

(i) Printed Pages : 3

Roll No.

(ii) Questions : 7

Sub. Code :

1	7	5	4	5
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Exam. Code :

0	0	0	6
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B.A./B.Sc. (General) 6th Semester

(2056)

PHYSICS

Paper—B : Electronics and Solid State Devices-II

Time Allowed : Three Hours]

[Maximum Marks : 44

Note:— (i) Attempt **five** questions in all, selecting **two** from each Unit-I and II. Question no. 7 (Unit-III) is compulsory.

(ii) Use of non-programmable calculator is allowed.

UNIT-I

1. (a) Discuss the principle and working of a field effect transistor. Draw its characteristics and hence find its parameters.
- (b) Calculate the dynamic resistance of FET having amplification factor 60 and transconductance $150 \mu\text{ohm}^{-1}$. 7,2
2. (a) What is feedback in an amplifier? Derive an expression for gain of the amplifier with feedback. Explain how the negative feedback reduces phase distortion.
- (b) An amplifier has voltage gain 100 without negative feedback. When negative feedback with $\beta = 0.25$ is applied, the normal gain changes by 5%. Find the percentage change in gain of the amplifier with feedback.

6,3

3. (a) Draw the circuit of Hartley oscillator and explain its working. Derive an expression for frequency of oscillation and condition for sustained oscillations.
- (b) What is Barkhausen criterion of sustained oscillations?

8,1

UNIT-II

4. (a) What is amplitude modulation? Show that the frequency spectrum of amplitude band consists of two band frequencies on either side of carrier frequency.
- (b) A 200 W carrier wave is modulated to a depth of 80%. Calculate the total power in modulated wave. 7,2
5. (a) What is an operational amplifier? What are the characteristics of an ideal operational amplifier? Discuss its application as inverting and non-inverting amplifier.
- (b) For a given op-Amp, differential mode gain is 100 and common mode gain is 0.001. Find the value of CMRR in dB. 8,1
6. (a) Construct AND gate by using NAND gate. Draw its symbol and truth table.
- (b) Find the maxterms and minterms of :

$$f(A,B,C) = (A + B)(\bar{A} + C)$$

- (c) Solve the Boolean expression and draw its logic circuit:

$$Y = \bar{A} \bar{B} \bar{C} + \bar{A} B \bar{C} + A \bar{B} \bar{C} + A B \bar{C} \quad 3,3,3$$

UNIT-III

7. Attempt any **eight** parts:
- (a) What is the largest decimal number that can be represented in binary using 8 bits?

- (b) Convert decimal number 259 to its binary equivalent.
- (c) What are the basic differences between BJT and JFET?
- (d) What are the applications of emitter follower?
- (e) Why is radio wave reception better at night?
- (f) State De Morgan's theorems.
- (g) Define modulation factor in frequency modulation.
- (h) Name one application of positive feedback.
- (i) What are the advantages of negative feedback?
- (j) Why is IC 555 timer called so? 8×1