

[This question paper contains 2 printed pages.]

**Your Roll No.....**

**Sr. No. of Question Paper : 2988**

**L**

Unique Paper Code : 2223512011

Name of the Paper : Analog Electronics

Name of the Course : **B.Sc. Prog. (Physical Sciences with Physics)  
(Under NEP-UGCF 2022)**

Semester : IV – (DSE Paper)

Duration : 2 Hours

Maximum Marks : 60

**Instructions for Candidates**

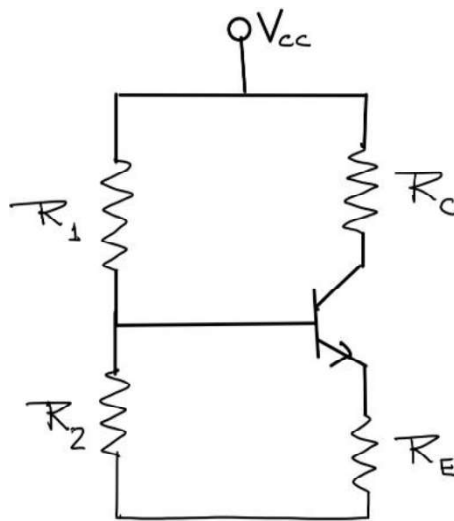
1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No. **1** is compulsory.
3. Attempt **four** questions in all.
4. **All** questions carry equal marks.
5. Use of a non-programmable scientific calculator is allowed.

**Attempt any five parts of Q.1.**

1. (a) Describe the working principle of the Solar Cell. (3)  
(b) What is the importance of the Q-point in transistor circuits like amplifier? (3)  
(c) Draw and explain the  $I$ - $V$  characteristics of a  $p$ - $n$  junction diode in forward and reverse bias. (3)  
(d) Discuss the characteristics of an ideal OP-Amp. (3)  
(e) Distinguish between half-wave and full-wave rectifiers. (3)  
(f) Derive the current gain of an op-amp in a non-inverting configuration. (3)
2. (a) Explain the structure and working of  $n$ - $p$ - $n$  or  $p$ - $n$ - $p$  transistors. (8)  
(b) What is the ripple factor and rectification efficiency of a full-wave rectifier? (7)

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3. (a) Describe the working of the Zener diode as a voltage regulator with a neat circuit diagram. (8)
- (b) Discuss the input and output characteristics of a transistor in CB configurations. (7)
4. (a) Define CMRR slew rate with respect to the Op-Amp. (6)
- (b) Describe the working of a CB amplifier using the  $h$ -parameter model and derive the expression for voltage gain. (6)
- (c) Discuss the Op-Amp as both an integrator and a comparator. (3)
5. (a) Derive the expression for the frequency of a Colpitt oscillator. (7)
- (b) The operating point is selected such that  $I_C = 5 \text{ mA}$ ,  $V_{CE} = 5 \text{ V}$ ,  $R_C = 2 \text{ K}\Omega$  and  $V_{CC} = 20 \text{ V}$ . Find  $R_1$ ,  $R_2$  and  $R_E$ . Current through  $R_1$  is 10 times the base current. Assume  $\beta = 50$  and  $V_{BE} = 0.7 \text{ V}$ . (5)



- (c) Explain the effect of a change in  $\beta$  on the characteristic curve of BJT. (3)