F.E. (Semester – II) (RC 2016-17) Examination, May/June 2018
FUNDAMENTALS OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Duration : 3 Hours | Total Marks : 100

Instructions *: 1) Answer* ***five*** *questions atleast* ***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.*

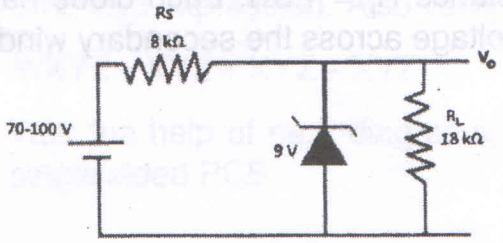
PART – A

Answer **any two full** questions.

1. a) With the help of a neat diagram, explain the formation of a depletion region in a pn junction under the forward bias condition. **5**

   b) Differentiate between npn and pnp transistor. **2**

   c) Find the maximum and minimum values of the current through the zener diode for the following circuit. **5**



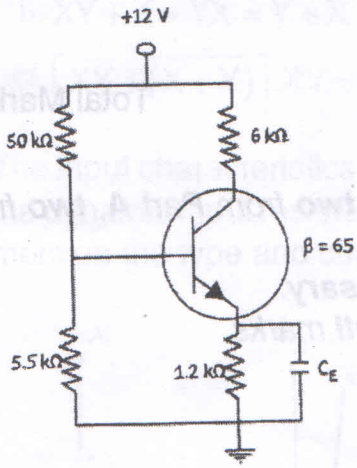
   d) Obtain the expression for ripple factor and rectification efficiency of a full wave rectifier. **8**

2. a) Draw and explain the output characteristics of a pnp transistor in CE configuration. Also mark the three regions of operation. **6**

   b) What is the effect of increase in V_{CB} on I_E, when V_{EB} is kept constant for pnp transistor in CB configuration. Explain. **2**

c) Explain the working a p-channel junction field effect transistor. Also draw the drain and transfer characteristics. 6

d) Using Thevenin's theorem, find the coordinates of the operating point for the circuit shown below. 6



3. a) Explain the working of a bridge rectifier. 4

b) Explain the construction and working of a p-channel depletion type MOSFET. 6

c) What is the significance PIV of a diode ? Explain how PIV is measured for a full wave and bridge rectifier. 5

d) In a half wave rectifier, the load resistance R_L = 1.5Ω. Each diode has a forward bias resistance of 15Ω. The voltage across the secondary winding is 200 sin 314t. Find

a) Peak value of current

b) Average value of current

c) Rms value of current

d) Ripple factor

e) Rectification efficiency. 5

PART – B

Answer **any two full** questions.

4. a) Implement the following gates using only NAND gate. 4

i) OR gate

ii) XOR gate

b) Explain the symbol, construction and operation of a silicon controlled rectifier. 8

c) Explain the functions of transmitter and receiver block of an electronic communication system. 4

d) With the help of a block diagram, explain the basic parts of a microcontroller. 4

5. a) Write distributive law, associative law and commutative law and verify using truth table. 6

b) Two square waves, A of frequency 200 kHz and B of frequency 400 kHz are applied as inputs to the logic gates. Draw the output waveform in each case. 4

i) NAND gate

ii) NOR gate

c) Explain the need for modulation. Mention the different modulation methods. 4

d) Draw a neat diagram and input-output waveforms of an inverting operational amplifier. Also obtain the expression for closed loop gain. 6

6. a) What is a strain gauge ? Explain the importance of gauge factor of the strain gauge. 4

b) Draw and explain the block diagram of programmable logic controller. 5

c) Reduce the following Boolean expression and draw the logic diagram of the simplified expression. Also verify using the truth table 5

$\overline{W}XY\overline{Z} + XY\overline{Z} + X\overline{Y}\overline{Z} + X\overline{Y}Z$

d) With the help of neat diagrams, explain the procedure of fabrication of a single sided PCB. 6

PART – C

Answer **any one full** question.

7. a) With the help of a neat diagram, differentiate between depletion and enhancement types MOSFET. 4

b) Explain the avalanche and zener breakdown mechanism in a pn junction diode. 5

c) Explain the working of a zener diode as a voltage regulator. 6

d) Explain the construction and operation of a CMOS inverter. 5

8. a) With the help of neat diagrams classify the solid materials on the basis of conductivity and energy band diagram. **6**

   b) What is positive logic and negative logic ? **6**

   c) Using the Boolean laws, prove the following. **4**

      i) $\overline{X}Y + X + \overline{Y}X = Y + X$

      ii) $\left[\overline{XY} + \overline{(X+Y)}\right].X\overline{Y} = X\overline{Y}.$

   d) The input characteristics of a transistor are given in figure below. Determine the dynamic input resistance of the transistor at point P where $V_{CB} = 4V$. Also mention the type and configuration of the transistor. **4**