CBCS SCHEME

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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 Ω 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 Ω. **(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 mA and V_p = –6V. Calculate I_D at V_{gs} = – 4V and V_{gs} at I_D = 3 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 mA, $V_{gs(on)}$= 6V, V_T = 4V and V_{gs} = 8V. **(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 kΩ. **(06 Marks)**

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 RC = 1 kΩ and β_{DC} = 125. Determine
(i) V_{CE} at V_{in} = 0 V.
(ii) $I_{B(min)}$ to saturate the collector current
(iii) $R_{B(max)}$ when V_{in} = 8 V
$V_{CE(sat)}$ can be neglected.

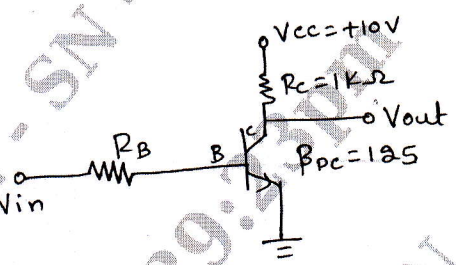

Fig.Q8(c) **(04 Marks)**

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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