3E1641

Roll No. _____ Total No. of Pages : 7

3E1641

B. Tech. (Sem. III) (Main/Back) Examination, December - 2017
Applied Elect. & Inst. Engg.
3AI2 Electronic Devices & Circuits (EC, EIC, EE, EX, AI, BM)

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

Min. Passing Marks : 26

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

1 (a) What is the position of the fermi level in an intrinsic semiconductor ? How does its position change when :
(i) donor and
(ii) acceptors are added to the semiconductor ?

5

(b) A sample of Ge is doped to the extent of 10^{14} donor atoms/cm^3 and 5×10^{13} acceptor atoms/cm^3 at 300 K, the resistivity of intrinsic Ge is $60\,\Omega - cm$. If the applied electric field is 2 V/cm, find the total conduction current density. Assume $\mu_p/\mu_n = 1/2$ and $n_i = 2.5 \times 10^{13}/cm^3$ at 300 K.

8

(c) What is mass action for the carrier concentration ?

3

OR

1 (a) What are "Hall effect" and "Hall field" ? Explain briefly the physical origin of the Hall effect.

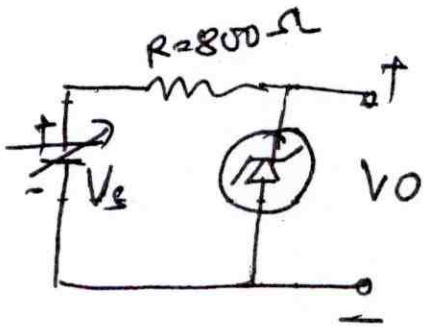
8

(b) A rectangular semiconductor specimen, 2 mm wide and 1 mm thick, gives a Hall coefficient of 10^{-2} m^3/c. When a current of 1 mA is passed through the sample, a Hall voltage of 1 mV is developed find the magnetic field and the Hall field.

8

UNIT - II

2 (a) In the circuit of figure the Zener diode is non ideal, having a knee voltage $V_{zo} = 9V$ and a dynamic resistance $r_z = 5\Omega$. If the supply voltage V_s varies from 15 to 30V, determine the range of variation of the output voltage V_o, also comment on the result.



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(b) (i) What is unijunction transistor ? Give the equivalent circuit.

(ii) Draw and explain its current voltage characteristics.

8

OR

2 (a) The voltage waveform v_i of Figure (a) is applied to the input of the circuit of Figure (b). Show the output voltage V_o waveform and mark the voltage levels.

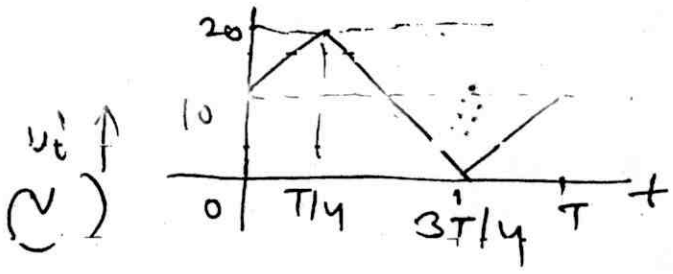


Figure (a)

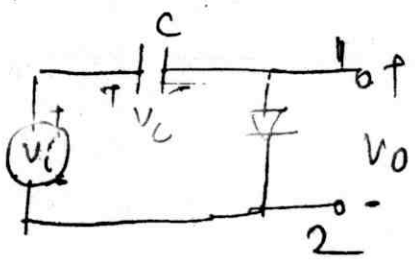


Figure (b)

Find the PIV of the diode, assumed to be ideal.

8

(b) Draw the circuit diagram of a fullwave voltage doubler and explain its operation, how can we construct a voltage trippler ?

8

UNIT - III

3 (a) Draw the circuit diagram of an emitter follower. Why it is called an emitter follower ? Obtain expression for the current gain, input resistance voltage gain and output resistance.

12

(b) A transistor is operating in the CE mode calculate V_{CE} if $\beta = 125$, $V_{BE} = 0.6\ V$.

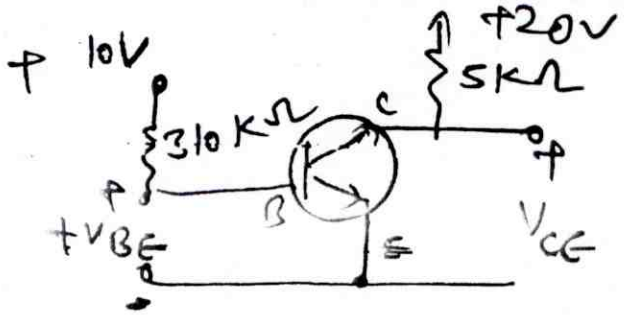
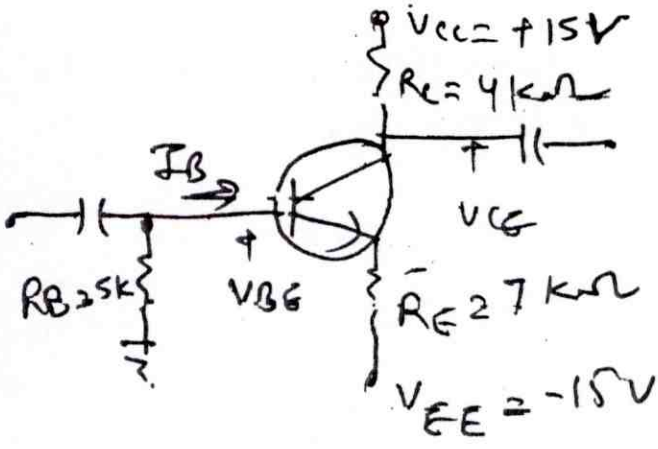


Figure 3(b)

4

OR

3 (a) In the circuit of figure shown below, $\beta = 99$ and $V_{BE} = 0.7V$. Calculate the quiescent values of I_B, I_C, I_E and V_{CE}. If β is increases by 20% what is the corresponding change in I_C ?



$R_B = 5k\Omega$, $R_E = 7k\Omega$
$R_C = 4k\Omega$.
$V_{CC} = +15\ V$
$V_{EE} = -15\ V$

9

(b) Draw and label the low frequency h-equivalent of CE amplifier and obtain voltage gain.

7

UNIT - IV

4 (a) Derive an expression for the small signal voltage gain of a common source FET amplifier.

8

(b) A n-channel JFET has I_{DSS} = 12 mA and Pinch off voltage V_P = –4V. Find the drain current for V_{GS} = –2V. If the transconductance g_{mo} of a JFET with the same I_{DSS} at V_{GS} = 0 is 4 millimho, find the pinch off voltage.

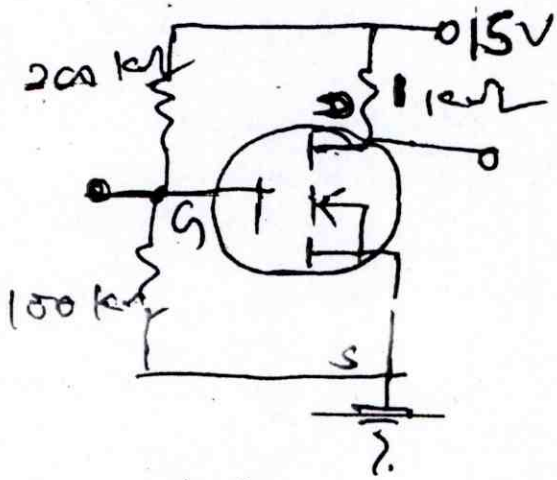
8

OR

4 (a) Sketch the structure of n-channel depletion type MOSFET. Explain how the depletion region is produced in the channel. Can a depletion MOSFET work in the enhancement mode ?

8

(b) An n-channel enhancement mode MOSFET, biased as shown in Fig. operates in the active region. The given parameters are $V_T = 2V$ and $K = 0.5\ mA/V^2$. Calculate I_D, V_{GS} and V_{DS} verify that the operation is indeed in the active region.



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UNIT - V

5 (a) An RC coupled amplifier employs two identical transistors, each having $h_{fe} = 100$, $h_{ie} = 2k\Omega$ and $C_{of} = 2PF$. The coupling capacitor has a capacitance $C = 0.4\ \mu F$. The load resistance for each transistor is $R_L = 8\ k\Omega$. The wiring capacitance $C_W = 10$ PF, calculate the lower and upper half power frequencies.

8

(b) Obtain an expression for the voltage gain of an R-C coupled amplifier in the mid, low and high frequency ranges.

8

OR

5 (a) Draw the circuit diagram of a common source n channel JFET amplifier. Discuss its small signal operation. 10

(b) What is the Darlington connection, compare between an emitter follower and a darlington pair ? 6

3E1652-1612

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3E1652-1612

B. Tech. (Sem. III) (Main / Back) Examination, December - 2017

Computer Sc. & Engineering

3CS2A Data Structures and Algorithms

CS, IT, EX, EC, EI

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

Min. Passing Marks : 26

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 materials is permitted during examination. (Mentioned in form No. 205)

1. Nil 2. Nil

UNIT - I

1 (a) Define algorithm. What do you understand by best, worst and average case analysis of an algorithm. 8

(b) Using suitable example explain row major and column major form of array. 8

OR

1 (a) Explain the difficulties in estimating exact execution time of Algorithms. 8

(b) Explain Asymptotic notations : Big-Oh, theta, Omega using suitable example. 8

UNIT - II

2 (a) Define the concept of recursion using stack using suitable examples. What are the difficulties in dealing with infix expression ? 8

(b) Convert following expressions in its equivalent postfix expressions.

(i) $A*(B+C*D)+E$

(ii) $A*B\hat{}C+D$ 8

OR

2 (a) Explain tower of Hanoi problem. Explain using suitable diagram and example. 8

(b) Explain transposition of sparse matrices with algorithms of varying complexity. 8

UNIT - III

3 (a) Compare binary search and sequential search. 8

(b) Using suitable diagram explain the concept of Head Node in linked lists. 8

OR

3 (a) Write the algorithm for insertion and deletion in doubly and circularly connected linear linked lists. 8

(b) Write down the following polynomial.

$3x^4 - 2x^2 + 9x - 11$ by a linked list. 8

UNIT - IV

4 (a) Define the concept of balanced trees. Write pseudo code for insertion into and deletion from AVL tree. **8**

(b) Define the different applications of trees for representation of sets. **8**

OR

4 (a) Define the following binary tree
(i) Complete binary tree.
(ii) Strictly binary tree. **8**

(b) Write an algorithm for inorder travesal of a threaded binary tree. **8**

UNIT - V

5 (a) Compare Internal sorting and External sorting. **8**

(b) By taking suitable example explain the principle of operation of heap sort. **8**

(c) Prove that Heap sort, Merge sort and Quick sort takes $\Omega(n \log n)$ tie in the worst case. **8**

OR

5 Write short notes on following :
(a) DFS traversal Algorithms **8**

(b) Comparison of sorting Algorithms in terms of time complexity. **8**

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3E1653

B. Tech. (Sem. III) (Main/Back) Examination, December - 2017
Electronics & Communication Engg.
3EC3A Digital Electronics

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 26

*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

1 (a) Find the 11's complement of following numbers :

(i) $(935)_{12}$ (ii) $(267)_{12}$ **6**

(b) X and Y are successive digits in positional number system and $(XY)_r = (25)_{10}$ and $(YX)_r = (31)_{10}$. Determine the value of X, Y and r. **6**

(c) A register contains 2's complement 10010110. What will be the contain of register if it is divided by 2.

4

OR

1 (a) Consider the signed binary number are $A = 01000110$ and $B = 11010011$ where B is in 2's complement form. Find the value of following Mathematical expression :

(i) $A + B$

(ii) $A - B$

(iii) $B - A$

(iv) $-A - B$

8

(b) Why the gray code is also known as reflected code ? Write a brief note on gray code and its applications.

8

UNIT - II

2 (a) What do you understand by following properties of logic family :

(i) Fan out

(ii) Figure of merit

(iii) Noise margin

(iv) Current mode logic.

8

(b) Find the output boolean function (Y) in terms of A and B as shown in **Fig. 1**.

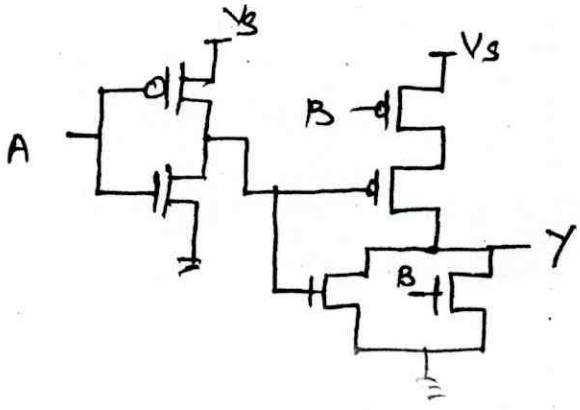


Fig. 1

8

OR

2 (a) A boolean function is implemented using NMOS logic family and shown in **Fig. 2**. How the output Y can be made 0 if C and D both values are 0. Also find implemented boolean function.

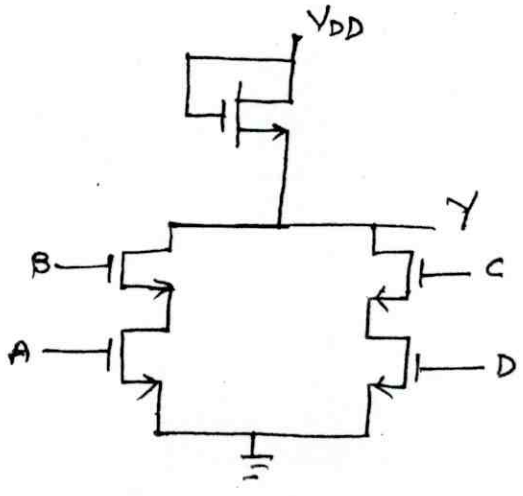


Fig. 2

8

(b) State the advantage of using totem pole output type TTL over open collector output TTL. Also explain the tristate output logic type TTL.

8

UNIT - III

3 (a) Simplify the following boolean function using tabulation method :

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

10

(b) Simplify the following boolean function using K-map :

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

6

OR

3 (a) The logic gate G_1 and G_2 as shown in **Fig. 3** have propagation delay of 10 ns and 20 ns respectively. If input v_i makes an abrupt change from logic-0 to logic-1 at time $t = t_0$, then draw output waveform (V_0).

ns → nano second.

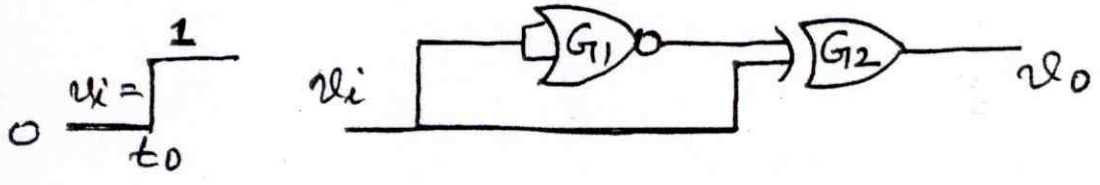


Fig. 3

8

(b) Minimize the following boolean function using K-map :

$f(a, b, c, d) = \sum m(0, 1, 2, 8, 9) \cdot d(4, 10, 12)$

8

UNIT - IV

4 (a) How many 3 : 8 line decoder with enable input are required to construct 6 : 64 line decoder without using any other logic ? Draw its block diagram also. 8

(b) Find the boolean function implemented by 4 : 1 mux as shown in **Fig. 4**.

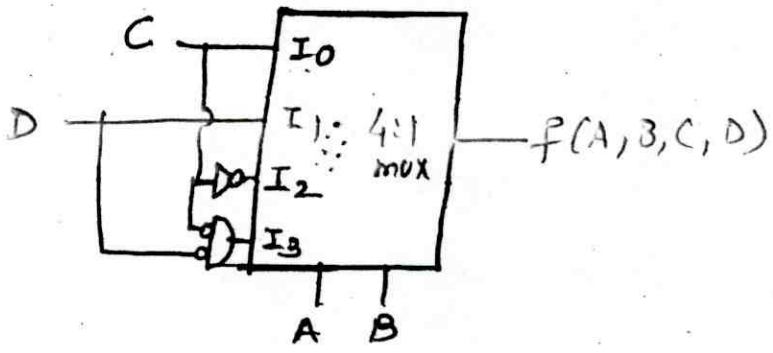


Fig. 4

8

OR

4 (a) Implement a full subtractor using two 4 : 1 multiplexer. 8

(b) Find the output of following decoder circuit as shown in **Fig. 5**.

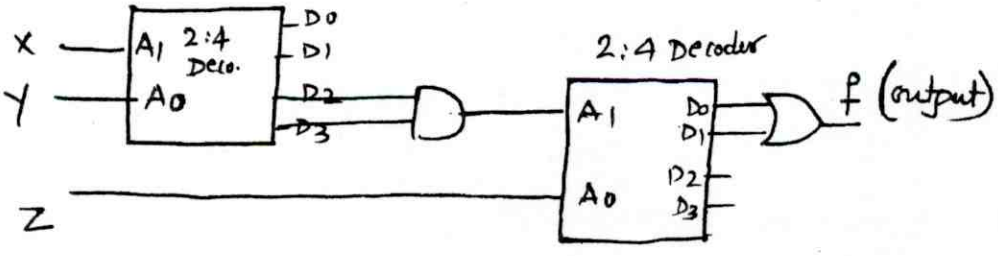


Fig. 5

4

(c) Find the output of 4 : 1 multiplexer as shown in **Fig. 6**.

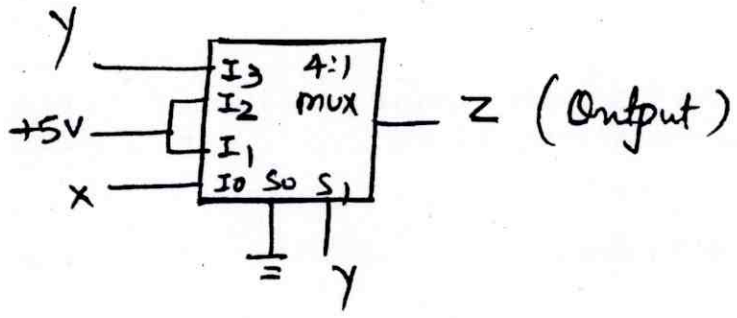


Fig. 6

4

UNIT - V

5 (a) State the difference between latch and flip flop.

4

(b) Explain the truth table, circuit diagram and working of universal flip flop.

4

(c) What are the counting states (Q_1, Q_0) for the circuit using D - flip flop as shown in **Fig. 7** ?

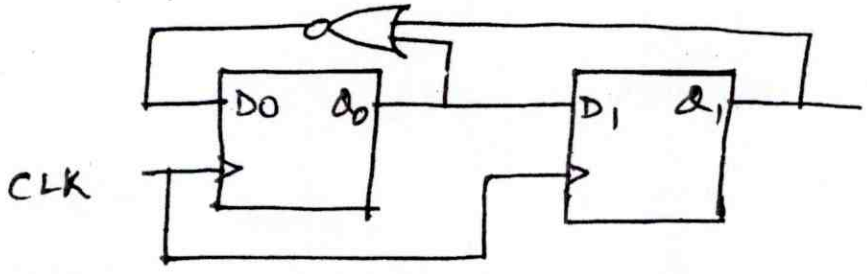


Fig. 7

Assume initial state (Q_1, Q_0) is 00.

8

OR

94

5 (a) Explain the procedure for conversion of JK flip flop to RS flip flop. **5**

(b) What is race around condition ? How it can be avoided ? **5**

(c) Design a binary counter with following binary sequence using D - flip flop : 0, 1, 3, 2, 6, 4, 5, 7 and repeat. **6**

3E1614

Roll No. : _____ Total Printed Pages : 8

3E1614

B. Tech. (Sem. III) (Main/Back) Examination, December 2017
Electronics & Communication Engg.
3EC4A Circuit Analysis & Synthesis

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 26

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

1 (a) Find the norton equivalent current in amperes with respect to the terminal P and Q is in **fig. 1**.

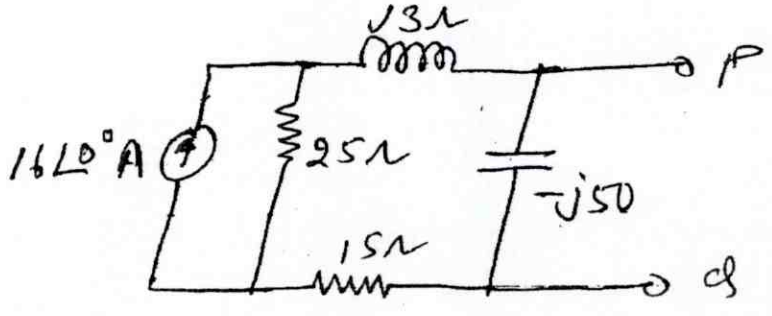


Fig. 1

5

(b) Find the total current in 10 Ω resistor in **fig. 2** using superposition theorem.

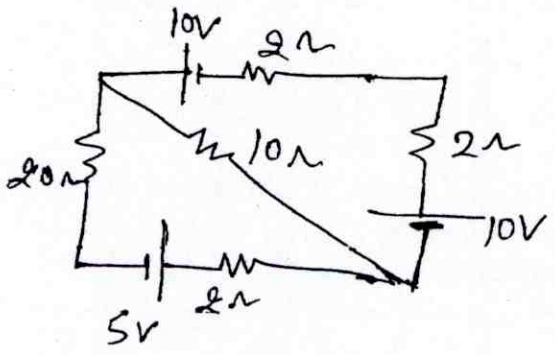


Fig.2

5

(c) Define following and explain :

(i) Reciprocity condition in network

(ii) Coupling coefficient between two mutually coupled coils.

3+3=6

OR

1 (a) Find the current I in **fig. 3** flowing through the 2 Ω resistor using superposition theorem.

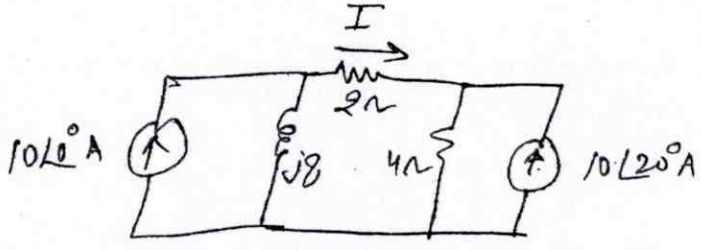


Fig. 3

8

(b) State maximum power transfer theorem and find the maximum power that can flow in load Z_L in **fig. 4**.

1 theorem.

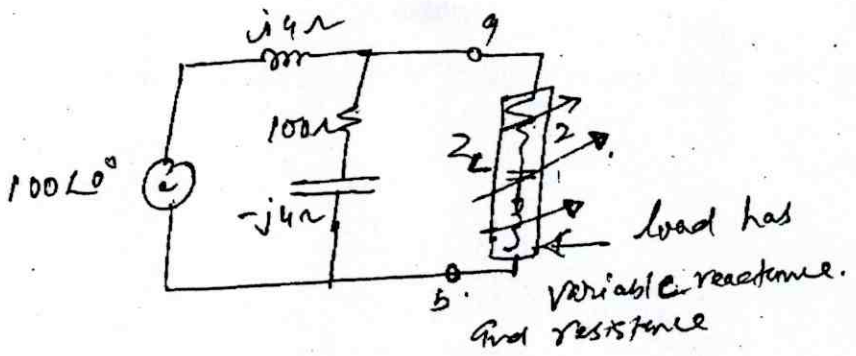
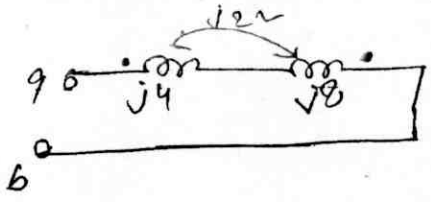


Fig. 4

5

(c) Find the equivalent inductance in **fig. 5**. Assume the frequency is f = 50 Hz.

5



3+3=6

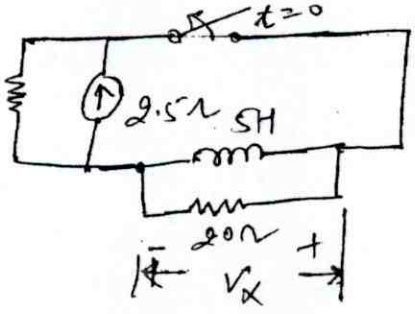
Fig. 5

3

stor using

UNIT - II

2 (a) In **fig. 6** the switch was closed for a long time before opening at t = 0. Find the voltage V_X at (i) $t = 0^+$ and $t = \infty$.



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power that

Fig. 6

4+4=8

(b) Transform the following network shown in **fig. 7** and find. $I(s), V_c(s)$ and $V_L(S)$.

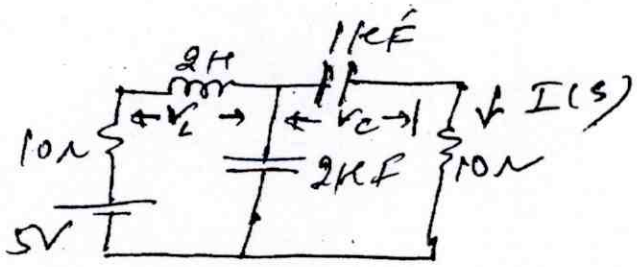

Fig. 7

4+2+2=8

OR

2 (a) Find $V(s)$ for the voltage waveform shown in **fig. 8**.

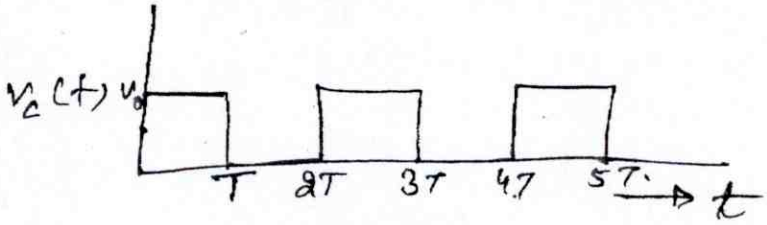

Fig. 8

6

(b) Find the step response in **fig. 9**.

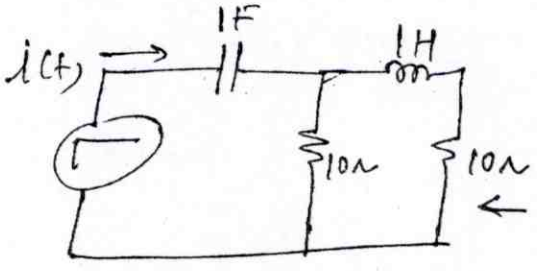

Fig. 9

6

(c) Define the initial and final value condition across an inductor and capacitor.

2+2=4

UNIT - III

3 (a) Write the restrictions on pole zero location for immittance functions. Check whether following polynomical are Hurwitz or not :

(i) $2(s) = 20s^3 + 4s^2 + 9s + 4$

(ii) $Y(s) = 1 + s + s^2 + s^3$.

2+2+2=6

(b) Find $Z_{11}(s)$ and $Z_{12}(s)$ in network shown in fig. 10.

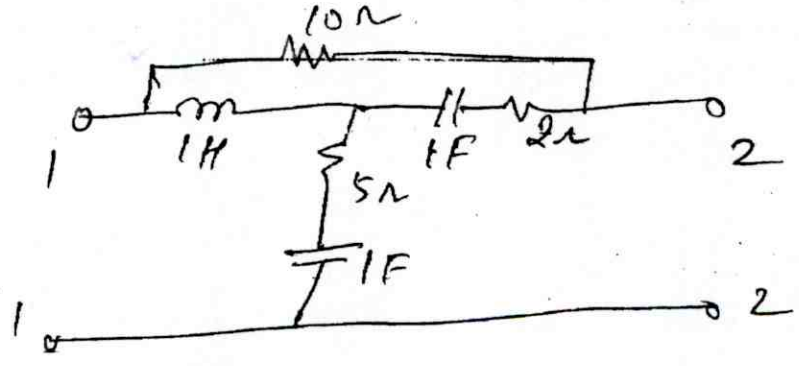

Fig. 10

4+4=8

(c) Write any two property of positive real functions.

2

OR

3 (a) Check whether following functions are positive real or not :

(i) $Y(s) = \dfrac{1+s^2}{s^3+4s^2+2s+1}$

(ii) $Z(s) = 4s^4 + 2s^2 + 2.$

3+3=6

(b) Determine $Y_{21}(s)$ and $Z_{12}(s)$ for the network shown in **fig. 11**.

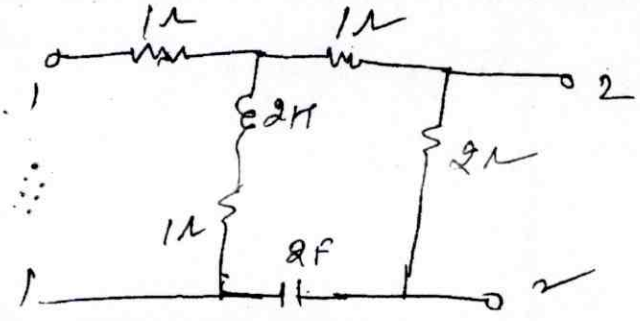

Fig. 11

4

4+4=8

(c) Draw the pole-zero diagram of $H(s) = \dfrac{s^2+s+1}{s^3+2s^2+2s+1}$.

2

UNIT - IV

4 (a) Find the Y-parameter in network shown in **fig. 12**.

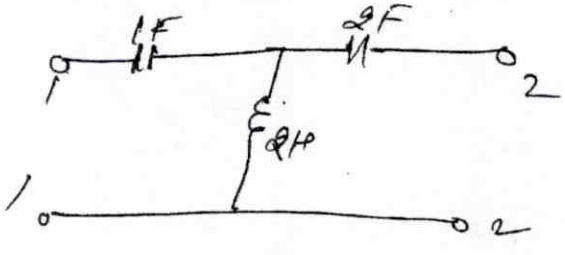

Fig. 12

(b)

(c)

6

(b) Convert following Z-parameter in Hybrid parameter.

$$Z = \begin{bmatrix} 10 & 1+2j \\ -4j & 5+4j \end{bmatrix}$$

6

(c) Write the condition of symmetry and reciprocal network for Z-parameter and Y-parameter.

2+2=4

OR

4 (a) Find the h-parameter for the network shown in fig. 13.

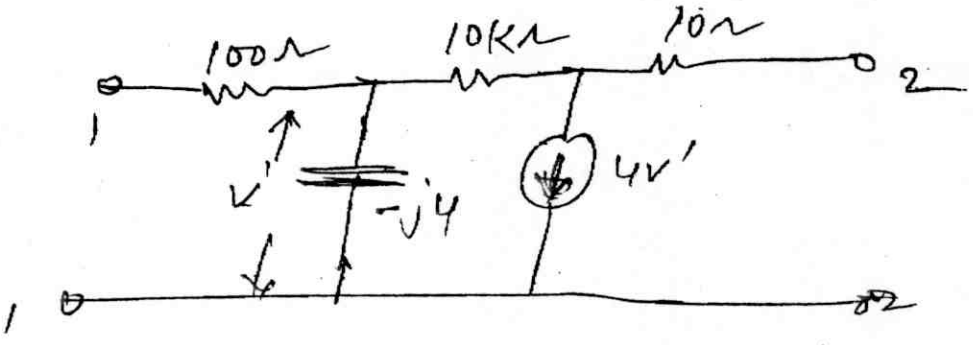

Fig. 13

8

(b) Convert the given h-parameter in equivalent y-parameter

$$h = \begin{bmatrix} 100\Omega & 40 \\ 10^{-3} & 0.0\mho \end{bmatrix}$$

6

(c) Define image impedance of a two port network.

6

2

UNIT - V

5 (a) Realize the Foster and Cauer form network for

(i) $Z(s) = \dfrac{s^4 + 4s^3 + 3}{s^3 + 25}$ and

(ii) $Z(s) = \dfrac{4 + 5s + s^2}{6 + 5s + s^2}$.

4+4=8

(b) Draw the general pole zero diagram of a LC network.

4

(c) Write all steps of realize a RC network for driving point impedance.

4

OR

5 (a) Realize the first and II Cauer form for

$$Z(s) = \frac{6s^3 + 8s^2 + 4s + 4}{6s^2 + 8s + 1}.$$

8

(b) Write all realizability condition of

(i) LC network and

(ii) RC network.

4+4=8

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3E1615

B. Tech. (Sem. III) (Main/Back) Examination, December - 2017
Electronics & Communication Engg.
3EC5A Electromagnetic Properties of Materials

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 26

*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

1 (a) Draw the variation of relative dielectric constant of a solid sample having its molecules permanent dipole moment with temperature. Explain the behaviour (i) when the sample change from solid to melt and (ii) sample changes from liquid to vapour. **2+2+2=6**

(b) Explain the ferroelectric behaviour of $BaTiO_3$ with the help of its cubic structure. **4**

(c) An atom of polarizability α is placed in a homogeneous field E. Show that the energy stored in the polarized atom is equal to $\frac{1}{2}\alpha E^2$. **6**

OR

1 (a) A solid containing N identical atoms per m^3 having polarizability $\alpha\left(farad\ m^2\right)$. Assuming a Lorentz internal field derive the Clausius - Mosotti relation.

6

(b) What is condition of a sample to show Piezoelectricity ? Give two examples of such material and write their applications.

2+2+2=6

(c) Define dielectric loss and find its expression in terms of loss Tangent. How this phenomena is used in Microwave Oven ?

4

UNIT - II

2 (a) Write the relation between B, H and M for a magnetic material. Find the flux density and Magnetization of a copper sample when the magnetic field strength is 10^6 Amp/Meter. Assume susceptibility of copper is -0.5×10^{-5}.

2+6=8

(b) Define following :

(i) Neel temperature

(ii) Curie temperature

(iii) Coercive force

(iv) Spontaneous magnetization.

4×2=8

OR

2 (a) Derive the relation

$\chi_A = \dfrac{C}{T+\theta_N}$ for an antiferromagnetic material.

6

(b) Write two applications of following in technology :

(i) Ferrites

(ii) Fe_2O_3

(iii) Cobalt and Nickel.

3×2=6

(c) Define giant magnetostriction resistor (GMR) and write its potential application.

4

UNIT - III

3 (a) How the Bandgap modify in following conditions ?

(i) Silicon is doped with Boron.

(ii) x is change in $\underset{x}{Ga}\ \underset{1-x}{As}$ from $x = 0$ to $x = 1$.

(iii) Temperature decreases from room temperature to $0°K$ in a thermistor.

3×2=6

(b) If an *n*-type semiconductor is doped with Boron, then how its conductivity changes with Boron density ? Explain the variation.

4

(c) If the temperature coefficient of an oxide material is $\alpha = -0.8 \times 10^2/°C$ then find its resistance at $T = 500°C$. Assume the $R_0 = 10\ k\Omega$ at $T = 300°C$.

6

OR

3 (a) Write the difference between :

(i) n-type and p-type semiconductor

(ii) Thermistor and Sensistor

(iii) Compound and Element semiconductor.

3×2=6

(b) Compare Si, GaAs and SiC in terms of their Bandgap. Also write their potential applications.

6

(c) Why indirect Bandgap materials are not suitable in light emitting diode (LED) ? Also write the name of any material useful in LED.

4

UNIT - IV

4 (a) Explain the theory of superconductor in detail, which explain the phenomena of high temperature super conductor.

8

(b) How Mattheissen rule used for determine the total resistance of a sample ? If intrinsic conductivity of Ni and Mn is $10^4\ \Omega/m$ and $10^{-2}\ \Omega/m$. Then find the net conductivity of a sample $Ni_x Mn_{1-x}$ when (i) $x = 0.5$ and (ii) $x = 0.8$.

2+3+3=8

OR

4 (a) How Type-I and Type-II superconductor behave in presence of external magnetic field ? Also discuss their response with temperature.

6

(b) Define Persistent and Critical current for a superconductor.

2×2=4

(c) For a specimen of V_3Ga,, the critical fields are respectively $1.4\times10^5\ A/m$ and $4.2\times10^5\ Amp/m$ for $14°K$ and $13°K$. Calculate the transition temperature and critical fields at $0°K$ and $4.2°K$.

3+3=6

UNIT - V

5 Write short notes on any two :

(i) Quantum Dots

(ii) CNT

(iii) Bandgap of Nanomaterial

(iv) Quantum Wire

(v) Fabrication of Nanomaterial.

8×2=16

3E1616

Roll No. _____ Total No. of Pages : 4

3E1616

B. Tech. (Sem. III) (Main/Back) Examination, December 2017

Applied Elect. & Inst. Engg.

3AI1 Mathematics III (EC, EIC, BM, AI, CR, PE, PC)

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

Min. Passing Marks : 26

*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 materials is permitted during examination. (Mentioned in form No. 205)

1. Nil 2. Nil

UNIT - I

1 (a) Find Laplace transform of the function $\sin\sqrt{x}$ and hence or otherwise obtain Laplace transform of $\frac{\cos\sqrt{x}}{\sqrt{x}}$. **8**

(b) Find the inverse Laplace transform of $\log\sqrt{1+\frac{9}{s^2}}$. **8**

OR

1 (a) Use Laplace transform theory to solve the following equation :

$\left(D^2+1\right)y = x\cos x$, where $y=0$, $\frac{dy}{dx}=0$ at $x=0$. **8**

(b) State and prove convolution theorem for Laplace transform. **8**

UNIT - II

2 (a) Obtain the Fourier series of the function $f(x) = x - x^2$, $-\pi < x \leq \pi$ and deduce that

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

8

(b) In the Z transform, show that $Z\left\{n^p\right\} = -z\frac{d}{dz}Z\left\{n^{p-1}\right\}$, and hence evaluate $Z\left\{n^3\right\}$.

8

OR

2 (a) If $f(x) = \begin{cases} x & 0 \leq x \leq \pi/2 \\ \pi - x, & \pi/2 < x \leq \pi \end{cases}$, then find half range cosine series of $f(x)$.

8

(b) Using convolution theorem, find the inverse Z transform of $\frac{z^2}{\left(z^2 - 4z + 3\right)}$.

8

UNIT - III

3 (a) Find the Fourier transform of $f(x) = \begin{cases} 1 - x^2, & |x| < 1 \\ 0, & |x| > 1 \end{cases}$. Hence evaluate the integral $\int_0^\infty \frac{x\cos x - \sin x}{x^3}\cos\frac{x}{2}\,dx$.

8

(b) Using Fourier transform, find the solution of the initial boundary value problem.

$$\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}, \; -\infty < x < \infty, \; t > 0$$

$u(x, 0) = f(x)$, $u(x, t)$ is finite as $x \to \pm\infty$.

8

OR

3 (a) Find the Fourier sine and cosine transform of the function x^{m-1}.

8

(b) Find $f(x)$, if its Fourier sine transform is, $\frac{p}{(1+p)^2}$.

8

UNIT - IV

4 (a) If $f(z) = u + iv$ is an analytic function of $z = x + i\,y$ and

$u - v = \frac{\cos x + \sin x - e^{-y}}{2\cos x - e^{y} - e^{-y}}$ then, find u and v and the corresponding analytic function $f(z)$.

6

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

6

(b) Prove that $\int_C \frac{dz}{(z-a)} = 2\pi i$, where C is given by the equation $|z - a| = R$.

4

OR

4 (a) Show that the function $f(z) = u + iv$, where

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

is not analytic at the origin although Cauchy Riemann equations are satisfied at the origin.

6

(b) Evaluate the integral $\int_C \frac{e^{2z}\,dz}{(z+a)^4}$, where C is the circle $|z| = 3$. **6**

(c) Show that function $u = \cos x \cosh y$ is harmonic and find its harmonic conjugate. **4**

UNIT - V

5 (a) Expand $f(z) = \frac{1}{(z-1)(z-3)}$ in the power of z which are valid for regions:

(i) $|z| < 1$

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

(iii) $|z| > 3$ **8**

(b) Use method of contour integration to prove that

$$\int_0^{2\pi} \frac{d\theta}{1 + a^2 - 2a\cos\theta} = \frac{2\pi}{1 - a^2};\ 0 < a < 1.$$ **8**

OR

5 (a) Find the residues of $\frac{z^2}{(z-1)(z-2)(z-3)}$ at $z = 1, 2, 3$ and ∞, and show that their sum is zero. **8**

(b) Use method of contour integration to evaluate $\int_0^{\infty} \frac{\cos mx}{a^2 + x^2}\,dx$. **8**

3E1472

Roll No. _____ Total No. of Pages : 3

3E1472

B. Tech. (Sem. III) (Back) Examination, December - 2017
Electronic Ins. & Control Engg.
3EI5(O) Electrical Technology

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 26

*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

1 (a) Explain types of dc generators in detail. **8**

(b) Explain parallel operation of dc generator. **8**

OR

1 (a) A 440V, shunt motor has armature resistance of .8 Ω and field resistance of 200 Ω. Determine the back emf when giving an output of 7.46 kW at 85% efficiency. **8**

(b) Explain various methods of speed control of DC shunt motors. **8**

UNIT - II

2 (a) Describe general principle of induction motor and its construction. **8**

(b) Define cogging and crawling in detail. **8**

OR

2 (a) A $3-\phi$ induction motor having a star connected rotor has an induced emf of 80 volts between slip rings at stand still on open circuit. The rotor has a resistance and reactance per phase of $1\,\Omega$ and $4\,\Omega$ respectively. Calculate current/phase and power factor when (a) slip rings are short circuited (b) slip rings are connected to a star-connected rheostate of $3\,\Omega$ per phase. **8**

(b) Write short note on starting methods of single phase induction motor. **8**

UNIT - III

3 (a) Explain principle of operation of $3-\phi$ synchronous motor. **8**

(b) Explain zero power factor characteristics of synchronous motor. **8**

OR

3 (a) Explain OC and SC Test in synchronous machine. **8**

(b) A 75 kW, $3-\phi$, Y connected, 50 Hz, 440 V cylindrical rotor synchronous motor operates at rated condition with .8 p.f. leading. The motor efficiency excluding field and stator losses is 95% and $X_S = 2.5\,\Omega$, calculate :

(i) Mechanical power developed
(ii) Armature current
(iii) Back emf
(iv) Power angle
(v) Maximum or pull out torque of the motor.

8

UNIT - IV

4 (a) Draw and explain general layout of a power system network. 8

(b) Give a brief description of the main components of power supply system. 8

OR

4 (a) Describe in detail the phenomena of interface of power lines with telecommunication circuit. 8

(b) Describe briefly the types of insulators for transmission line. 8

UNIT - V

5 (a) What are the advantages of static relays over electromagnetic relay ? 8

(b) Explain static relay. What are the limitations of static relay. 8

OR

5 (a) Describe basic types of fault and its causes in an electrical power system. 8

(b) Explain static IDMT over current relay, giving a neat block diagram. 8

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3E1494

Roll No. : _____

Total Printed Pages : 3

3E1494

B. Tech. (Sem. III) (Main/Back) Examination, December - 2017
Bio Medical Engg.
3BM4 Electronic Measurement & Instrumentation

Time : 3 Hours] **[Maximum Marks : 80**
[Min. Passing Marks : 26

*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 materials is permitted during examination. (Mentioned in form No. 205)

1. Nil 2. Nil

UNIT - I

1 Write a short note on static errors. **8**

2 A voltmeter having a sensitivity of 1kΩ/V is connected across an unknown resistance in series with a milliammeter reading 80V on 150V scale. When the milliammeter reads 10 mA, calculate the (i) Apparent resistance of the unknown resistance (ii) Actual resistance of the unknown resistance and (iii) Error due to the loading effect of the voltmeter. **8**

OR

1 Write a short note on Gaussian error analysis. **8**

2 What is ment by
(a) an absolute error of measurement ?
(b) reading correction and relation of it to absolute error ?
(c) resolution of an instrument ?
(d) limiting error ?

4×2=8

UNIT - II

1 Explain with the help of a neat circuit diagram, the working of a dual slope DVM.

8

2 What are the advantages of digital instruments over analog instruments ? Write down the difference between DMM and DPM.

8

OR

1 On what principle does a digital frequency meter operate ? Explain with the help of a neat diagram the working of a DFM.

8

2 Explain the principle and working of vector impedance meter with the help of suitable diagram.

8

UNIT - III

1 Write a short note on the measurement of phase of two signal on CRO using Lissajous pattern.

8

2 Explain all about the CRO probes.

8

OR

1 What is the difference between multibeam and multitrace CRO. Explain the working principle of storage and sampling oscilloscope.

8

2 Write all the steps for the measurement of frequency from the oscilloscope.

8

UNIT - IV

1 Explain all about Harmonic distortion analyzer with the help of neat and clean diagram. **8**

2 Explain the steps for measurement of frequency from frequency selective wave analyzer. **8**

OR

1 Explain the working of sweep frequency generators with neat sketch. **8**

2 Write the working principle of spectrum analyzer. **8**

UNIT - V

1 Derive the generalized expression for the gauge factor of the stain gauge. Write the process of stain measurement. **8**

2 The stain gauge bridge measures the stain in a cantilever. The gauge is fixed with stain ϵ; the gauge resistance increases from 110Ω to 110.53Ω. If the gauge factor is 2.30 then measure the stain in cantilever. **8**

OR

1 What is piezoelectric effect ? How pressure can be measured by piezoelectric crystal explain ? **8**

2 Explain the construction details and working principle of RVDT. **8**

3E1641

Roll No. _____ Total No. of Pages : 7

3E1641

B. Tech. (Sem. III) (Main/Back) Examination, December - 2017
Applied Elect. & Inst. Engg.
3AI2 Electronic Devices & Circuits (EC, EIC, EE, EX, AI, BM)

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 26

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

1 (a) What is the position of the fermi level in an intrinsic semiconductor ? How does its position change when :
(i) donor and
(ii) acceptors are added to the semiconductor ?

5

(b) A sample of Ge is doped to the extent of 10^{14} donor atoms/cm^3 and 5×10^{13} acceptor atoms/cm^3 at 300 K, the resistivity of intrinsic Ge is $60\,\Omega - cm$. If the applied electric field is 2 V/cm, find the total conduction current density. Assume $\mu_p/\mu_n = 1/2$ and $n_i = 2.5 \times 10^{13}/cm^3$ at 300 K.

8

(c) What is mass action for the carrier concentration ?

3

OR

1 (a) What are "Hall effect" and "Hall field" ? Explain briefly the physical origin of the Hall effect.

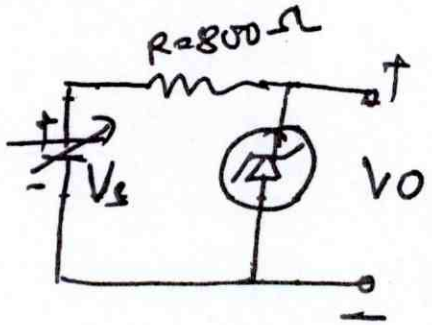
3

(b) A rectangular semiconductor specimen, 2 mm wide and 1 mm thick, gives a Hall coefficient of 10^{-2} m^3/c. When a current of 1 mA is passed through the sample, a Hall voltage of 1 mV is developed find the magnetic field and the Hall field.

8

UNIT - II

2 (a) In the circuit of figure the Zener diode is non ideal, having a knee voltage $V_{zo} = 9V$ and a dynamic resistance $r_z = 5\Omega$. If the supply voltage V_s varies from 15 to 30V, determine the range of variation of the output voltage V_o, also comment on the result.



8

(b) (i) What is unijunction transistor ? Give the equivalent circuit.

(ii) Draw and explain its current voltage characteristics.

8

OR

2 (a) The voltage waveform v_i of Figure (a) is applied to the input of the circuit of Figure (b). Show the output voltage V_o waveform and mark the voltage levels.

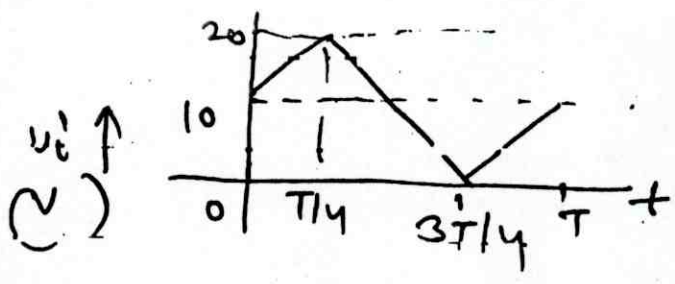


Figure (a)

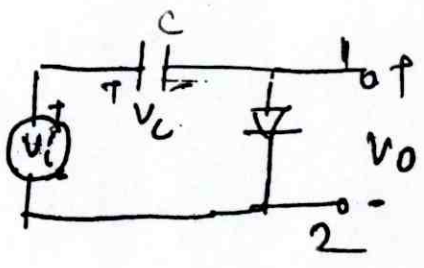


Figure (b)

Find the PIV of the diode, assumed to be ideal.

8

(b) Draw the circuit diagram of a fullwave voltage doubler and explain its operation; how can we construct a voltage trippler ?

8

UNIT - III

3 (a) Draw the circuit diagram of an emitter follower. Why it is called an emitter follower ? Obtain expression for the current gain, input resistance voltage gain and output resistance. **12**

(b) A transistor is operating in the CE mode calculate V_{CE} if $\beta = 125$, $V_{BE} = 0.6\,V$. **4**

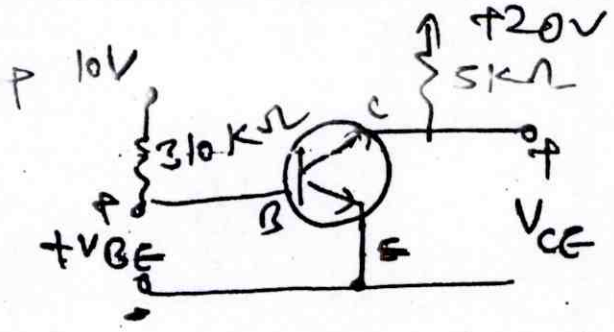
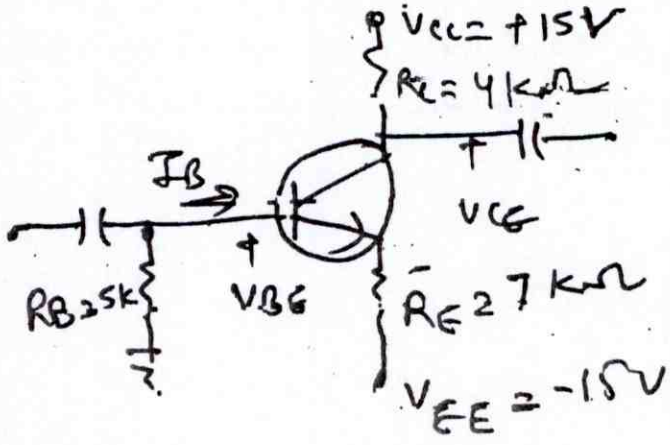


Figure 3(b)

OR

3 (a) In the circuit of figure shown below, $\beta = 99$ and $V_{BE} = 0.7V$. Calculate the quiescent values of I_B, I_C, I_E and V_{CE}. If β is increases by 20% what is the corresponding change in I_C ? **4**



$R_B = 5k\Omega$, $R_E = 7k\Omega$
$R_C = 4k\Omega$.
$V_{CC} = +15\,V$
$V_{EE} = -15\,V$

9

(b) Draw and label the low frequency h-equivalent of CE amplifier and obtain voltage gain.

7

UNIT - IV

4 (a) Derive an expression for the small signal voltage gain of a common source FET amplifier.

8

(b) A n-channel JFET has I_{DSS} = 12 mA and Pinch off voltage V_P = –4V. Find the drain current for V_{GS} = –2V. If the transconductance g_{mo} of a JFET with the same I_{DSS} at V_{GS} = 0 is 4 millimho, find the pinch off voltage.

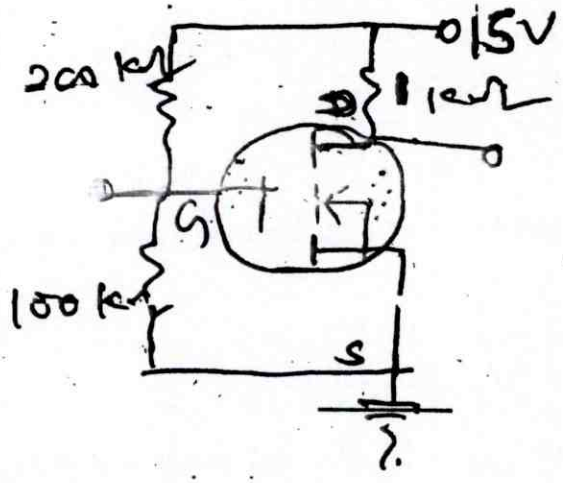
8

OR

4 (a) Sketch the structure of n-channel depletion type MOSFET. Explain how the depletion region is produced in the channel. Can a depletion MOSFET work in the enhancement mode ?

8

(b) An n-channel enhancement mode MOSFET, biased as shown in Fig. operates in the active region. The given parameters are $V_T = 2V$ and $K = 0.5$ mA/V^2. Calculate I_D, V_{GS} and V_{DS} verify that the operation is indeed in the active region.



8

UNIT - V

5 (a) An RC coupled amplifier employs two identical transistors, each having $h_{fe} = 100$, $h_{ie} = 2k\Omega$ and $C_{of} = 2$PF. The coupling capacitor has a capacitance $C = 0.4\ \mu F$. The load resistance for each transistor is $R_L = 8\ k\Omega$. The wiring capacitance $C_W = 10$ PF, calculate the lower and upper half power frequencies.

8

(b) Obtain an expression for the voltage gain of an R-C coupled amplifier in the mid, low and high frequency ranges.

8

OR

5 (a) Draw the circuit diagram of a common source n channel JFET amplifier. Discuss its small signal operation.

10

(b) What is the Darlington connection, compare between an emitter follower and a darlington pair ?

6