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18ELN14/24

## First/Second Semester B.E. Degree Examination, Dec.2019/Jan.2020 Basic Electronics

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Explain the working of PN junction diode under forward and reverse biased conditions. (06 Marks)  
 b. Explain the working of Photodiode. (05 Marks)  
 c. Explain with neat circuit diagram and waveforms, the working of full wave bridge rectifier. Show that the efficiency of full wave bridge rectifier is 81%. (09 Marks)

**OR**

- 2 a. Explain the operation of Half wave rectifier with capacitor filter with neat circuit diagram and waveforms. (06 Marks)  
 b. A full wave rectifier uses 2 diodes having internal resistance of  $10 \Omega$  each. The transformer RMS secondary voltage from center to each end is 200V. Find  $I_m$ ,  $I_{dc}$ ,  $I_{rms}$  and  $V_{dc}$  if the load is  $800 \Omega$ . (06 Marks)  
 c. Explain how zener diode helps in voltage regulation with neat circuit diagram. Give detail mathematical analysis. (08 Marks)

### Module-2

- 3 a. Explain the construction, working and characteristics of n-channel JFET. (09 Marks)  
 b. With a neat circuit diagram, explain the working of CMOS Inverter. (06 Marks)  
 c. For a n-channel JFET if  $I_{DSS} = 9 \text{ mA}$  and  $V_p = -6\text{V}$ . Calculate  $I_D$  at  $V_{gs} = -4\text{V}$  and  $V_{gs}$  at  $I_D = 3 \text{ mA}$ . (05 Marks)

**OR**

- 4 a. Explain the construction, working and characteristics of enhancement type MOSFET. (09 Marks)  
 b. Explain the working of Silicon Controlled Rectifier [SCR] using two transistor model. (06 Marks)  
 c. For an EMOSFET, determine the value of  $I_D$  if  $I_{D(on)} = 4 \text{ mA}$ ,  $V_{gs(on)} = 6\text{V}$ ,  $V_T = 4\text{V}$  and  $V_{gs} = 8\text{V}$ . (05 Marks)

### Module-3

- 5 a. What is an OP-AMP? List the characteristics of an ideal OP-AMP. (06 Marks)  
 b. Explain the operation of an OP-AMP as inverting amplifier with neat diagram and waveforms. (06 Marks)  
 c. Explain how OP-AMP can be used as (i) Integrator (ii) Voltage follower. (08 Marks)

**OR**

- 6 a. Explain the different input modes of an OP-AMP. (06 Marks)  
 b. Design an adder circuit using OP-AMP to obtain an output voltage,  $V_o = -[2V_1 + 3V_2 + 5V_3]$ . Assume  $R_f = 10 \text{ k}\Omega$ . (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.



- c. Explain the following terms with respect to OP-AMP:  
(i) CMRR (ii) Slew rate (iii) Input bias current (iv) Supply Voltage Rejection ratio. (08 Marks)

**Module-4**

- 7 a. With a neat circuit diagram, explain how transistor is used as an amplifier. Derive an equation for  $A_v$ . (08 Marks)  
b. Explain RC phase shift oscillator with circuit diagram and necessary equations. (08 Marks)  
c. Explain the voltage series feedback circuit and derive an equation for voltage gain,  $A_v$ , with feedback. (04 Marks)

OR

- 8 a. With a neat circuit diagram, explain the working of Wein-bridge oscillator. (08 Marks)  
b. Explain the operation of IC555 as an Astable oscillator with neat circuit diagram and necessary equations. (08 Marks)  
c. The Transistor in CE configuration is shown in Fig.Q8(c) with  $R_C = 1 \text{ k}\Omega$  and  $\beta_{DC} = 125$ . Determine  
(i)  $V_{CE}$  at  $V_{in} = 0 \text{ V}$ .  
(ii)  $I_{B(\min)}$  to saturate the collector current  
(iii)  $R_{B(\max)}$  when  $V_{in} = 8 \text{ V}$   
 $V_{CE(\text{sat})}$  can be neglected.

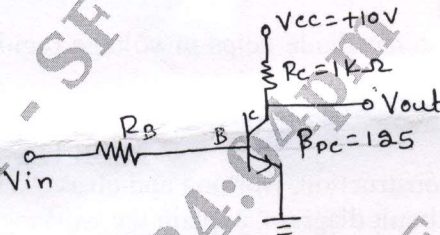


Fig.Q8(c)

(04 Marks)

**Module-5**

- 9 a. Design Full adder circuit and implement it using basic gates. (08 Marks)  
b. Find (i)  $(1101 \ 0111 \ 0110 \ 1010)_2 = (?)_{16}$   
(ii)  $(EB986)_{16} = (?)_2$   
(iii)  $(925.75)_{10} = (?)_8$  (06 Marks)  
c. Explain the basic elements of communication system with block diagram. (06 Marks)

OR

- 10 a. State and prove De-Morgan's theorem. (06 Marks)  
b. With a block diagram, explain the working of a 3-bit ripple counter. (06 Marks)  
c. What is a Flip-flop? Explain the operation of master-slave JK flip-flop. (08 Marks)

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