53 (EC 201) BAEL

2019

BASIC ELECTRONICS

Paper : EC 201

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer ***any five*** *questions out of* **7**.

1. *(a)* Describe the breakdown mechanism of a p–n junction ϕ draw the I–V characteristics. 3+3

   (b) Why capacitor filter/peak rectifier is necessary in the chain of of AC-to-DC conversion ? Describe its operation and hence derive the expression for ripple voltage. 2+8

   (c) Write a short note on extrinsic semiconductors. 4

Contd.

2. *(a)* Explain the full-wave rectification using Bridge rectifier circuit and hence derive expressions for average and r.m.s value of output voltage. 6+2+2

(b) Describe the operation of n MOSFET in triode mode and plot $I_D \sim V_{DS}$ & $I_G \sim V_{GS}$ characteristics. 6+2+2

3. *(a)* Classify the types of feedback amplifiers and give a detail comparison of these amplifiers with reference to voltage. gain, current gain, Input impedance and output impedance. 2+8

(b) $(8A)_{16}, (3E)_{16}, (83)_8$: Convert these numbers into decimal equivalent and its corresponding binary equivalent. 3×2

(c) Describe the Early Effect in BJT in brief. 4

4. *(a)* Draw the block diagram of ramp-type Digital Multi Meter (DMM) and explain its basic operation. 10

(b) How does an Light Emitting Diode unit light ? Explain. 6

(c) $Y = (A + B)$: Implement this Boolean expression using universal gates. (NAND 2 input) 4

5. *(a)* $Y = (A.B)$: Implement the Boolean expression using 2 input NOR gate. 4

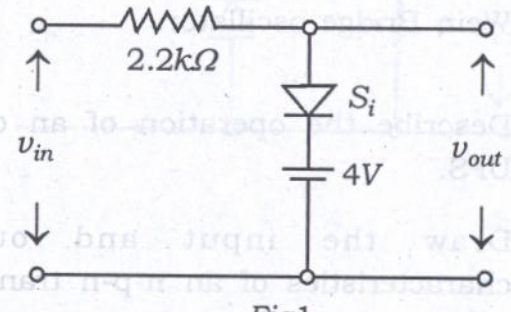

Fig1

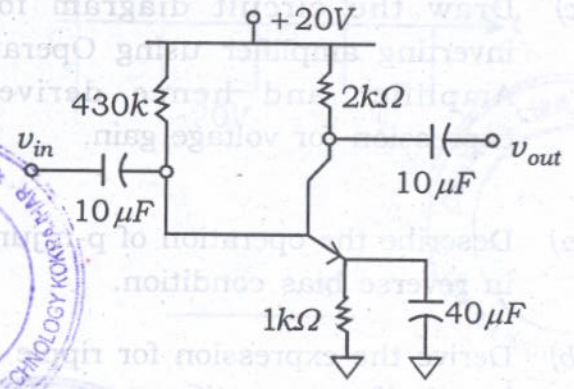

Fig2

(b) An input sine wave of $14V$ peak-to-peak, $60Hz$ is applied to the input of *Fig* 1, so draw the output waveform exactly below the input. 4

(c) Describe the Barkhousen's criterion for oscillation, and derive the expression for the frequency of oscillation in an Wein Bridge oscillator. 2+10

6. (a) Describe the operation of an offline UPS. 10

(b) Draw the input and output characteristics of an n-p-n transistor in Common-Base mode. 2+2

(c) Draw the circuit diagram for an inverting amplifier using Operational Amplifier and hence derive the expression for voltage gain. 6

7. (a) Describe the operation of p-n junction in reverse bias condition. 6

(b) Derive the expression for ripple factor in a half-wave rectifier. 6

(c) Explain the working principle and plot the output waveform for the following circuit. (the input waveform is shown below). 8