U.S.N | | | | | | | | | | |

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

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester, B.E. - Semester End Examination; May/June - 2019

Basic Electronics

(Common to All Branches)

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

*CO1: **Apply** the knowledge of physics and mathematics to understand the operation of PN diodes, Zener diodes, MOSFET, Solar cells, LCD, CRT, Transducers, Modulation techniques and Opamps.*

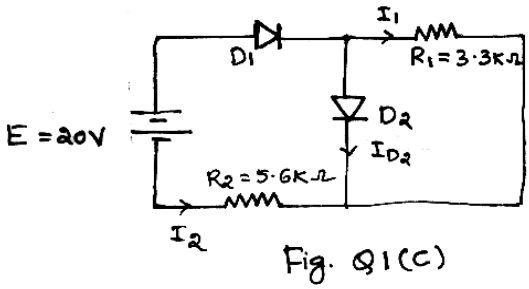
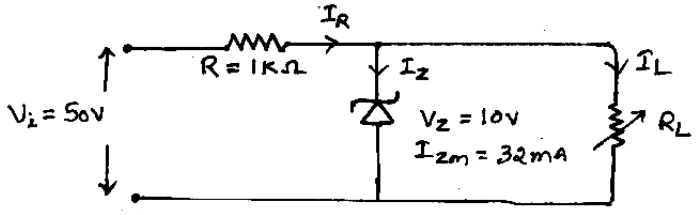
*CO2: **Analyze** circuits built with diodes, Zener diodes, MOSFET and Opamp.*

*CO3: **Design** simple circuit to perform rectification, voltage regulation, Opamp base amplifier, summer and filter, MOSFET base amplifier, digital circuits.*

*CO4: **Analyze** and **implement** basic Digital Electronic circuit for a given application using knowledge of Boolean Algebra and basic gates.*

*CO5: **Discuss** different modulation techniques communication systems.*

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

Q. No.	Questions	Marks	COs	BL	POs
	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	CO1	L2	PO1
b.	With the help of neat diagram and associated waveforms, explain the working of full wave rectifier with center tapped transformer.	8	CO1	L1	PO1
c.	Two diodes are connected as shown in Fig. Q1(c). Determine the currents I_1, I_2 and I_{D2}.  Fig. Q1(c)	6	CO2	L2	PO2
2 a.	Mention any two differences between Diode and IR emitter? With the help of a neat diagram, explain IR emitter diode.	8	CO1	L2	PO1
b.	Derive an expression for the ripple factor of a full wave rectifier with capacitor filter.	6	CO1	L1	PO1
c.	For the network of Fig. Q2(c), determine the range of R_L and I_L that will result in V_{RL} being maintained at 10 V.  Fig. Q2(c)	6	CO2	L2	PO2
	UNIT - II				
3 a.	With the help of a neat diagram, explain the construction and operation of *N*-channel enhancement type MOSFET.	6	CO1	L1	PO1

Contd…2

	b.	Mention the important characteristics of CMOS FET arrangement with a diagram and explain CMOS inverter.	6	CO1	L1	PO1
	c.	If an average threshold voltage $V_{GS(th)}$ = 3 V and $V_{GS(on)}$ = 10 V, $I_{D(on)}$ = 3 mA, sketch the transfer characteristics of *N*-channel enhancement MOSFET, for V_{GS} = 5, 8, 10, 12 and 14 V.	8	CO2	L2	PO2
4	a.	State and explain Barkhausen criterion for sustained oscillation.	5	CO2	L1	PO2
	b.	Draw an AC equivalent network for an amplifier constructed using E-MOSFET drain feedback configuration.	5	CO2	L1	PO2
	c.	For the *n*-channel depletion-type MOSFET with R_1 = 110 MΩ, R_2 = 10 MΩ, R_D = 1.8 kΩ, R_S = 750 Ω , I_{DSS} = 6 mA, V_p = –3 V. Determine; i) I_{DQ} and V_{GSQ} and draw DC load line ii) V_{DS} iii) For the transfer characteristics use, $I_D = \frac{I_{DSS}}{4} = \frac{6\,mA}{4} = 1.5\,mA$ and $V_{GS} = \frac{V_P}{2} = \frac{-3V}{2} = -1.5\,V$	10	CO3	L3	PO3
		UNIT - III				
5	a.	List the properties of an ideal Opamp.	6	CO2	L1	PO2
	b.	Show that maximum frequency of a sinusoidal voltage that results in an undistorted output from an Opamp is given by $f_{max} = \frac{S_R}{2\pi Vm}$; S_R = Maximum slew rate of Opamp	6	CO2	L2	PO2
	c.	With the help of neat diagram, explain how an Opamp can be used as, i) Integrator ii) Summing amplifier	8	CO1	L1	PO1
6	a.	Design an adder circuit using Opamp to obtain output voltage given by, $V_0 = -[0.5\,V_1 + 0.8\,V_2 + 2\,V_3]$, Where V_1, V_2 and V_3 are the inputs.	6	CO3	L3	PO3
	b.	With the neat circuit diagram, explain; i) Current controlled voltage source ii) Current controlled current source	6	CO1	L1	PO1
	c.	What is a filter? Mention any two differences between active and passive filter. Write the Opamp circuit and frequency response curve of a 1st order active high passes filter.	8	CO2	L2	PO2
		UNIT - IV				
7	a.	Perform; i) $(725.25)_8 = (\ ?\ )_{10} = (\ ?\ )_2$ ii) $(31C.DE)_{16} = (\ ?\ )_{10}$	5	CO3	L2	PO2
	b.	Simplify and realize using basic gates : i) $Y = AB + \bar{A}C + BC$ ii) $Y = C\,(B + C)(A + B + C)$	10	CO4	L3	PO3
	c.	Perform binary subtraction using 1's and 2's complement 1010 – 111.	5	CO3	L2	PO2
8	a.	With the help of truth table realize XOR gate using; i) Basic gates ii) Nand gates.	8	CO4	L2	PO4
	b.	Implement and explain 4:1 multiplexer using basic gate.	6	CO4	L2	PO4
	c.	Realize and implement the given expression using Nor gate only, $Y = \bar{A}BC + A\bar{B}C + ABC$	6	CO4	L2	PO4
		UNIT - V				
9	a.	Obtain an expression for the total average power of a sinusoidal AM wave.	8	CO5	L1	PO2
	b.	With a neat block diagram explain the operation of a super heterodyne receiver.	8	CO5	L1	PO2
	c.	Compare AM and FM.	4	CO5	L1	PO2
10	a.	Explain the functional Blocks of optical fibre communication. List its advantages and applications.	10	CO5	L1	PO2
	b.	Explain LVDT and Capacitive transducers.	10	CO1	L1	PO1

* * * *