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

(An Autonomous Institution affiliated to VTU, Belagavi)

First Semester, B.E. - Semester End Examination; April - 2021

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

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

CO4: Analyze 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 Maximum of **18 marks** from each unit.*

| Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
I a.	Draw the block diagram of power supply unit.	2	L1	CO1	PO1
b.	List any two differences between Deflection type and Enhancement type MOSFET.	2	L1	CO1	PO1
c.	List the ideal characteristics of Op-Amp.	2	L1	CO1	PO1
d.	Obtain 1's and 2's complement of $(011010)_2$.	2	L1	CO4	PO2
e.	Differentiate the characteristics between Amplitude Modulation (AM) and Frequency Modulation (FM).	2	L1	CO1	PO1
	II : PART - B	**90**			
	UNIT - I	**18**			
1 a.	With necessary circuit diagram and wave forms, explain center tapped full wave rectifier.	9	L3	CO2	PO2
b.	Define Voltage regulation. Analyze the working of Zener diode as voltage regulator with fixed V_i and variable R_L.	9	L3	CO2	PO2
c.	Define Load line. Determine I_{DQ} and V_{DQ} for the network shown in Fig.1(c).	9	L2	CO3	PO2

Fig.1(c)
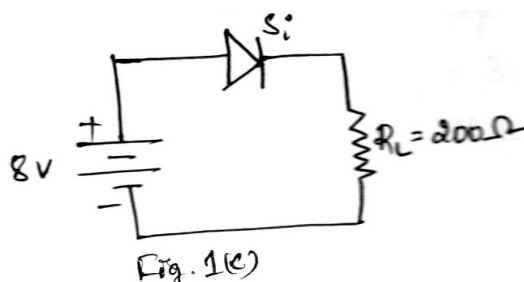
UNIT - II   **18**

2 a. Describe the operation and characteristics of *n*-channel deflection type MOSFET with necessary diagram and equation.   9   L2   CO2   PO2

  b. Explain the construction, operation of CMOS. Also illustrate the working of CMOS inverter.   9   L2   CO2   PO2

  c. Determine the following for the network in the Fig.2(c):

  i) V_{GSQ} ii) I_{DQ} iii) V_{DS} 9   L2   CO3   PO2

Fig 2(c)
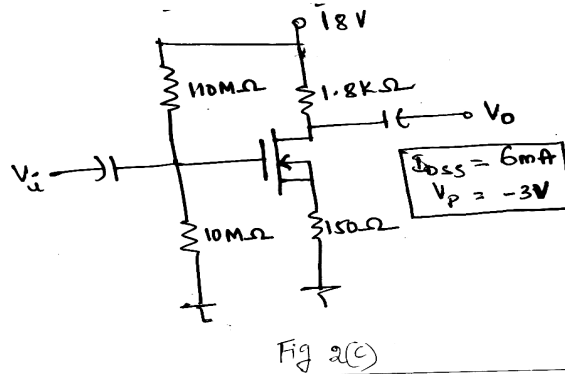
UNIT - III   **18**

3 a. Determine the output voltage of an Op-Amp for input voltage of $V_{i1} = 350\ \mu V$ and $V_{i2} = 200\ \mu V$. The amplifier has a differential gain of $A_d = 4000$ and the value of CMRR is i) 1000 and ii) 10^6, conclude by comparing the results.   9   L3   CO2   PO2

  b. Explain the Op-amp with necessary circuit diagram and equations for the following:
  i) 2-input inverting summing amplifier
  ii) Integrator   9   L2   CO3   PO2

  c. Derive the expression for the output voltage and gain of an inverting Op-Amp with neat circuit diagram and equivalent diagram.   9   L4   CO4   PO2

UNIT - IV   **18**

4 a. Design and implement the full adder using 2 half adders with characteristics equation for sum and carry.   9   L4   CO4   PO2

  b. Compute the following :
  i) $(1234.12)_{10} = ()_2 = ()_8 = ()_{16}$
  ii) $(1010101) \times (010111)$
  iii) Perform binary subtraction using 2's compliment $(15)_{10} - (03)_{10}$ 9   L2   CO4   PO2

  c. Implement the following logic gates using only NAND and NOR:
  i) AND   ii) OR   iii) XOR   9   L2   CO4   PO2

	UNIT - V	**18**			
5 a.	Explain super hetero dyne receiver used in radio receivers with neat diagram.	**9**	L2	CO5	PO2
b.	Write a short note on; i) Resistive transducer ii) Capacitive transducer	**9**	L2	CO5	PO2
c.	Explain Amplitude Modulation (AM) with wave forms and equation along with spectrum diagram of AM wave.	**9**	L2	CO1	PO1

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