SEM 2 – 5(RC16-17)

F.E. (Semester – II) (Revised in 2016-17) Examination, May/June 2017
FUNDAMENTALS OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Duration : 3 Hours | Max. Marks : 100

Instructions: 1) *Answer **five** questions with **two** from Part – **A**, **two** from Part – **B** and **one** from Part – **C**.*
2) *Assume **suitable** data **if** necessary.*
3) *Figures to the **right** indicate **full** marks.*

PART – A

Answer **any two** questions form the following :

1. a) With the help of heat sketch explain the formation of the depletion region in an open circuited PN junction (No Bias condition/No external voltage). **7**

   b) Differentiate between a bridge and a center-tapped rectifier. **3**

   c) For the network shown below in Fig. 1 (c) determine the range of R_L and I_L that will result in VR_L being maintained at 12V. **5**

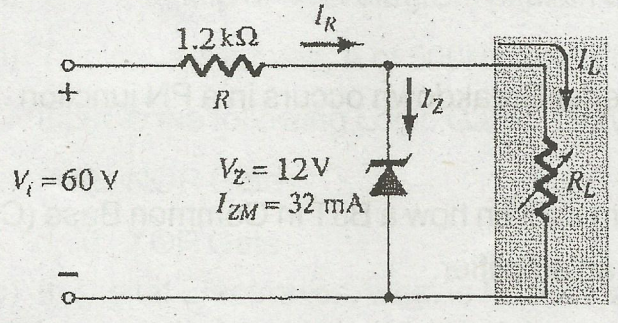

Fig. 1 (c)

   d) Derive an expression for RMS value of current (I_{rms}) of a half wave rectifier. **5**

P.T.O.

2. a) With the help of a neat diagram explain the construction of N-channel Depletion MOSFET. Also draw the drain characteristics for N-channel Depletion MOSFET. 7

b) Derive the relation between Ic and I_{CEO} for a transistor. 3

c) Determine the dc bias voltage V_{CE} and the current I_C for the voltage divider configuration given below in Fig. 2(c) : 6

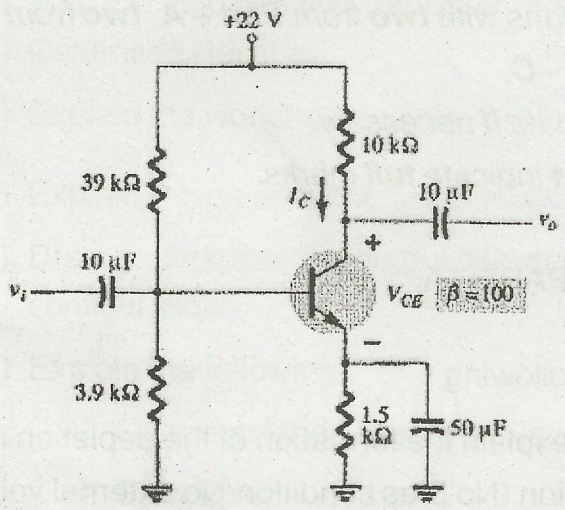

Fig. 2 (c)

d) Explain the term Thermal Runaway. 4

3. a) With the help of energy diagrams, explain how materials are classified based on their conductivity. 5

b) Explain how the process of Zener Breakdown occurs in a PN junction diode. 5

c) With the help of a neat diagram explain how a BJT in Common Base (CB) configuration can be used as an amplifier. 5

d) With the help of a neat diagram and drain/output characteristics explain the working of N-channel JFET. 5

PART – B

Answer **any two** questions form the following :

4. a) What are the various ways in which a Silicon Controlled Rectifier can be turned off ?. 5

   b) With the help of Logic Diagram and Truth Tables, state and prove the DeMorgan's Laws. 6

   c) Differentiate between an ideal and practical op-amp. 4

   d) Draw the Logic Symbols, construct Truth Tables, and with the help of circuit diagrams, explain the working of : 5

      i) AND

      ii) OR

5. a) Define the gauge factor of a strain gauge. Explain the various characteristics of a strain gauge. 5

   b) With the help of a block diagram list and explain the basic units of a microprocessor. 5

   c) What is a PCB ? Give the steps involved in the manufacturing of single sided PCB with the help of a flow diagram. 5

   d) With the help of a neat diagram explain the basic concept of amplitude modulation and frequency modulation. 5

6. a) With the help of neat diagram explain the characteristics of an SCR. 6

   b) Two square waves, A of 500Hz and B of 1 KHz frequency are applied as input to the following Logic Gates. Draw the output waveform in each case.

      i) NOR Gate

      ii) XOR Gate 2

   c) In Digital Electronics, what is Positive and Negative Logic ? 2

   d) With the help of a flow diagram explain the operating cycle of a CPU of a Programmable Logic Controller. 5

   e) What are the important functions of transmitter and receiver in a basic communication system ? 5

PART – C

Answer **any one** question form the following :

7. a) Explain how the process of Avalanche Breakdown occurs in a PN junction diode. **5**

   b) With the help of neat diagram explain how Complementary MOSFET (CMOS) can be used as an inverter. **5**

   c) With the help of a two-transistor model, explain the working of a Silicon Controlled Rectifier. **5**

   d) Explain the working principle of Piezoresistive strain gauge. **5**

8. a) Explain P type semiconductor materials with the help of a neat diagram. **5**

   b) Draw and explain the output characteristics of a npn BJT connected in CB configuration. **5**

   c) Explain the following :

      i) Common Mode Rejection Ratio (CMRR).

      ii) Slew Rate. **5**

   d) What is a PLC ? How is it different from a computer ? **5**
