SEM-2-4 (RC 16-17)

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

Duration : 3 Hours

Total Marks : 100

Instructions : 1) *Answer **five** questions. At least **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

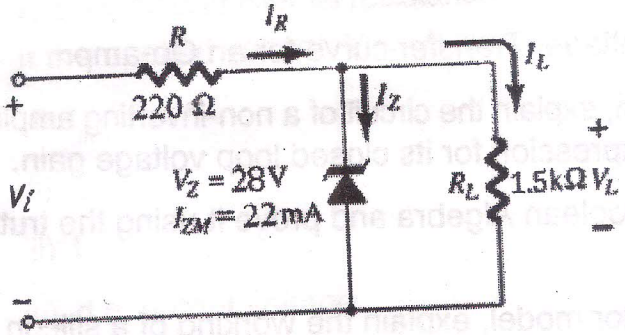
Answer **any two** questions from the following :

1. a) With the help of neat sketch explain forward biasing of PN junction diode. **5**

   b) Draw the V/I characteristics of a Silicon Diode and explain the term Threshold voltage. **5**

   c) Differentiate between Avalanche and Zener breakdown. **5**

   d) Over what range of input voltages will the Zener diode circuit shown in figure below maintain 28 V across a 1.5 K load, assuming that series resistance R = 200 Ω and Zener current rating is 22 mA ? **5**



2. a) Derive the relationship between αdc and βdc. **5**

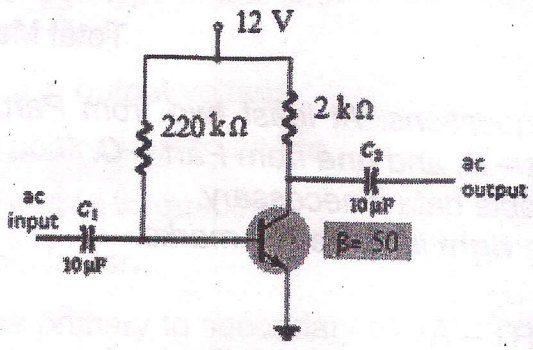
   b) With the help of a neat circuit diagram explain the output characteristics of a npn BJT connected in CB configuration. **5**

   c) With respect to biasing circuits of a Bipolar junction transistor, explain the concept of thermal runaway. **5**

P.T.O.

d) For the fixed bias network shown below, determine the following : 5

a) I_{BQ} b) I_{CQ} c) V_{CEQ} d) V_{BC} e) I_{csat}



3. a) Derive an expression for the rectification efficiency of a half wave rectifier. 5

b) Explain the construction and working of a light emitting diode. 5

c) With the help of a neat diagram explain the construction of N-channel JFET. 5

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

PART – B

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

4. a) Draw and explain the ideal voltage. Transfer curve for an Op-amp. 5

b) With the help of a neat diagram, explain the circuit of a non-inverting amplifier using op-amp and give the expression for its closed loop voltage gain. 5

c) State the associative law in Boolean Algebra and prove it using the truth table method. 5

d) With the help of a two-transistor model, explain the working of a silicon controlled rectifier. 5

5. a) With the help of neat diagrams, explain the construction, working and characteristics of a thermistor. 5

b) With the help of neat sketches explain the construction, working and characteristics of LVDT. 5

c) What is a printed circuit board ? What are the advantages of having a PCB over point to point soldered circuit ? 5

d) With the help of waveforms, explain the basic concept of frequency modulation. 5

6. a) Two square waves, A of 1 KHz and B of 2 KHz frequency are applied as input to the following logic gates. Draw the output waveform in each case. 5

i) NOR gate

ii) XNOR gate.

b) What do you mean by slew rate of an Op-amp ? What is the need for feedback in an op amp ? 5

c) Explain the working principle of strain gauge. 5

d) With the help of diagram explain the process of photolithography used for image transfer of artwork onto the board. 5

PART – C

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

7. a) A diode having internal resistance $r_d = 10\ \Omega$ is used for half-wave rectification. If the applied voltage $V = 40 \sin \omega t$ and load resistance $R_L = 810\Omega$, find : 5

i) I_m

ii) I_{dc}

iii) I_{rms}

iv) d.c. output voltage

v) efficiency of rectification.

b) With the help of a neat diagram explain the construction of CMOS. 5

c) What are the various ways in which a silicon controlled rectifier can be turned off ? 5

d) How is a PLC different from a computer ? 5

8. a) In the bridge type circuit shown in figure below, the diodes are assumed to be ideal. Find : 5

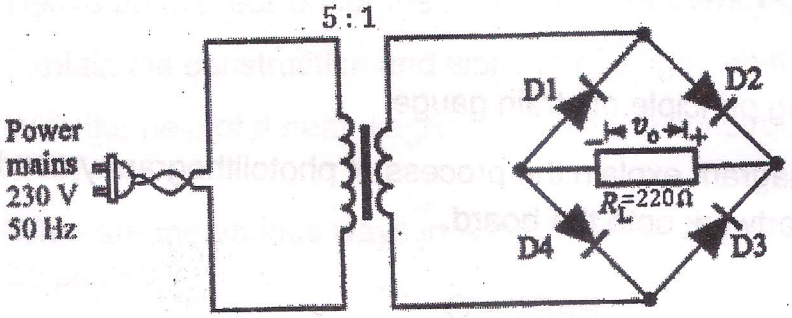
i) the d.c. output voltage

ii) the peak inverse voltage

iii) the output frequency

iv) ripple factor.

Assume primary to secondary turns ratio to be 5:1.



b) Differentiate between Emitter, Base and Collector. 5

c) With the help of logic diagrams, explain why NAND gate is called a universal gate. 5

d) Explain the following steps involved in the manufacturing of a single-sided printed circuit board : 5

i) Etching ii) Coating.