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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
First / Second Semester, B.E. - Semester End Examination; August - 2023
Basic Electronics
(Common to All Branches)

Time: 3 hrs   *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1: Apply knowledge of physics and mathematics to understand operation of PN diodes, Zener diodes MOSFET, solar cells, LCD, CRT, Transducers, modulation techniques and Opamps.

CO2: Analyse circuits built with diodes, Zener diodes, MOSFET and Opamp

CO3: Design simple circuit to perform rectification, voltage regulation, Opamp based amplifier, summer and filter.

CO4: Analyse and implement basic Digital Electronic circuits for a given application using knowledge of Boolean Algebra and Basic gates.

CO5: Discuss different modulation techniques and communication systems.

<u>*Note:*</u> *I) PART - A is compulsory. **Two** marks for each question.*

*II) PART - B: Answer any <u>**Two**</u> sub questions (from a, b, c) for a Maximum of **18 marks** from each unit.*

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
1 a.	Draw the block diagram of power supply unit.	2	L1	CO1	PO1
b.	List any two differences between Depletion type and Enhancement type MOSFET.	2	L1	CO1	PO1
c.	List the ideal characteristics of Op-amp.	2	L1	CO1	PO1
d.	Write the 1's and 2's complement of binary number 1101011010.	2	L2	CO4	PO2
e.	Define amplitude modulation and draw modulated signal.	2	L1	CO5	PO2
	II : PART - B	**90**			
	UNIT - I	**18**			
2 a.	Determine V_{DQ} and I_{DQ} for the series diode configuration circuit with input 10 V, consisting of Silicon diode and resistor of 2 KΩ.	9	L3	CO3	PO2
b.	Explain the working of Full wave Bridge Rectifier with the help of circuit diagram and waveforms.	9	L2	CO1	PO1
c.	Explain the working of Zener diode as voltage regulator for the condition of fixed V_i and variable R_L with necessary diagram and equations.	9	L2	CO1	PO1
	UNIT - II	**18**			
3 a.	Explain the Construction, Operation and Characteristics of *n*-channel Depletion-type MOSFET with necessary diagrams.	9	L2	CO1	PO1
b.	Explain the construction and operation of CMOS inverter.	9	L3	CO3	PO2
c.	Draw the Enhancement-type MOSFET amplifier using voltage divider configuration. Sketch its corresponding ac equivalent circuit.	9	L2	CO2	PO1

Find the equations for the following:

i) g_m and g_{m0}

ii) Z_i and Z_o

iii) Av

UNIT - III	**18**	

4 a. Derive and expression for voltage gain (A_V) of an inverting Op-Amp with the help of circuit diagram and its ac equivalent circuit. — 9 — L2 — CO2 — PO2

b. Explain the following with necessary diagram and equations:

i) Op-Amp as an Integrator

ii) Op-Amp Summing Amplifier

iii) Op-amp first order Low pass filter — 9 — L2 — CO2 — PO2

c. Explain the following controlled sources with required ideal diagram and circuit diagram:

i) Voltage Controlled Voltage Source

ii) Voltage Controlled Current Source — 9 — L3 — CO3 — PO3

UNIT - IV — **18**

5 a. Compute the following:

i) $(1234.12)_{10} = ( )_2 = ( )_8 = ( )_{16}$

ii) Binary Multiplication $(1011)_2 * (101)_2$

iii) Perform binary subtraction using 2's compliment $(15)_{10} - (3)_{10}$ — 9 — L2 — CO4 — PO3

b. Design and implement the full adder using 2-half adder with characteristics equation for sum and carry. — 9 — L4 — CO4 — PO2

c. Implement the following logic gates using only NAND and NOR

i) AND

ii) OR

iii) XOR — 9 — L2 — CO4 — PO3

UNIT - V — **18**

6 a. Explain Amplitude Modulation (AM) with waveforms and equation along with spectrum diagram of AM wave. — 9 — L2 — CO5 — PO2

b. Explain super heterodyne receiver used in radio receivers with neat block diagram. — 9 — L2 — CO5 — PO2

c. Explain the advantages and application of Optical fiber communication. — 9 — L2 — CO5 — PO2

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