B. Sc. DEGREE END SEMESTER EXAMINATION OCTOBER 2018

SEMESTER – **3 : PHYSICS (CORE COURSE)**
COURSE : **15U3CRPHY3, ELECTRONICS**

(For Regular - 2017 Admission and Supplementary / Improvement 2016, 2015 & 2014 Admissions)

Time : Three Hours   Max Marks : 60

Part A   (Very short answer questions)

Answer all questions. Each question carries 1 Mark.

1. Why the PN junction diodes conduct only in one direction, when connected to a circuit?
2. Why conductivity of a semiconductor increases with temperature?
3. The reverse current in silicon diode is lower than that of germanium diode, why?
4. In a simple voltage regulator, why the zener is connected parallel to the load resistance?
5. What is meant by operating point of a CE amplifier?
6. Why FET is called unipolar device?
7. In cascaded amplifiers the overall voltage gain is the product of voltage gains of the individual stages but over all current gain is not the product of current gains of individual stages why?
8. What is the main disadvantage of Class A power amplifier?
9. What are the basic conditions for oscillations in an oscillator unit?
10. Explain the concept of virtual ground in OP - Amp.   (1 x 10 = 10)

Part B (Short answer questions)

Answer any 7 questions. Each question carries 2 Marks

11. Write the main differences between amplifier and oscillator.
12. What are the main advantages of class B push pull amplifier over class A?
13. Write the main advantages of using negative feedback in amplifier circuits.
14. State the main advantages of FET over junction transistor.
15. Explain the term thermal runaway in transistor amplifier circuits.
16. In a CE amplifier there is a phase shift of 180^0 between input and output voltages, explain.
17. What is modulation index in AM?
18. Explain the term leakage currents I_{CBO} and I_{CEO} and write the relation between them?
19. Explain the term sidebands in modulation.

   (2 x 7 = 14)

Part C (Problem/Derivations)

*Answer any 4 question. Each question carries 4 Marks*

20. Draw the circuit of diode shunt clipper and the input output wave form for the following cases. (i) Positive clipper (ii) negative clipper (iii) biased positive clipper and (iv) combination of biased positive and negative clipper.
    Assume that the diode is ideal, the input signal is sine wave of maximum voltage V_m and the bias voltages are V_1 and V_2.

21. For the opamp circuit below find V_{out}, input impedance Z_{in} and input current. Given V_{in} = 15µV, R_{in}=10 K and R_f = 68K
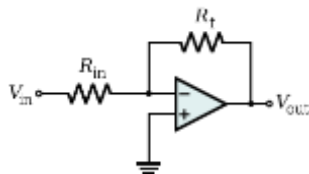

22. Total power content of an AM wave is 1500 W. For 100% modulation determines the power transmitted by the (i) Carrier (ii) each side band.

23. Figure below shows a negative feedback amplifier. Calculate the open-loop gain G, feedback factor H and voltage gain Av with feedback.
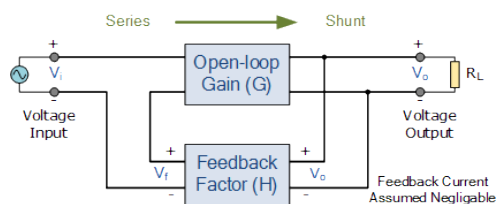
    Given, voltage input from source Vi = 0.1 V, voltage input to the amplifier = 2µV, feedback voltage Vf = 0.1V and output voltage V0 = 2V.

24. Figure below shows the voltage divider bias method. Draw the d.c load line and determine the operating point. Assuming the transistor to be of silicon.
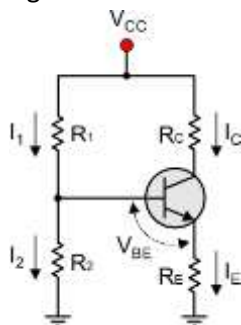
    Given R_1=20K, R_2=10K, R_C=4K, R_E=5K and V_{cc}=30V

25. A silicon diode having internal resistance R_f=30Ω is used for half wave rectification. The input ac voltage is V_i=6 sin(ωt) volt and load resistance is 500Ω. Find the dc output voltage, ac input power and the efficiency of the rectifier. $\qquad$ (4 x 4 = 16)

Part D Long answer questions
Answer any 2 question. Each question carries 10 Marks

26. Draw the circuit diagram and explain the working of a full wave rectifier. Also explain the terms and the expressions for efficiency ripple factor and peak inverse voltage.

27. Describe the working of a CE amplifier, what is d.c load line and operating point. What is a.c load line?

28. What is negative feedback? Derive the expression for gain of an amplifier with negative feedback. Compare negative and positive feedback in amplifier circuit.

29. What are the different classes of power amplifiers? Describe the working of a class A push-pull amplifier.

$\qquad$ (10 x 2 = 20)

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