SEM 2 – 4 (RC 16-17)

F.E. (Semester – II) (RC 2016 – 17) Examination, November/December 2017
FUNDAMENTALS OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Duration : 3 Hours | Total 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) Draw a reverse biased PN junction and explain the following terms :
   i) Potential barrier
   ii) Reverse saturation current
   iii) Breakdown voltage. **7**

   b) Differentiate between n type and p type semiconductor materials. **3**

   c) For the circuit shown in Fig. 1(c) below determine
   i) The output voltage (V_L)
   ii) The voltage drop across series resistance (V_R)
   iii) The current through the Zener diode (I_z)
   iv) Power dissipated in Zener (P_z). **4**

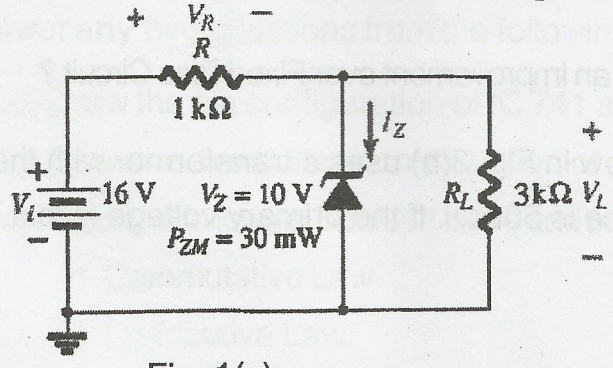

Fig. 1(c)

   d) Derive an expression for the rectification efficiency and ripple factor of a Bridge wave rectifier. **6**

P.T.O.

2. a) Draw and explain the output characteristics of a npn BJT connected in CB configuration. 7

b) Derive the relation between current gain of CB configuration (α dc) and current gain of CE configuration (β dc) for a transistor. 3

c) For the fixed bias network shown in Fig. 2(c), determine :

a) I_{BQ}

b) I_{CQ}

c) V_{CEQ}

d) V_{BC}

e) I_{csat} 5

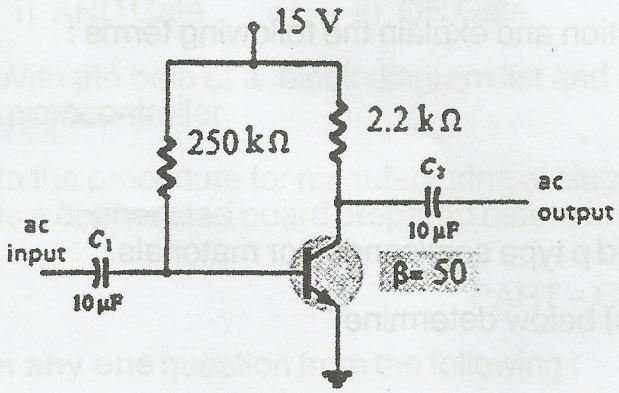

Fig. 2(c)

d) What are the various ways in which transfer characteristics of a JFET can be plotted ? 5

3. a) Why is Emitter Stabilized Bias Circuit an improvement over Fixed Bias Circuit ? 5

b) A half wave rectifier as shown below in Fig. 3(b) uses a transformer with the turns ratio 2 : 1. The load resistance is 500 Ω . If the primary voltage (r.m.s.) is 240 V, find :

i) d.c. output voltage

ii) peak inverse voltage

iii) the r.m.s. current.

iv) efficiency of rectification. 5

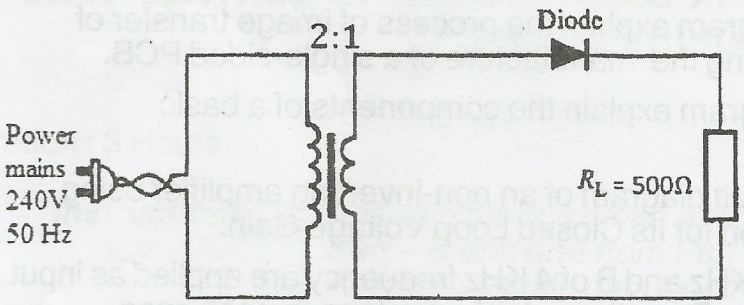

Fig. 3(b)

c) With the help of a neat diagram explain the construction of N-channel Enhancement MOSFET. Also differentiate between Enhancement type and Depletion type MOSFET. 5

d) Compare the Common Base, Common Emitter and Common Collector BJT Configurations with respect to the following characteristics :

i) Input Dynamic Resistance (R_i)

ii) Output Dynamic Resistance (R_o)

iii) Voltage Gain (A_V)

iv) Current Gain (A_i)

v) Phase relation between input and output. 5

PART – B

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

4. a) Draw the pin configuration of IC 741 and explain the use of each pin. 5

b) Draw the symbol and construction of a Silicon Controlled Rectifier. 3

c) State the following Boolean Laws and prove them using the Truth Table method :

i) Commutative Law

ii) Distributive Law. 6

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

i) OR ii) NOT. 6

5. a) What are transducers ? How can these be classified as active and passive transducers ? Explain with the help of examples. 5

b) What is a PLC ? Enlist the advantages of using a PLC for industrial automation. 5

c) With the help of a neat diagram explain the process of image transfer of artwork onto the board during the manufacture of a single-sided PCB. 5

d) With the help of a neat diagram explain the components of a basic communication system. 5

6. a) With the help of a neat circuit diagram of an non-inverting amplifier using op-amp, give the expression for its Closed Loop Voltage Gain. 3

b) Two square waves, A of 2 KHz and B of 4 KHz frequency are applied as input to the following Logic Gates. Draw the output waveform in each case.

i) NAND Gate ii) OR Gate. 2

c) With the help of logic diagrams, implement the following logic gates using NAND gate :

i) AND Gate ii) OR Gate iii) NOT Gate. 5

d) With the help of a block diagram list and explain the basic units of a microcontroller. 6

e) In the procedure for manufacturing of single-sided Printed Circuit Board, how is a copper clad board prepared before image transfer ? 4

PART – C

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

7. a) Explain the construction and working of a Light Emitting Diode. 6

b) Differentiate between Emitter, Base and Collector region of transistor. 4

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

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

8. a) Draw the V/I characteristic of Si diode and explain the term threshold or knee voltage. 5

b) With the help of neat diagrams explain the working of npn Bipolar Junction Transistor. 5

c) State and prove the DeMorgan's Laws using the truth table method. Also draw the logic diagrams for the same. 5

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