(i) **Printed Pages: 3** **Roll No. .....**

(ii) **Questions : 7** **Sub. Code :** 0 5 4 5

Exam. Code : 0 0 0 6

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

1059

PHYSICS

Paper—B : Electronics and Solid State Devices—II

Time Allowed : Three Hours] **[Maximum Marks : 22**

Note :— (1) Attempt ***five*** questions in all, selecting ***two*** from each Unit I and II. Unit III (question no. **7**) is compulsory.

(2) Use of non programmable calculator is allowed.

UNIT—I

1. (a) Draw the structure and characteristics of p-channel depletion MOSFET. Discuss its working. 3

(b) Common source FET amplifier has a load resistance of 500 kΩ. If the a.c drain resistance and amplification factor are 100 kΩ and 0.15 mA/V respectively, calculate the voltage gain of the amplifier. 1½

2. (a) Explain, with the help of a block diagram, the working principle of a feedback amplifier. Find the expression for the voltage gain with feedback. 3

(b) State Barkhausen Criterion for sustained oscillations. Give an expression for the frequency of oscillation and condition for the sustained oscillation. 1½

3. (a) Draw the circuit diagram of Wein Bridge Oscillator. Explain the principle of its operation. Show that the amplifier used in it must have again greater than 3 for sustained oscillations. 3

(b) A MHz Colpitt's oscillator is generating waveforms of frequency 16 MHz. The coil used in it has inductance of 10 mH and transistor has $h_{fe} = 50$ and $\Delta_{he} = 0.5$. Find the value of the capacitance. 1½

UNIT—II

4. (a) Write the characteristics of an ideal operational amplifier. Discuss its application as differentiator. 2

(b) Explain the working of astable multivibrator using IC555 Timer. Also, derive an expression for frequency and duty cycle of multivibrator. 2½

5. (a) What is the need for modulation ? Derive an expression for amplitude modulated wave with sinusoidal modulation. 2½

(b) Write a short note on skip distance and selective fading. 2

6. (a) What do you understand by standard form of SOP ? Explain with example the method to convert SOP expression into canonical SOP form. 2

(b) Solve the following Boolean expression and draw the simplified logic circuit and its truth table :

$$\overline{A}\,\overline{B}\,\overline{C} + \overline{A}B\overline{C} + A\overline{B}\,\overline{C} + AB\overline{C} \qquad 1½$$

(c) State De Morgan's theorem. 1

UNIT—III

(Compulsory Question)

7. Attempt any ***eight*** questions :

(a) Why is NAND gate considered as the building block of digital electronics ?

(b) Convert the following binary number $(1100.1011)_2$ to decimal number.

(c) What are the applications of emitter follower ?

(d) Why OP-Amp is generally not used in open loop mode ?

(e) Name the various modes of propagation of radio waves.

(f) What happens to the overall gain in positive feedback when $A\beta = 1$?

(g) What is comparator ?

(h) Name one application of positive and negative feedback.

(i) A 500 W carrier is modulated to depth of 60%. Calculate the total power in the modulated wave.

(j) What is pinch off voltage in FET ? $8 \times \frac{1}{2} = 4$