FYUGP B.Sc 4th Semester Sessional Examination 2026

Paper Code: PHY4400304

Paper Name: Analog Electronics

Time: 90 minutes **Total marks: 30**

1. Answer the following questions: 1 x 5 =5
   a) What do you mean by common emitter forward amplification factor?
   b) What is the value of total collector current in a CB circuit?
   c) What happens to the collector current when the E/B junction of a transistor is forward biased?
   d) For a CB connected transistor $\alpha = 0.96$ and $I_E = 2mA$. Find I_c and I_B.
   e) What is a donor level of extrinsic semiconductors?

2. Answer the following questions: (any five) 3 x 5 =15
   a) What do you mean by transistor biasing? Write about the different methods of transistor biasing.
   b) Draw characteristics curve of diode in order to explain the significance of knee voltage and break down voltage.
   c) Draw a simple band diagram of the PN junction diode under (a) forward biased condition (b) reverse biased condition.
   d) Use individual band diagrams to show the normal positions of donor and acceptor levels ?
   e) Draw circuit diagrams to explain the working principle of (a) half wave rectifier (b) full wave rectifier.
   f) i) If the voltage gain of an amplifier is 10, find the power gain.
   ii)An amplifier has maximum output power of 8 W. Find the output power at the 3 dB frequency.
   g) At a certain frequency, the output voltage of an amplifier is 7.07 V, while the maximum voltage is 10 V. Show that this corresponds to the 3 dB point.

3. Answer the following questions: (any two) 5 x 2 =10
   a) Using the necessary schematic diagram explain ACTIVE, CUT OFF and saturation region of a transistor.
   b) What do you mean by Amplification of a transistor? Use a NPN transistor to draw a circuit diagram of a single stage CE amplifier.
   c) Draw the equivalent circuit with hybrid parameters. Write the significance of h_{11}, h_{12}, h_{21} and h_{22}.
   d) What do you mean by phase reversal? Draw the necessary circuit diagram to explain the phase reversal in CE transistor amplifier.
   e) An amplifier has: Maximum output voltage = 30 V, Lower cutoff frequency = 200 Hz, Upper cutoff frequency = 20 kHz
   (a) Find the output voltage at both cutoff frequencies. (b) Calculate the bandwidth.

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FYUGP B.Sc 6th Semester Sessional Examination 2026
Paper Code: PHY-0600304
Paper Name: Astronomy and Astrophysics

Time: 90 minutes **Total marks: 40**

1. **Answer the following questions:** 1 x 5 =5
   a) State the cosmological principle.
   b) What is dark energy?
   c) What do you mean by bolometric magnitude of a star ?
   d) What is spectral classification of stars? Arrange spectral classes in order of decreasing temperature.
   e) Where are giants and white dwarfs located in the H–R diagram?
2. **Answer the following questions: (any three)** 3 x 5 =15
   a) Define Hubble's law and explain its significance.
   b) When GMT clock reads 20:20 i.e.8:20 PM in Greenwich, the local time is noon. Obtain the longitude
   c) Explain the basic principle of stellar parallax method used for the distance measurement of nearby stars.
   d) Using the H–R diagram, explain the relationship between luminosity and radius of stars.
   e) i) Two stars have the same radius but temperatures in the ratio 2 : 1. Find the ratio of their luminosities.
   ii) A black body emits 100 W/m² at a certain temperature. What will be the emission if the temperature is doubled?
3. **Answer the following questions: (any two)** 10 x 2 =20
   a) Describe the large-scale structure of the universe: galaxies, clusters, superclusters, filaments, and voids.
   b) Compare Big Bang theory and steady state theory.
   c) What do you mean by apparent magnitude (am) and absolute magnitude (AM) of a star ? The distance of a star is 100pc and its am is 6. Determine its AM.
   d) i) Two stars have peak wavelengths 400 nm and 800 nm.
      (a) Find their temperatures (b) Identify which one is hotter
   ii) A black body radiates energy at a rate of 500 W/m² at temperature T.
      (a) Find the energy radiated when the temperature becomes 2T.
      (b) By what factor does the radiation increase?

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