

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(MID SEMESTER EXAMINATION)**

**CLASS: BTECH  
BRANCH: CSE/ECE/EEE/AI & ML**

**SEMESTER: I  
SESSION: MO/2022**

**SUBJECT: EC101 BASICS OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**TIME: 2 HOURS**

**FULL MARKS: 25**

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

- |   |         |     |
|---|---------|-----|
|   | CO      | BL  |
| Q1 (a) Describe the operation of Zener Diode based voltage regulator with a suitable circuit diagram.   | [3] CO1 | BL2 |
| Q1 (b) In the following Fig.1, If Germanium (Ge) diode connection (direction) is reversed, the value of output voltage ( $V_o$ ) changes by how much volts? (Assume that the Ge diode has large breakdown voltage). | [2] CO1 | BL4 |

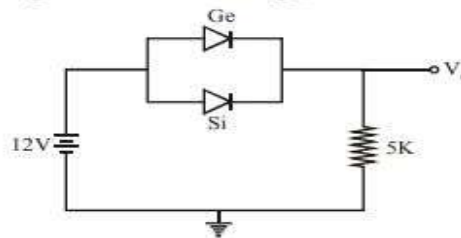


Fig. 1

- |   |     |         |
|---|-----|---------|
| Q2 (a) Draw the circuit of diode based Half Wave Rectifier (HWR) and Derive the expressions for average and RMS voltage for HWR.  | [3] | CO1 BL1 |
| Q2 (b) A full wave rectifier produces a rms voltage of 10 V from a 50 Hz line source and feeds a resistive load of 1100 $\Omega$ . If the filter uses a capacitor of $C = 50 \mu\text{F}$ , calculate the output dc voltage and ripple voltage. | [2] | CO1 BL4 |
| Q3 (a) Explain Base-width Modulation Effect in BJT using suitable diagram.  | [3] | CO2 BL2 |
| Q3 (b) Find the Quiescent-point voltage and current values for voltage divider configuration shown (Fig2)   | [2] | CO2 BL4 |

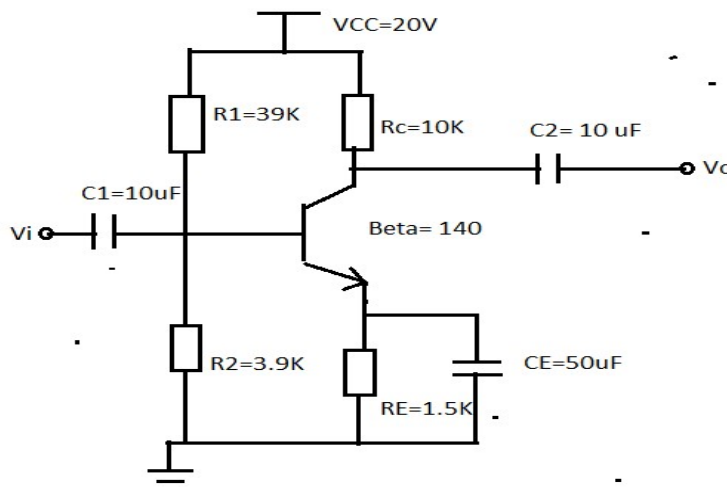
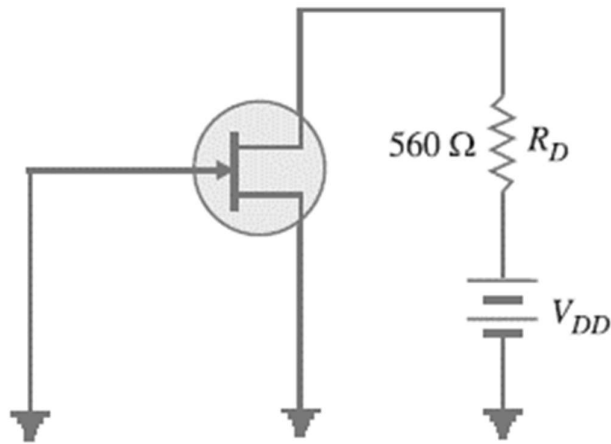


Fig2

- Q4 (a) What are the types of possible configurations in BJT. Derive the relation between  $\alpha$ ,  $\beta$  and  $\gamma$ . [3] CO2 BL1
- Q4 (b) In a fixed biased circuit of CE-transistor,  $V_{CC} = 15\text{ V}$ ,  $R_B = 820\text{ K}\Omega$ ,  $R_C = 4.7\text{ K}\Omega$ ,  $V_{BE} = 0.7\text{ V}$  and  $\beta = 120$ . Draw the DC load line and locate the operating point. [2] CO2 BL4
- Q5 (a) With a neat sketch, explain the operation of n-channel enhancement type MOSFET. [3] CO2 BL2
- Q5 (b) For the JFET in Figure,  $V_{GS}(\text{off}) = -4\text{ V}$  and  $I_{DSS} = 12\text{ mA}$ . Determine the minimum value of  $V_{DD}$  required to put the device in the constant-current region of operation. [2] CO2 BL2



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