

[Total No. of (i) Printed Pages 4 (ii) Questions 7]

Sub Code : 0545 (1048) **Exam Code** : 0006

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

Subject : Physics

Paper : Paper-B : Electronics and Solid State
 Devis-II

Time : 3 Hours

Maximum Marks : 44

Note: (i) Attempt **five** question 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 FET transistor. Draw its characteristics and hence find its parameters. 7
- (b) A JFET $I_{DSS} = 32\text{mA}$, $V_{GS(off)} = -8\text{mA}$, $V_{GS} = -4.5\text{V}$. Find the drain current. 2
2. (a) What is feedback ? Explain how gain of an amplifier can be stabilized with the help of negative feedback. Also explain how it helps in reducing nonlinear distortion ?

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- (b) An amplifier with negative feedback has voltage gain of 100. It is found that without feedback an input signal of 50mV is required to produce a given output whereas with feedback, the input signal must be 0.6V for the same output. Calculate A and β .

2

3. (a) Draw the circuit of Colpitt's Oscillator and explain its working. Derive the expression for resonant frequency.

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UNIT - II

4. (a) What is an operational amplifier ? What are the characteristics of an ideal OPAMP ? Discuss its application as (i) adder (ii) scale changer (iii) differentiator.

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- (b) In the difference amplifier, $R_1=500\Omega$, $R_f=2000\Omega$. Find the voltage gain ? If $V_1=-0.3V$ and $V_2=0.5V$ what is the output voltage ?

2

5. (a) Show that power in lower side frequency is the same as that in the upper side frequency. Obtain an expression for total power for an AM wave in terms of unmodulated carrier power and modulation index.

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- (b) A 500W carries is modulated to a depth of 60%. Calculate the total power in the modulated wave. 2
6. (a) Describe IC 555 timer pin diagram and explain its operation as a monostable multivibrator. 7
- (b) Why IC 555 timer is called so ? 2

UNIT - III

(Compulsory Question)

7. Attempt any **eight** questions : 1×8=8
- (a) Which is the largest decimal number that can be represented in binary using 16 bits ?
- (b) What do you mean by minterm and maxterm ?
- (c) What is the importance of modulation index ?
- (d) What is the phenomena of 'selective fading' in condition with sky waves ?
- (e) Why is field effect transistor so called ?
- (f) Define common mode rejection ratio.

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- (g) Convert the binary number 1010111 to decimal.
- (h) Name one application of positive feedback.
- (i) What is the difference between alternator and an oscillator ?
- (j) What is the Barkhausen criterion for sustained oscillations ?