



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 from the following :

1. a) With the help of neat 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 V_{R_L} being maintained at 12V. 5

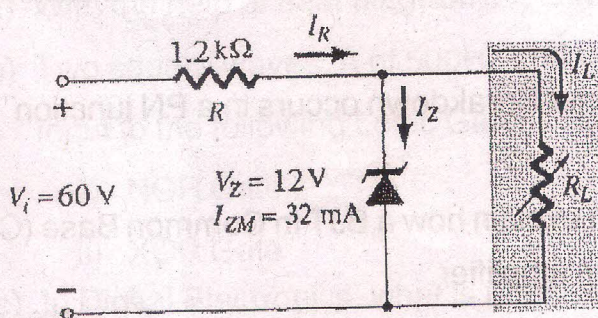


Fig. 1 (c)

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



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 I_C 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

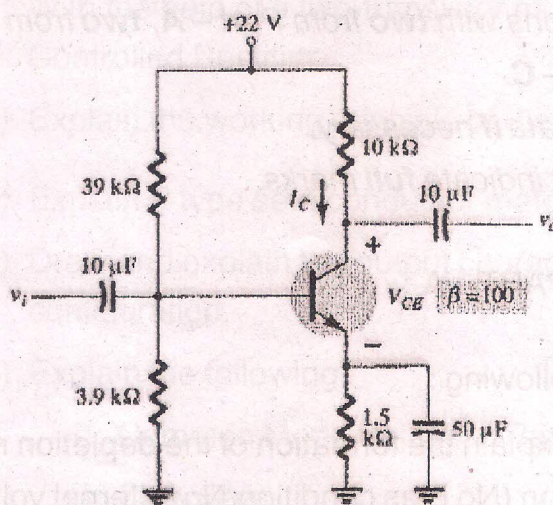


Fig. 2 (c)

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). 5
- ii) Slew Rate. 5
- d) What is a PLC ? How is it different from a computer ? 5
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