



Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, November 2013**  
**First Degree Programme under CBCSS**  
**PHYSICS**  
**Core Course – VII**  
**PY 1543 : Electronics**

Time: 3 Hours

Weight : 30

**SECTION – A**

[This Section contains **four** bunches **each** of **four** questions. Answer **all** questions. **Each** bunch carries a weightage of **one**].

- I. 1) P type semiconductor is formed by doping intrinsic semiconductor with
  - a) tetra valent impurity
  - b) trivalent impurity
  - c) penta valent impurity
  - d) antimony
- 2) A reverse biased p.n. junction
  - a) is equivalent to an open switch
  - b) is equivalent to a low resistance
  - c) is equivalent to a closed switch
  - d) can conduct current easily
- 3) Ripple factor of a rectifier is a measure of the
  - a) amount of d.c. component in the rectifier output
  - b) amount of a.c. component in the rectifier output
  - c) conversion efficiency
  - d) rectifying capacity

P.T.O.



4) Full wave rectifiers are preferred to half wave rectifiers because of

- a) high efficiency
- b) high ripple factor
- c) low ripple factor
- d) both (a) and (c)

II. 5) The relation between  $\alpha$  and  $\beta$  of a transistor is given by

a)  $\alpha = \frac{\beta}{1-\beta}$

b)  $\beta = \frac{\alpha}{1-\alpha}$

c)  $\alpha = \frac{\beta}{1+\alpha}$

d)  $\alpha = \frac{\beta}{\beta-1}$

6) When the emitter bypass capacitor of a common emitter amplifier is removed

- a) voltage gain is decreased
- b) voltage gain is increased
- c) no change for voltage gain
- d) voltage gain and current gain are increased

7) The main application of an emitter follower is as

- a) voltage amplifier
- b) power amplifier
- c) low input impedance circuit
- d) impedance matching circuit



8) Current gain in a Common Base transistor configuration is given by

a)  $\alpha = \frac{\Delta I_C}{\Delta I_E}$

b)  $\alpha = \frac{\Delta I_B}{\Delta I_E}$

c)  $\alpha = \frac{\Delta I_C}{\Delta I_B}$

d)  $\alpha = \frac{\Delta I_E}{\Delta I_C}$

III. 9) Voltage divider bias circuit is commonly used in amplifier circuits because

- a) it can be used for high current applications
- b) it can give more voltage gain
- c) it consumes more power
- d) it makes the operating point almost independent of  $\beta$

10) The maximum overall efficiency of a transformer coupled class A amplifier is

- a) 78.5 %
- b) 25 %
- c) 12.05 %
- d) 50 %

11) Voltage gain of an amplifier is 200. When a negative feed back of 1.5 % is applied, what is the gain ?

- a) 60
- b) 300
- c) 50
- d) 100

12) Gain of a non inverting OP AMP is

- a)  $\frac{R_f}{R_i}$
- b)  $1 + \frac{R_f}{R_i}$
- c)  $1 + \frac{R_i}{R_f}$
- d)  $\frac{R_i}{R_f}$



- IV. 13) The main function of the transformer in the output stage of a power amplifier is to
- a) reduce distortion
  - b) match the load with the output impedance
  - c) increase the voltage gain
  - d) increase the bandwidth
- 14) A photodiode is always used
- a) under forward bias
  - b) under positive bias
  - c) with no bias
  - d) under reverse bias
- 15) 100 % modulation is produced in amplitude modulation when the
- a) carrier frequency equals the signal frequency
  - b) carrier frequency is two times the signal frequency
  - c) carrier amplitude is greater than signal amplitude
  - d) carrier amplitude equals signal amplitude
- 16) An ideal OPAMP has
- a) infinite output resistance
  - b) zero input resistance
  - c) zero output resistance
  - d) zero input and output resistances

#### SECTION – B

[Answer **any eight** questions. **Each** question carries a weightage of **one**.]

- 17) Define the efficiency of a rectifier. What are the values for half wave and full wave rectifiers ?
- 18) What is the function of a filter circuit in a rectifier ? Draw the output waveform of a fullwave rectifier using shunt capacitor filter.



- 19) Define current amplification factor in CB transistor configuration. What is its typical value ?
- 20) What is transistor biasing ? Name three different methods of transistor biasing.
- 21) What are the merits of FET when compared with ordinary transistor ?
- 22) Briefly explain the operation of a TRIAC. What are its important applications ?
- 23) What do you mean by distortion in amplifiers ?
- 24) What are the important advantages of potential divider method of transistor biasing ?
- 25) What is the need of modulation in a communication system ?
- 26) Draw the block diagram of a superheterodyne radio receiver.
- 27) What is a phase shift circuit ? Draw its circuit diagram.
- 28) What are the characteristics of an ideal OP AMP ? How do the different characteristics of a practical OP AMP differ from an ideal one ?

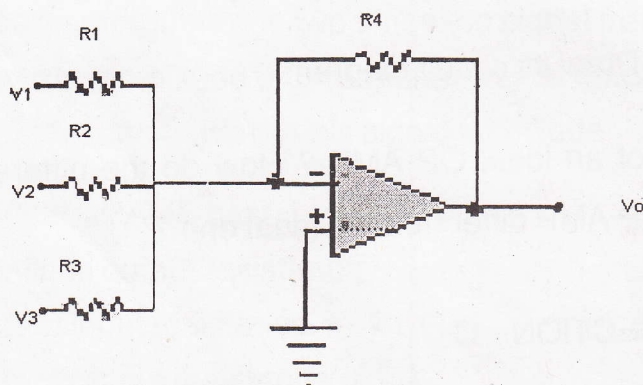
#### SECTION – C

[Answer **any five** questions. **Each** question carries a weightage of **two**.]

- 29) The open loop gain of an amplifier is 200. A voltage series negative feedback is used with ratio of 0.02. The input and output impedances of the amplifier are  $2\text{K}\Omega$  and  $40\text{K}\Omega$  respectively in the absence of feedback. Determine the closed loop gain and input and output impedances when feedback is applied.
- 30) What is the frequency of oscillation of a Hartley oscillator if the total inductance of the coil in the tank circuit is 50 mH and capacitance is 200 pF ?



- 31) The peak to peak value of an AM voltage has a maximum value of 5V and minimum value of 1V. What is the modulation index and amplitude of the unmodulated carrier voltage ?
- 32) The r.m.s. voltage of a transformer from the centre tap to each end of the secondary is 20 V. This transformer is used in a rectifier where the two diodes have a forward resistance of  $16\ \Omega$  each. The load has a resistance of  $900\ \Omega$ . Determine (a) r.m.s. value of the load current (b) average load current and (c) the rectifier efficiency.
- 33) Figure below shows the circuit of an adder.  $R_1 = 1000\ \Omega$ ,  $R_2 = 200\ \Omega$ ,  $R_3 = 400\ \Omega$  and  $R_4 = 500\ \Omega$ . The input voltages are  $V_1 = -5\text{V}$ ,  $V_2 = 3\text{V}$  and  $V_3 = 4\text{V}$ . Calculate the output voltage  $V_o$ .



- 34) A CE transistor amplifier using potential divider method of biasing has the following parameters.  $V_{CC} = 12\text{V}$ ,  $R_1 = 10\text{K}\Omega$ ,  $R_2 = 2\text{K}\Omega$ ,  $R_C = 1\text{K}\Omega$  and  $R_E = 390\Omega$ . Determine the operating point ( $V_{CE}$ ,  $I_C$ ) assuming that the transistor is Silicon.
- 35) What is the Barkhausen criterion for sustained oscillations in electronic oscillators ? Draw the circuit diagram of a Hartley oscillator and explain its working.
- 36) What are h parameters of a transistor ? How they are calculated for a CE amplifier ? Draw the h parameter equivalent of a CE amplifier.



SECTION – D

[Answer **any two** questions. **Each** question carries a weightage of **four**]

- 37) Draw the circuit diagram of a full wave centre tapped rectifier. Explain its working. Derive the expressions for its efficiency and ripple factor. What are the advantages of full wave rectifier over half wave rectifier ?
- 38) Explain briefly the three transistor configurations. Define current amplification factor in each case and derive the relations between them. Why CE configuration is the most preferred configuration for amplifiers ?
- 39) What is the need of modulation in radio communication ? What is the principle of amplitude modulation ? What do you mean by modulation index ? Give the frequency spectrum of an amplitude modulated wave. Draw the block diagram of a super heterodyne radio receiver and explain its working.
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