



## SEMESTER END EXAMINATIONS - MAY 2023

Program : **B.E. - Common to all Programs**  
Course Name : **Introduction to Electronics**  
Course Code : **ESC133**

Semester : **I**  
Max. Marks : **100**  
Duration : **3 Hrs**

### Instructions to the Candidates:

- Answer one full question from each unit.
- Missing data may be suitably assumed.

### UNIT - I

- What is a Zener diode? Explain its V-I characteristics and hence identify characteristic parameters associated with the Zener diode. CO1 (07)
  - Explain the construction of Bipolar junction transistor (BJT) and principle of operation under normal bias conditions. CO1 (07)
  - An LED is to be used to indicate the presence of a 21 V DC supply rail. If the LED has a nominal forward voltage of 2.2 V, and is rated at a current of 15 mA, determine the value of series resistor required. CO1 (06)
- Explain the operation of P-N junction diode under forward and reverse biased modes. CO1 (07)
  - Write the characteristic features of light emitting diode (LED). CO1 (07)
  - A transistor operates with  $I_C = 30$  mA and  $I_B = 600$   $\mu$ A. Determine the value of  $I_E$  and  $h_{FE}$ ? With the application of the signal, the base current changes to 620  $\mu$ A and given that  $h_{FE}$  is 60, what is the new value of collector current? CO1 (06)

### UNIT - II

- With a neat block diagram explain the working of a D.C. power supply. CO2 (04)
  - Implement the voltage multiplier circuit producing an output which is theoretically an integer times the AC peak input. CO2 (08)
  - With a neat diagram and waveform, explain the working of Bi-phase rectifier circuits. CO2 (04)
  - Determine the equivalent output resistance and regulation of the power supply for the following data obtained during a test carried:

#### Load Test

- (i) Output Voltage (no-load) = 8.5V  
(ii) Output Voltage (800 mA load) = 8.1V

#### Regulation Test

- (i) Output Voltage (a.c. input: 230 V) = 15V  
(ii) Output Voltage (a.c. input: 190 V) = 14.6V

- With neat diagrams and respective waveforms, explain the following: CO2 (10)
    - Half-wave rectifier with reservoir capacitor
    - Full-wave bridge rectifier circuit.
  - A 5V Zener diode has a maximum rated power dissipation of 500 mW. If the diode is to be used in a simple regulator circuit to supply a regulated 5V to a load having a resistance of 400 ohm, determine a suitable value of series resistor for operation in conjunction with a supply of 9V. CO2 (04)
  - With neat diagrams, explain the regulating action of Zener diode for the following: CO2 (06)
    - Varying Input Voltage
    - Varying Load Resistance.

## UNIT - III

5. a) Mention the types of amplifiers and their important features. CO3 (07)  
b) From the configuration of amplifier provided with positive feedback, arrive at the conditions for oscillations. CO3 (07)  
c) A transistor amplifier has a Bandwidth of 400 kHz, and a mid-band gain of 90. If the lower cut-off frequency is 100 Hz, then what is the value of upper cut-off frequency? Also, calculate the gain at cut-off frequencies? What information do we get by knowing the Bandwidth of an amplifier? CO3 (06)
6. a) Explain how a transistor under common-emitter configuration can operate as a switch. CO3 (07)  
b) A transistor amplifier produces an output voltage of 3.6V when no load is connected to it and an output voltage of 3V for a 10 k $\Omega$  load. Calculate the value of output resistance of the amplifier. If the open-circuit voltage gain is 120 and the input signal current drawn is 30  $\mu$ A, what is the value of input resistance offered by the amplifier? CO3 (07)  
c) Define (i) common-emitter input resistance and (ii) common-emitter current gain. How can we determine them from transistor characteristics? CO3 (06)

## UNIT- IV

7. a) With the relevant implementation steps, show how an AND gate and exclusive OR gate can be realized using minimum number of NOR and NAND gates only. CO4 (10)  
b) Explain 4 bit binary counter using JK bistables FFs switch timing diagram. CO4 (10)
8. a) With necessary equations and truth table realize full adder using two half adders. CO4 (10)  
b) Differentiate between Combinational circuit and Sequential Circuit. CO4 (06)  
Design a logic gate arrangement using only 2 input NAND gates that will perform the logic function as in the expression given below. Simplify your answer as far as possible using the minimum number of logic gates. CO4 (04)  
 $Y = A + B'$

## UNIT - V

9. a) Explain the principal internal architecture of 8 bit microprocessor with diagram. CO5 (10)  
b) Differentiate between microprocessor and microcontroller. CO5 (10)
10. a) Explain the block diagram of microcontroller based system. CO5 (10)  
b) Explain read and write operation in microprocessor with timing diagram. CO5 (10)

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