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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

I Semester, B.E. – Electronics & Communication Engineering

Basic Electronics

Time: 3 hrs *Max. Marks: 100*

Note: *Answer **FIVE** full questions, selecting **ONE** full question from each unit*

UNIT - I

1 a. Compare Half Wave Rectifier(HWR), Full wave Rectifier(FWR) and Bridge rectifier on the basis of i) Ripple factor ii) Efficiency iii) DC output voltage iv) Transformer utility — 6

b. With the help of neat diagram & associated waveforms, explain the working of full wave rectifier with center tapped transformer. — 8

c. Two diodes are connected as shown in fig. Q 1©. Determine the currents I1, I2 & I_{D_2} — 6

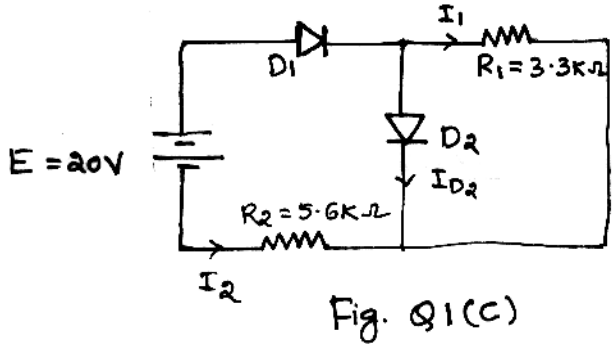

Fig. Q1(C)

2 a. Mention any two differences between Diode & IR emitter? With the help of a neat diagram explain IR emitter diode. — 8

b. Derive an expression for the ripple factor of a full wave rectifier with capacitor filter. — 6

c. For the network of fig. Q2(c), determine the range of R_L & T_L that will result in V_{RL} being maintained by 10V. — 6

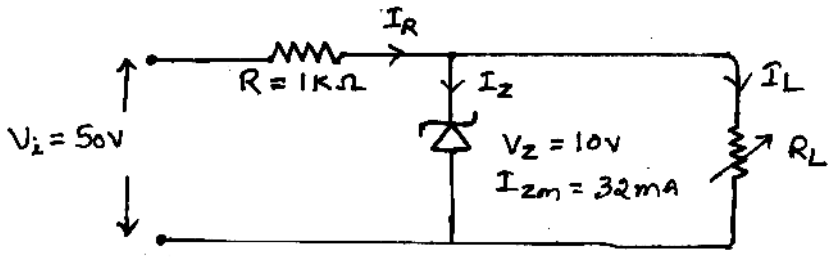

Fig. Q2(c)

UNIT - II

3 a. With the help of a neat diagram explain the construction & operation N-channel enhancement type MOSFET. — 6

b. Mention the important characteristics CMOS MOSFET arrangement with a diagram explain CMOS inverter. — 6

c. If an average threshold voltage $V_{GS(th)}$=3V & $V_{GS(on)}$=10V, ID(on) =3mA. Sketch the transfer characteristics of N-channel enhancement MOSFET, for V_{GS}=5, 8,10,12 & 14 V. — 8

4 a. State & explain Barkhausen criterion for sustained oscillation. 5

b. Draw an AC equivalent network for an amplifier constructed using E-MOSFET drain feedback configuration. 5

c. For the n-channel depletion-type MOSFET with R1=110MΩ, R2=10MΩ, RD=1.8kΩ, RS=750Ω , IDSS=6mA, Vp=-3V determine

i) IDQ & VGSQ & draw DC load line

ii) VDS

iii) For the transfer characteristics use, $I_D = \frac{I_{DSS}}{4} = \frac{6mA}{4} = 1.5mA$ 8

and $VGS = \frac{VP}{2} = \frac{-3V}{2} = 1.5V$

UNIT - III

5 a. List the properties of an ideal op – amp. 6

b. Show that maximum frequency of a sinsusidal voltage that results in an undistorted output from an op-amp is given by $f\max = \frac{SR}{2\pi Vm}$; SR = Max. Slew rate of op-amp 6

c. With the help of neat diagram explain how an op-amp can be used as,

i) Integrator ii) Summing amplifier. 8

6 a. Design an adder circuit using op-amp to obtainan output voltage given by

$V_0 = -[0.5V1 + 0.8V2 + 2V3]$

when V1, V2 and V3 are the inputs. 6

b. With the net circuit diagram explain,

i) Current controlled voltage source

ii) Current controlled current source. 6

c. What is a filter? Mention any 2 differences between active and passive filter. Write the op – amp circuit and frequency response curve of a 1st order active high passes filter. 8

UNIT – IV

7 a. Perform the following:

i) $(725.25)_8 = (\ ?\ )_{10} = (\ ?\ )_2$

ii) $(31C.DE)_{16} = (\ ?\ )_{10}$ 5

b. Simplify and realize using basic gates.

i) i) Y= AB + $\bar{A}$C + BC ii) Y = C $(B + C)(A + B + C)$ 10

c. Perform binary subtraction using 1s and 2s complement 1010 – 111. 5

8 a. With the help of truth table realize X – OR gate using i) Basic gates ii) Nand gates. 8

b. Implement and explain 4 : 1 multiplexes using basic gate. 6

c. Realize and implement the given expression using Nor gate only.

Y = $\bar{A}$BC + A$\bar{B}$C + ABC 6

UNIT – V

9	a.	Obtain an expression for the total average power of a sinusoidal AM wave.	8
	b.	With a neat block diagram explain the operation of a super heterodyne receiver.	8
	c.	Compare AM and FM.	4
10	a.	Explain the functional Blocks of optical fibre communication. List its advantage and application.	10
	b.	Explain LVDT & Capacitive transducers.	10

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