n)+x(n-1)$$

3. Determine the frequency response, magnitude response, phase response and time delay of the system given by -

$$\left[y(n)+\frac{1}{2}y(n-1)=x(n)-x(n-1)\right].$$ **(10)**

4. a) Find the four point DFT of the sequence $x(n)=\cos\frac{n\pi}{4}$. (7)

b) Find the N point DFT for $x(n) = a^n$ for $0<a<1$. (3)

5. a) Find $x(n)$ of $\left[X(z)=\frac{1+\frac{1}{2}z^{-1}}{1-\frac{1}{2}z^{-1}}\right]$. (5)

b) Discuss the term Aliasing and its effect on sampling. (5)

3E1224

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3E1224

B.Tech. III Sem. (Main) Examination, April/May - 2022
Electronic Inst. & Control Engineering
3EI4-06 Network Theory
EC, EI

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**. All **five** questions from **Part B** and **three** questions out of **Five** questions from **Part C**.*

Schematic diagrams must be shown wherever necessary. Any data missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

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

PART - A

(word limit 25) **(10×2=20)**

1. Define apparent power.
2. What do you mean by power factor?
3. Write the statement of norton's Theorem.
4. Define Active and passive element.
5. What are the lumped and distributed network?
6. Explain the Jerm Filter.
7. Define :
   a) Node.
   b) Mesh.
8. Find laplace transport of u(t) signal.
9. Define two post network.
10. Write expression for fourier representation.

PART - B

(word limit 100) **(5×4=20)**

1. Using mesh analysis, obtain the current through the 10 V battery for the circuit shown - fig. (1).

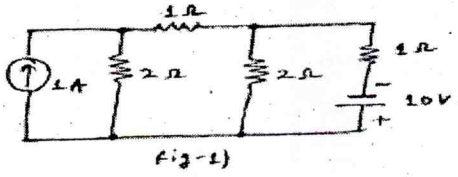

Fig-1)

2. In the circuit (Fig. - 2). Find the current through r_1.

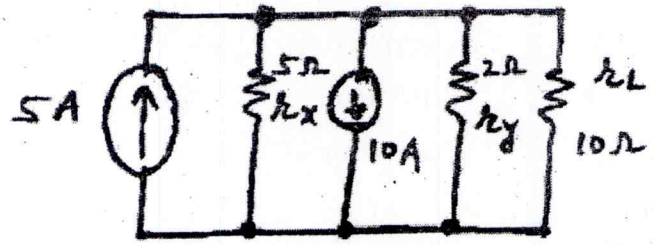

Fig-2)

3. Find the current in 3 Ω resistor for the circuit (Fig. - 3).

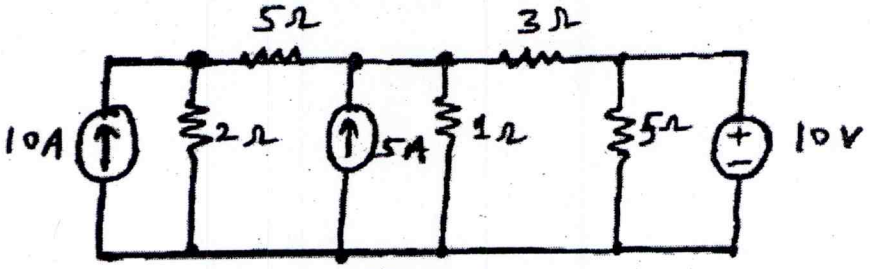

Fig-3)

4. **Write the properties of Resonance of RLC series circuit.**

5. **In a series R-L-C circuit R = 5 Ω, L = 1 H and C = 1 F. A d.c. voltage of 20 V is applied at t = 0. obtain i(t).**

PART - C

(Any three - analytical type) **(3×10=30)**

1. **In fig - 4, with switch open, steady state is reached with V = 100 sin 314 t volts. The switch is closed at t = 0. The circuit is allowed to come steady state again. Determine the steady state current and complete solution of transient current.**

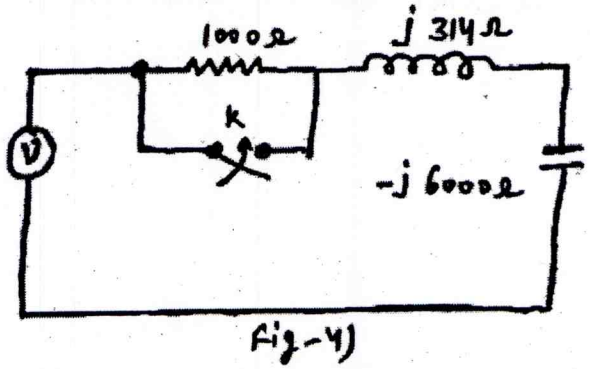

Fig-4)

2. For circuit shown in fig - 5, Find the current from r_1 [V_1 = 12 V, r_1 = 4 Ω, I = 3A, r_2 = 2 Ω, V_2 = 24 V].

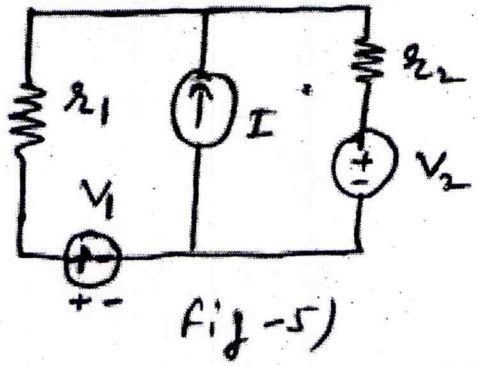

Fig-5)

3. A series RLC circuit has R = 1.5 Ω × X_c = 5 Ω and the inductance is impure having it's resistance of 3 Ω and inductive reactance of 1 Ω. Find the input impedance and the circuit current. Calculate the frequency of resonance. The supply is 100 V, 50 Hz.

4. Two networks have been shown in Fig - 6, Obtain the transmission parameters of the resulting circuit when both the circuits are in cas cade.

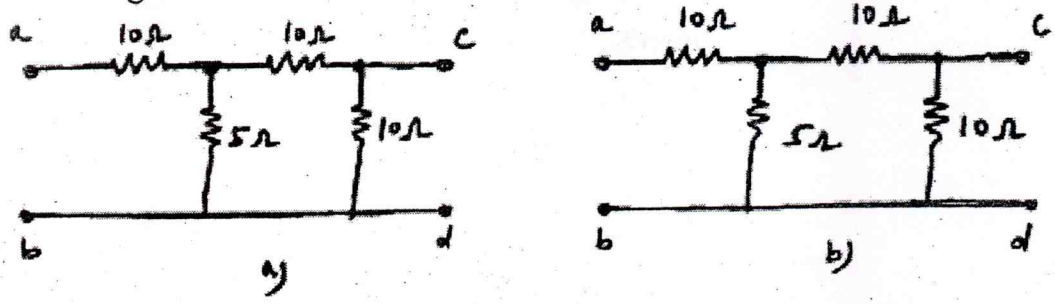

Fig - 6)

5. The driving point impedance of an LC network is given by -

$$Z(s) = \frac{10(s^2+4)(s^2+16)}{s(s^2+9)}$$

obtain the first form of faster network.

3E1223

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3E1223

B.Tech. III Sem. (Main) Examination, April / May - 2022
Electronic Inst. & Control Engineering
3EI4-07 Electronic Devices
EC, EI

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

*Attempt all ten questions from **Part A**. All **five** questions from **Part B** and **three** questions out of **Five** questions from **Part C**.*

Schematic diagrams must be shown wherever necessary. Any data missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(As Mentioned in form No. 205)

PART - A

(word limit 25) **(10×2=20)**

1. Define drift current?
2. State what is energy band gap?
3. Explain phenomena of drift?
4. Define acceptor doping?
5. Explain recombination?
6. Define reverse saturation current levels?
7. Define mobility and conductivity?
8. Define schotty diode?
9. Define solar cell?
10. Describe Oxidation in IC fabrication?

PART - B

(word limit 100) **(5×4=20)**

1. A sample of Ge is doped of 10^4 donor atoms/cm^3 and 5×10^{13} acceptor atom/cm^3 at 300K. The resistivity of intrinsic Ge is 60-2-cm. If the applied electric field is 2V/Cm, find the total conduction current density Assume $u_p / u_n = ½$ and $n_i = 2.5\times10^{13} / cm^3$ at 300 K.

2. What is mass action for the carrier concentration.
3. Write a short note on LED.
4. Explain etching process.
5. Discuss energy band in intrinsic and extrinsic silicon.

PART - C

(Any three) **(3×10=30)**

1. Briefly explain twin - tub CMOS process?
2. Write a short note on
   a. chemical vapor deposition.
   b. Sputtering.
3. Write a brief note on Ebers - Moll mode?
4. Discuss
   a. Avalanche breakdown.
   b. Zener diode.
5. Draw and explain the construction and operations of enhancement MOSFET?

No. _____ [Total No. of Pages : 7

3E1149

B.Tech. III Sem. (Back) Examination, April/May - 2022
PCC Electronics & Comm. Engineering
3EC4-06 Network Theory
Common for EC, EI

Time : 3 Hours **Maximum Marks : 160**
Min. Passing Marks : 56

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** questions from **Part B** and **Four** questions out of **Five** questions from **Part C**.*

Schematic diagrams must be shown wherever necessary. Any data you feel missing may 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)

PART - A

All questions are **compulsory** **(10×3=30)**

1. What is the difference between loop and mesh?
2. State superposition theorem.
3. Define Y - parameters.
4. Write down the Kirchhoff's laws.
5. Define impedance and admittance.
6. Explain active and reactive powers.
7. Draw the pole - zero plot of the network function given as $F(s)=\frac{s-a}{(s-b_1)(s+b_2)}$ where, a, b_1, b_2 are positive constants.
8. Define Transfer Impedance function with reference to a two port network.

9. Define Bandwidth and quality factor with reference to filters.

10. State Maximum Power Transfer theorem.

PART - B

Attempt any **five** questions **(5×10=50)**

1. Define h-parameters. Determine the h - parameters for the network shown in fig 1. **(3+7=10)**

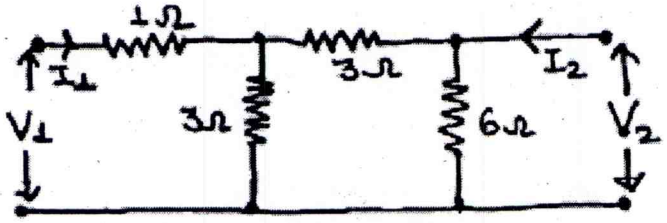

fig. 1

2. Find the currents i_1, i_2 and i_3 and power delivered by the sources of the network shown in fig.2 **(10)**

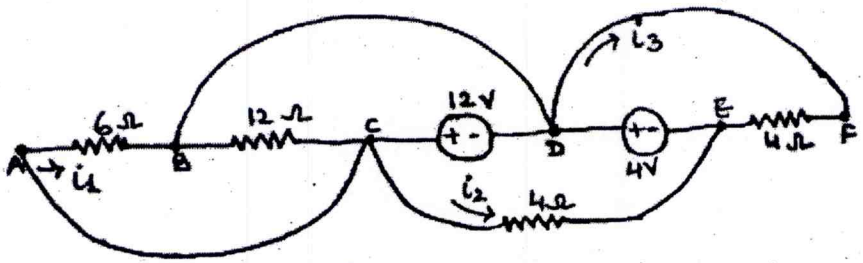

fig 2.

3. State Therenin's theorem. In the circuit of Fig 3, Obtain the thevenin's equivalent circuit across x - y. **(3+7=10)**

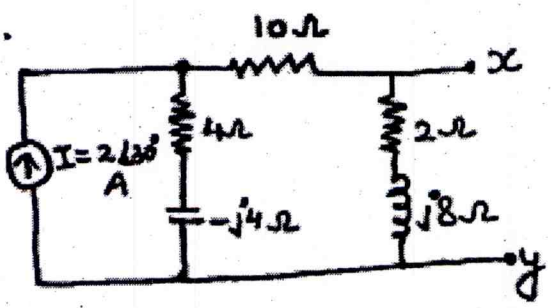

fig 3.

4. Find the fourier Transform of the single triangular pulse shown in fig. 4 and draw the continuous spectra. **(6+4=10)**

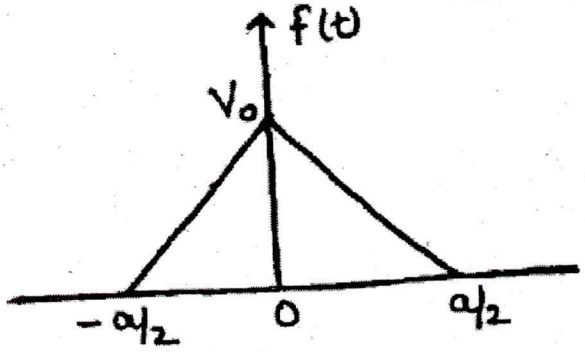

fig 4

5. A Sinusoidal voltage 25 sin 10t is applied at time t = 0 to a circuit as shown in fig5. Find the current i(t) by Laplace transform method. R = 5Ω and L = 1H. **(10)**

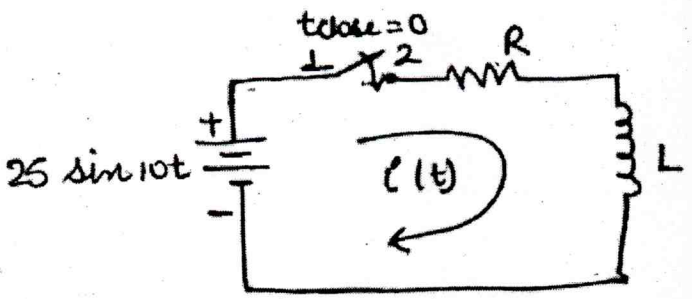

fig 5.

6. Determine the voltage transfer Ratio $\frac{V_2(s)}{V_1(s)}$ of the networks shown in fig 6(a) and 6(b). **(5+5=10)**

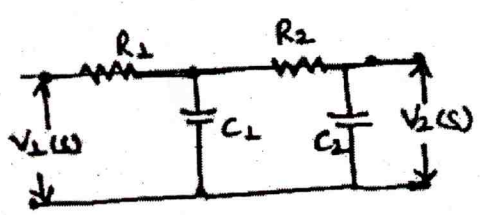

fig. 6(a)

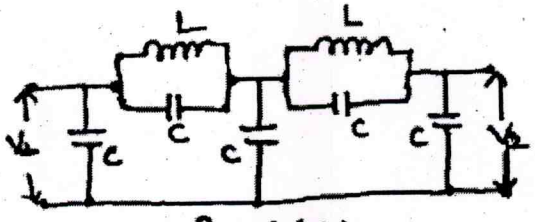

fig. 6(b).

7. Using superposition theorem, calculate the current through the $(2+j3)\Omega$ impedance branch of the circuit shown in Fig. 7. **(10)**

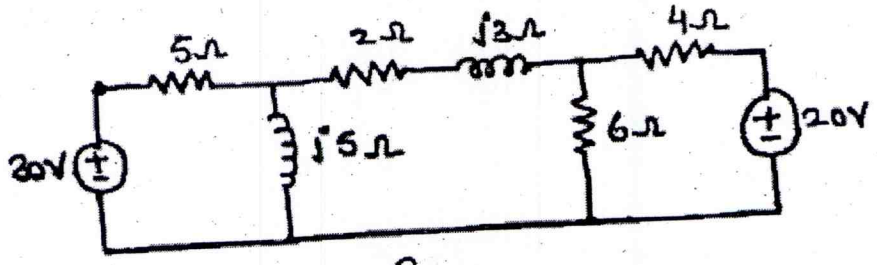

fig: 7

PART - C

Attempt any **Four** questions **(4×20=80)**

1. a. Explain the concept of Duality. Draw the dual of the network shown. in fig. 8(a). **(10)**

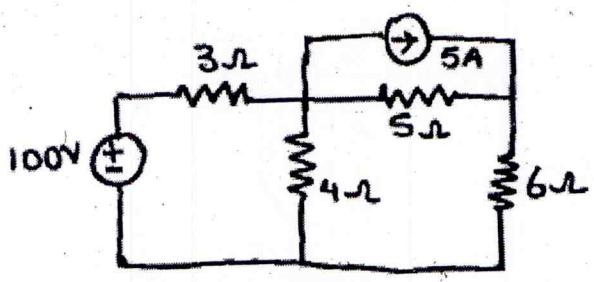

fig 8(a)

b. Determine the current I and I_1 in the circuit shown in fig 8(b) by using nodal analysis. **(10)**

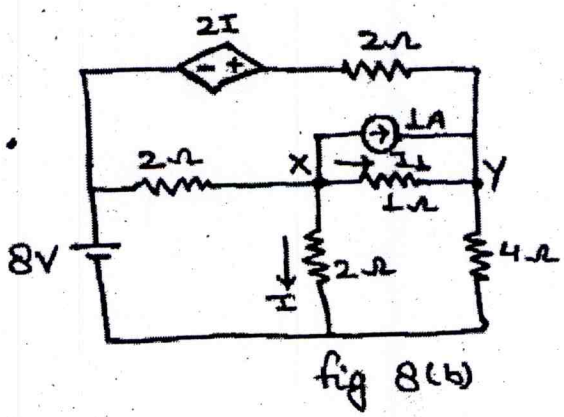

fig 8(b)

2. a. Determine the current through the $R_L = 10\ \Omega$ resistor shown in fig 9(a) using the thevenin's theorem. Verify it by Norton's theorem. **(10)**

b. Find the value of R_L for which maximum power will be transfered to it. Also determine the maximum power transfer. **(10)**

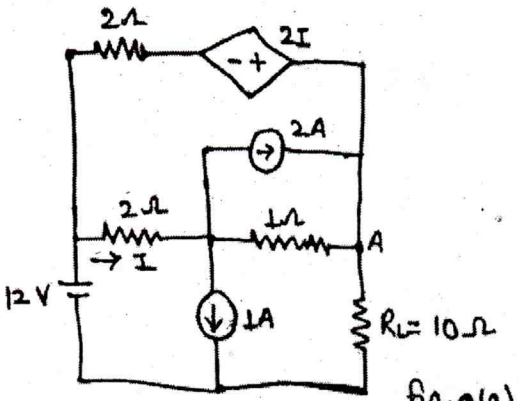

fig. 9(a)

3. a. In the circuit shown in Fig. 10 (a) if $v(t) = (20 \cos 5t + 30\cos 10t)\ u(t)$, where u(t) is the unit - step function. Find i(t). Assume that circuit was initially relaxed. **(10)**

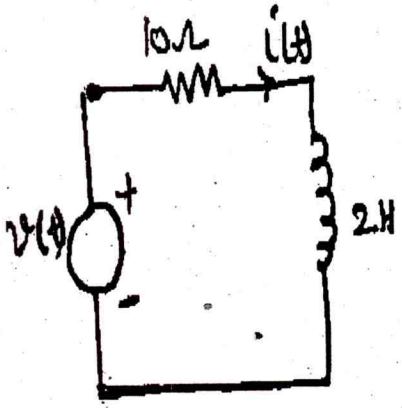

fig 10 (a)

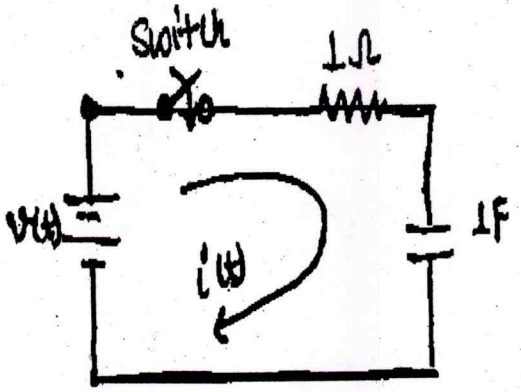

fig 10 (b).

b. Find the current i(t) for the circuit shown in fig 10(b) if the voltage source is $v(t) = 5e^{-2t}u(t)$ and $v_c(0^-) = 0$. **(10)**

4. a. The output of a rectifier is given by the equation

$$v(t) = \begin{cases} V_m Coswt & 0 \le wt \le \pi/2 \\ 0 & \pi/2 \le wt \le 3\pi/2 \\ V_m Coswt & 3\pi/2 \le wt \le 2\pi \end{cases}$$

Determine the trigonometric form of Fourier series of v(t). **(10)**

b. Find the Fourier series of the function whose periodic waveform is shown in fig. 11(a) and plot its frequency spectra. **(10)**

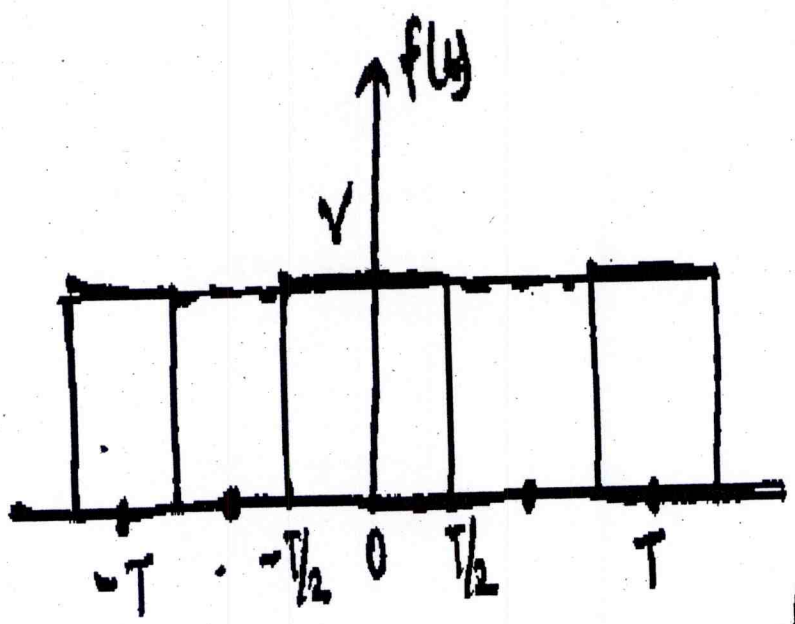

fig 11 (a)

5. a. Write down the driving - point impedance Z(s) of the network shown in fig. 12. Locate the poles and zeros of Z(s) on the S-plane. **(12)**

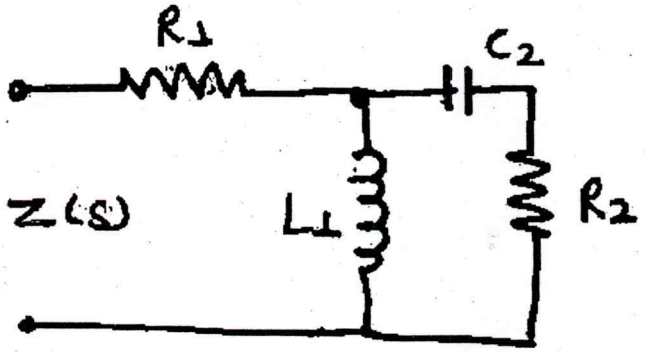

fig 12

b. Write a short note of filters and its types. **(8)**

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Roll No. _____ [Total No. of Pages : 4

3E1150

B.Tech. III Sem. (Back) Examination, April/May - 2022
PCC Electronics & Communication Engineering
3EC4-07 Electronics Devices
EC, EI

Time : 3 Hours **Maximum Marks : 160**
Min. Passing Marks : 56

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** questions from **Part B** and **Four** questions out of **Five** questions from **Part C**.*

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)

PART - A

(Answer should be given up to 25 words only)

All questions are **compulsory** **(10×3=30)**

1. Draw V-I characteristics of schottky diode.
2. Draw the resistance variation with temperature of a Thermistor.
3. Draw the symbol of Enhancement mode MOSFET.
4. Write the name of two compound semiconductor.
5. Calculate the value of collector current (Ic) if emitter current $I_{\epsilon} = 10MA$ and current gain factor $\beta = 100$ assume BJT is in common base (CB) and reverse saturation current I_{CD} = 100 nA.
6. Find the photon wavelength (λ) emit by a LED whose bandgap is 1.24 eV.
7. Write continuity equation for a sample which is isolated and irradiated by photons.
8. Write the sequence of oxidation, diffusion and deposition process when a PN diode fabricated.
9. A semiconductor sample has no hole and electron equal = $10^{10}/cm^3$. If it is doped with $10^{15}/cm^3$ Boron. then find the no.of electron in it.
10. Write one difference between zener and avalanche breakdown.

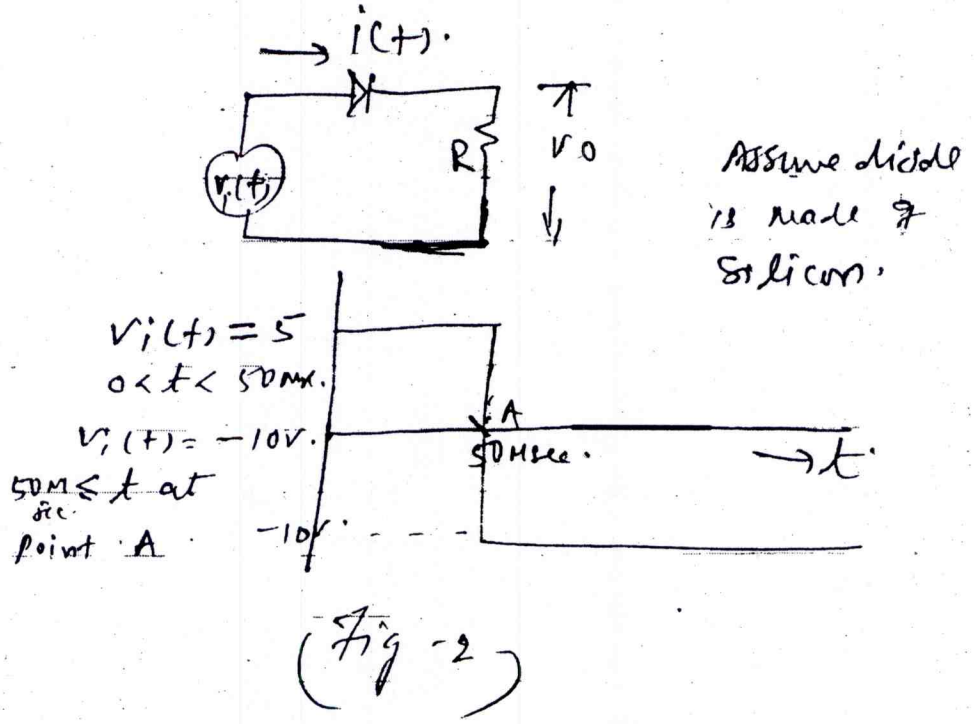
PART - B

(Analytical/Problem solving questions)

Attempt any **five** questions **(5×10=50)**

1. A n-type sample has $10^{18}/cm^3$ electron and instrisic carrier concentration ni = $10^{12}/cm^3$. Then find its conductivity assume the electron mobility $\mu_n = 1200\frac{cm^2}{v-sec}$ and hole mobility is $600\frac{cm^2}{v-sec}$.

2. Draw the voltage and current waveform in following diode circuit. (fig-2).



(Fig-2)

3. Draw the I_{as}/V_{as} characteristic of a MOSFET at different vgs voltage. Define the Pincholt and saturation region in it.

4. Find their is point in fig - 4

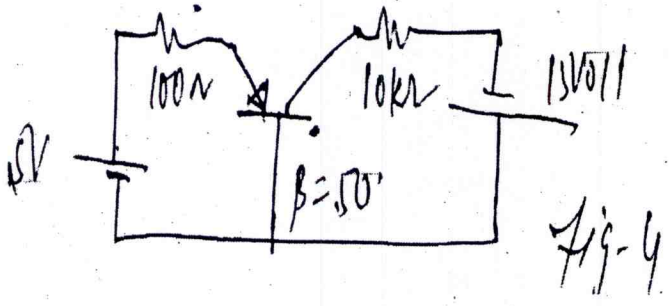


Fig-4

Here is point mean (I^C, I_E, V_{CB}).

5. Draw all fabrication steps to obtain a PNP transistor.

6. Define generation and recombination rate and calculate their values in following sample.

   i) n-type sample $N_D = 1.5\times10^{18}/cm^3$ $ni = 1.5\times10^{10}/cm^3$ average life of hole $\tau_p = 0.8\times10^{-6}$ sec. electron $\tau_n = 2\times10^{-6}$ sec.

   ii) p-type sample $N_A = 2\times10^{12}/cm^3$, ni = $1.5\times10^{10}/cm^3$, $\tau_n = \tau_p = 10^{-6}$ sec.

7. Draw small signal model of MOSFET and explain its all component.

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any **Four** questions **(4×20=80)**

1. Compare following :

   i) Direct and indirect semiconductor.

   ii) Degenerate and non degenerate semiconductor.

   iii) Elemental and compound semiconductor.

   iv) Sensistor and thermistor.

2. i) Draw E-K diagram and explain its use in valance and conduction band.

   ii) How band gap/forbidden band is shown in E-K diagram.

3. Design a zener voltage regulator that provide constant voltage of 12volt across a load $R_L = 10k\Omega$ from a uncontrolled voltage source whose voltage vary between 10-15 volt Assume the maximum current rating of a 12 volt zener is 20 mA.

4. Find I_B,I_C,I_E and V_{CE} in the silicon BJT circuit shown in fig (4C)

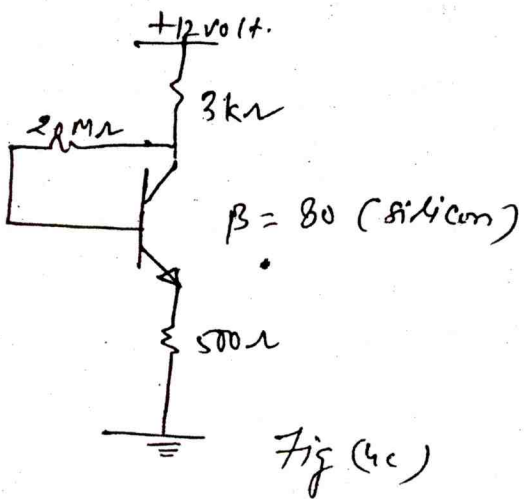


Fig (4c)

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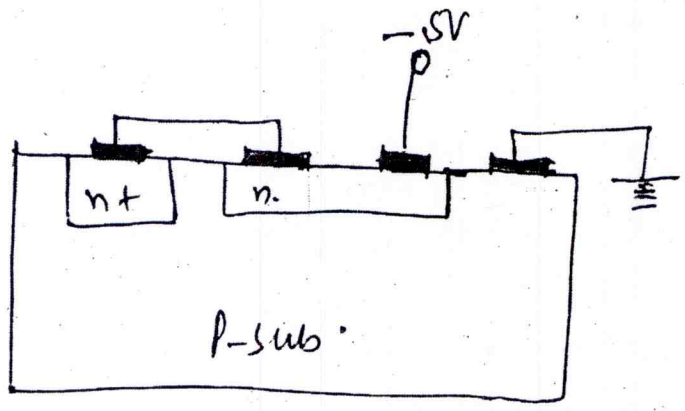
5. Draw the electrical equivalent circuit from the fabricated structure shown in fig - 5C.



(Fig - 5C).

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3E1616

3E1616

B.Tech. III Sem. (Old Back) Examination, April/May - 2022
Applied Elect. & Inst. Engg.
3AI1 Mathematics III / Advanced Engg. 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.

(Mention in form No.205)

1. a) Find the Laplace transform of $Sin\sqrt{t}$. Hence deduce $L\left[\frac{\cos\sqrt{t}}{\sqrt{t}}\right]=\left(\frac{\pi}{s}\right)^{1/2}e^{-\frac{1}{4s}}$. **(8)**

b) Solve the differential equation $\frac{d^2x}{dt^2}+\frac{dx}{dt}=2$, given that x=3 at t=0 and $\frac{dx}{dt}=L$ at t=0. **(8)**

(OR)

1. a) Apply convolution theorem to evaluate $L^{-1}\left[\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right]$ **(8)**

b) Solve the problem $\frac{\partial u}{\partial t}=\frac{\partial^2 u}{\partial x^2}$, $u(x,0)=3\sin 2\pi x$ $u(0,t)=0, u(1,t)=0$ where $0<x<1, t>0$. **(8)**

2. a) Obtain the Fourier series for the function $f(x)=x^2, -\pi<x<\pi$ **(8)**

b) Obtain the constant term and the coefficient of the first sine and cosine terms in the Fourier series that represents y as- **(8)**

x	0	1.0	2.0	3.0	4.0	5.0
y	9	18	24	28	26	20

(OR)

2. a) Find the Half range cosine series for the function $f(x)=x$ in $0<x<2$. **(8)**

b) Using convolution theorem, evaluate $Z^{-1}\left[\frac{z^2}{(z-1)(z-3)}\right]$ **(8)**

3. a) Find the Fourier sine transform of - $f(x)=\begin{cases} x & for \quad 0<x\leq 1 \\ 2-z & for \quad 1<x<2 \\ 0 & for \quad x\geq 2 \end{cases}$ **(8)**

b) Obtain the Fourier transform of

$f(x)=1,\ |x|\leq a$

$= \ 0 \ , |x|>a$

Also evaluate $\int_{-\infty}^{\infty}\frac{\sin\lambda a\cos\lambda s}{\lambda}d\lambda$ **(8)**

(OR)

3. a) Express the function

$f(x)=1,\ |x|\leq 1$

$= \ 0 \ , |x|>1$ as a Fourier integral. Hence evaluate $\int_0^{\infty}\frac{\sin\lambda\cos\lambda x}{\lambda}d\lambda$ **(8)**

b) Using Fourier transform, show that the solution of the partial differential equation $\frac{\partial^2 u}{\partial t^2}=c^2\frac{\partial^2 u}{\partial x^2}$, $-\infty<x<\infty$, $t\geq 0$, subject to conditions: **(8)**

i) $u=f(x)$, when t = 0

ii) $\frac{\partial u}{\partial t}=0$, when t = 0.

iii) Assume that $u(x,t)$ & $\frac{\partial u}{\partial x}$ both tends to zero as $x\to\pm\infty$ can be written in the form $u(x,t)=\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty}\overline{F}(s)\cos(cst)e^{-iS}d$

4. a) Show the function $u=e^x(x\cos y-y\sin y)$ is harmonic and find its conjugate. **(8)**

b) Find the bilinear transformation which maps the points $Z=\infty,i,0$ into the points $w=0,i,\infty$ **(8)**

(OR)

4. a) Evaluate the integral $\oint_c \frac{\cos \pi z^2}{(z-1)(z-2)} dz$ where C is the circle $|Z| = 3$. **(8)**

b) Find the value of the integral $\int_0^{1+c} (x - y + ix^2) dz$. Along the straight line from $z = 0$ *to* $z = 1 + i$ **(8)**

5. a) Expand $\frac{1}{(z-1)(z-2)}$ in Laurent's series for

i) $|z| < 1$ ii) $1 < |z| < 2$ iii) $|z| > 2$ **(8)**

b) Evaluate the integral $\int_c \frac{z^2 dz}{(z-1)^2 (z-2)}$ in the region $C : |z| = 2.5$ **(8)**

(OR)

5. a) Find the poles and Residue for the functions

i) $f(z) = \frac{z+2}{(z+1)^2 (z-2)}$ **(4)**

ii) $f(z) = \frac{(1-2z)}{z(1-z)(z-2)}$ **(4)**

b) Evaluate $\int_0^{2\pi} \frac{d\theta}{5 + 4\sin\theta}$ **(8)**

3E1641

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3E1641

B.Tech. III Sem. (Old Back) Examination, April / May - 2022
Applied Elect. & Inst. Engg.
3AI2 Electronic Devices & Circuits
EC, EIC, EE, EX, AI, BM

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

Min. Passing Marks : 26

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)

UNIT - I

1. a) Define and explain following terms :

i. Mobility and conductivity.

ii. Fermi dirac distribution. **(8)**

b) Find the magnitude of Hall voltage V_H in an n-type germanium bar having majority carrier concentration $N_D = 10^{17}/Cm^3$. Assume $B_Z = 0.1$ Wb/m^2, d = 3mm and $\epsilon_x = 5V/cm$ as shown in Figure - 1. **(8)**

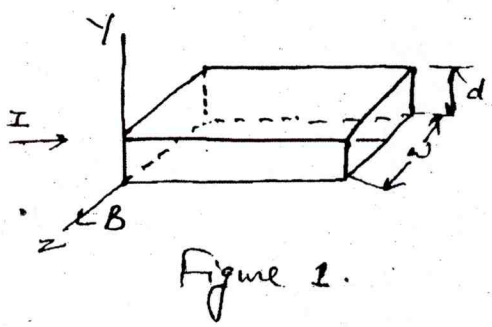

Figure 1.

(OR)

1. a) Write a brief note on continuity equation. **(8)**

b) The Hall effect is used to determine the mobility of holes in a P-type silicon bar used in Figure 1. Assume bar resistivity 200,000 Ω - cm, the magnetic field $B_Z = 0.1$ Wb/m^2 and d = w = 3mm. The measured value of current and Hall voltage are 10 μA and 50 mV respectively. Find hole mobility (μ_p). (8)

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UNIT - II

2. a) Draw the output of following circuits. Assume diodes are ideal in figure 2 and Figure 3. Input voltage $(v_i) = 40 \sin wt$. **(10)**

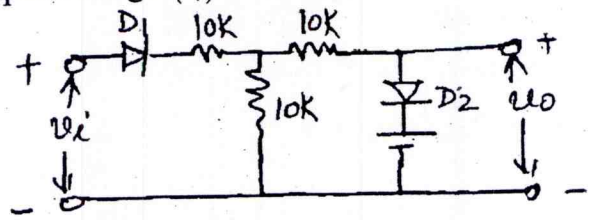

Figure 2.

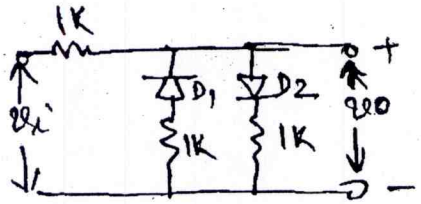

Figure 3

b) What is voltage multiplier? What is fundamental limitation of voltage multiplier compared to step up transformer. **(6)**

(OR)

2. a) What do you understand by clamping circuit? Explain with neat diagram the action of. **(8)**

i. Positive clamping.

ii. Negative clamping.

b) Find output waveform for the circuit shown in figure 4. Assume diode is ideal. **(8)**

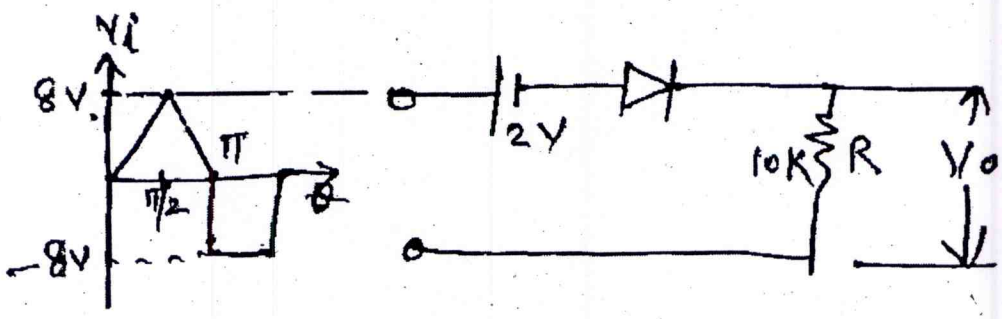

Figure - 4

UNIT - III

3. a) What is base width modulation? How it affects the output characteristics of a CE amplifier? **(6)**

b) Find the transistor currents in circuit of figure 5. A silicon transistor with $\beta = 100$ and $I_{CO} = 20$ nA is under consideration. **(10)**

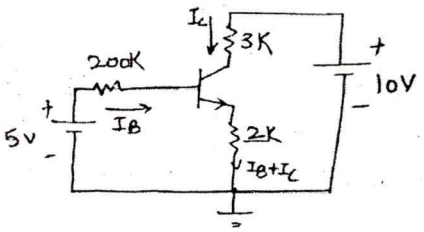

Figure - 5

(OR)

3. a) Draw the circuit of transistor in common base configuration and sketch the output characteristics also indicate the cut off, active and saturation region. **(8)**

b) For the circuit shown in Figure 6, $\alpha_1 = 0.98$, $\alpha_2 = 0.96$, $V_{cc} = 24$ V, $R_C = 120\ \Omega$ and $I_E = -100$ mA. Neglect the reverse saturation currents determine

a. the currents I_C, I_B, I_E, I_{C2}, I_{B2}, and I_C.

b. V_{CE}.

c. I_C/I_B, I_C/I_E. **(8)**

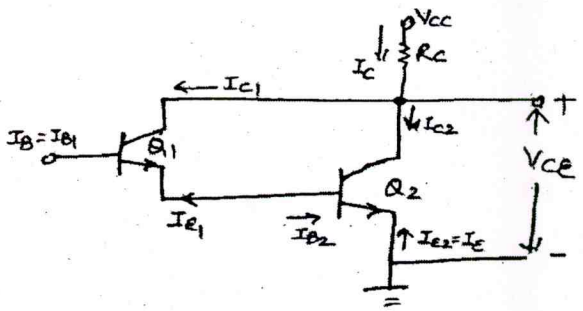

Figure - 6

UNIT - IV

4. a) How the MOSFET can be used as constant current source? Explain in detail. **(6)**

b) Show that the trans conductance g_m of a JFET is related to drain currents I_{DS} by $g_m = \frac{2}{|V_P|}\sqrt{I_{DSS} I_{DS}}$ Also plot g_m versus I_{DS} if $V_P = -4$V and I_{DSS} - 4mA. **(10)**

(OR)

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4. a) State the advantage of FET over BJT. **(6)**

b) The amplifier of Figure 7 utilizes an n - channel FET for which $V_p = -2.0$ V and $I_{DSS} = 1.65$ mA. It is desired to bias the circuit at $I_D = 0.8$ mA using $V_{DD} = 24$ V. Assume $rd >> R_d$. Find (a) V_{as} (b) g_m (c) R_S (d) R_d such that the voltage gain is at least 20 dB, with R_S by passed with a very large capacitance C_S. **(10)**

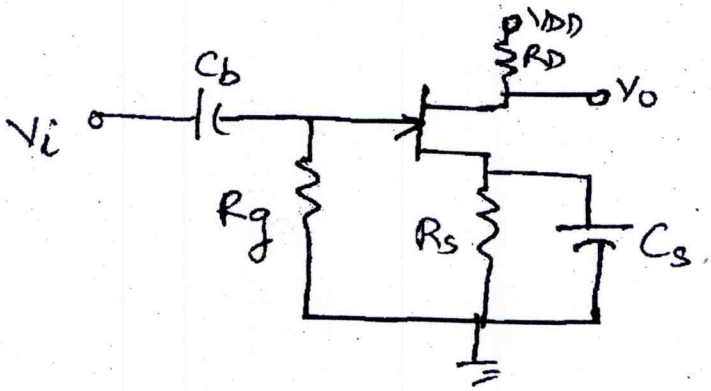

Figure - 7

UNIT - V

5. Write short note on following (any **two**) **(16)**

i. Cascode amplifier.

ii. RC coupled amplifier.

iii. Darlington pair

iv. Differential amplifier.

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3E1653

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3E1653

B.Tech. III Sem. (Old Back) Examination, April / May - 2022
Applied Elect. And Inst. Engg.
3AI4 Digital Electronics
EE, EX, EC, EI, CS, IT, 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 from No.205)

UNIT - I

1. a) Convert the following :

i. $(AB6)_{16}$ to Decimal

ii. $(26453)_{10}$ into octal

iii. $(ABCD)_{16}$ into Binary.

iv. $(236.88)_{8}$ into Hexadecimal. **(8)**

b) Write the various types of codes used in digital circuits. **(8)**

(OR)

1. a) Simplify the following expressions using basic laws of Boolean algebra :

i. $Y = AB + \overline{AC} + A\overline{B}C(AB + C)$.

ii. $Y = (AB + \overline{C}) + (\overline{A + B + C})$. **(8)**

b) With the help of neat diagram explain

i. AND gate.

ii. OR gate.

iii. EX-OR gate.

iv. NAND gate. **(8)**

UNIT - II

2. a) Draw and explain diagram of I^2L logic in detail. **(8)**

   b) Write short note on MOSFET. **(8)**

(OR)

2. a) Explain in detail TTL working. Also give the advantages and characteristics of TTL. **(10)**

   b) Write short note on MOS. **(6)**

UNIT - III

3. a) Minimize and Draw K-map for the following Boolean functions :

   i. $y = \sum m(0,1,2,8,9).d(4,10,12)$.

   ii. $y = \sum m(2,5,6,8,12,13,14) + d(3,9)$. **(4+4=8)**

   b) Minimize the following using Quine - Mccluskey method : $y = \sum(0,1,2,6,7)$ and important the funtion using appropriate gates. **(8)**

(OR)

3. a) Simplify the following boolean function using tabulation method.

   $F = \sum m(0, 1, 2, 8, 10, 11, 14, 15).d(9, 12)$. **(10)**

   b) Simplify the expression and implement with NAND gate ckt.

   $G = BD + BC\overline{D} + \overline{ABCD}$. **(6)**

UNIT - IV

4. a) Design a 4 bit Binary to Gray code converter and draw the logic digram. **(10)**

   b) Implement the following logic function using an 8×1 MUX. **(6)**

(OR)

4. a) Design a 4 bit Binary to BCD code converter. **(10)**

   b) Write short note on 'Demultiplexers'. **(6)**

UNIT - V

5. Draw and explain :

   i. J-K flip flop.

   ii. D flip flop. **(16)**

(OR)

5. a) Draw a synchronous Modulo - 10 counter and explain its working. **(10)**

   b) Draw a state diagram and logic diagram of T flip flop. **(6)**
