Seat No. _____

HAL-003-2015027
B. Sc. (Sem. V) (CBCS) Examination
June - 2023
Physics : 503
(New Course)

Faculty Code : 003
Subject Code : 2015027

Time : $2\frac{1}{2}$ / Total Marks : **70**

Instructions :
- (1) All questions are compulsory.
- (2) Symbols have their usual meanings.
- (3) Figurtes to the right indicate marks.

1 (a) Answer the following in short :   **4**
- (1) Define band width of an amplifier.
- (2) Write the function of emitter bypass capacitor.
- (3) Define distortion in an amplifier.
- (4) To which class does the push pull amplifier belong ?

(b) Answer in brief : (any one)   **2**
- (1) Find the voltage gain in dB if the voltage gain is 40.
- (2) A power transistor dissipates 7W. If the maximum junction temperature is 85ºC, find the maximum ambient temperature at which it can be operated, given that $\theta = 6.5$ºC/W.

(c) Answer in detail : (any one)   **3**
- (1) Give the comparison of different types of coupling methods.
- (2) Write a note on thermal runaway.

(d) Write notes on : (any one)   **5**
- (1) Explain transformer coupled amplifier with neat circuit diagram.
- (2) Writre a note on Push-pull amplifier.

2 (a) Answer the following in short :   **4**
    (1) Define astable multivibrator.
    (2) Give two advantages of electronic switches.
    (3) What is the other name for bistable multivibrator ?
    (4) Define a clamping circuit.

    (b) Answer in brief : (any one)   **2**
    (1) An astable multivibrator has $R_2=R_3=15k\Omega$ and $C_1=C_2=0.05$ μf. Find the time period and frequency of the output wave form.
    (2) A peak-to-peak input voltage of 30V is applied to a positive clipper. If $R_L = 2.5$ kΩ and R = 220Ω, determine the output voltage for each half cycle.

    (c) Answer in detail : (any one)   **3**
    (1) Write the conditions necessary for an RC circuit to work as integrating circuit.
    (2) Show that the output of a differentiating circuit is derivative of the input voltage.

    (d) Write notes on : (any one)   **5**
    (1) Explain monostable multivibrator with neat circuit diagram.
    (2) What do you understand by clipping circuit ? Explain the working of a combination clipper with a neat circuit diagram.

3 (a) Answer the following in short :   **4**
    (1) What is the need of regulated power supply ?
    (2) Write the equation of minimum load resistance.
    (3) Define differential amplifier.
    (4) Write the full form of VLSI.

    (b) Answer in brief : (any one)   **2**
    (1) A power supply has a voltage regulation of 1.5%. If the no-load voltage is 23V, what is its full-load voltage ?
    (2) A non-inverting op-amp has $R_1 = 12$ kΩ and $R_f = 1.3$ mΩ. Determine its voltage gain.

    (c) Answer in detail : (any one)   **3**
    (1) Explain voltage regulation.
    (2) Write the characteristics of an ideal op-amp.

    (d) Write notes on : (any one)   **5**
    (1) Write a note on series feedback voltage regulator.
    (2) Explain single ended input operation of a differential amplifier.

4 (a) Answer the following in short :   **4**
  (1) Define resonse time of thermistors.
  (2) Give two examples of acoustical transducers.
  (3) Write the principle of capacitive pressure transducer.
  (4) Write the equation which gives the relation between temperature and resistance of a metallic wire.

  (b) Answer in brief : (any one)   **2**
  (1) A platinum wire with $R_0 = 75\,\Omega$ and $\alpha = 0.004$, is kept in an environment at 90°C. What is its resistance ?
  (2) A wire strain gauge with a gauge factor K=3 is bonded to a steel member which is subjected to a strain of 10^{-7}. If the original no-strain resistance of the gauge is $85\,\Omega$. Calculate the change in gauge resistance.

  (c) Answer in detail : (anuy one)   **3**
  (1) Explain strain gauge.
  (2) Explain the working of tachometer.

  (d) Write notes on : (any one)   **5**
  (1) Explain construction and working of LVDT.
  (2) Write a note on moving coil microphone.

5 (a) Answer the following in short :   **4**
  (1) Write the function of electron gun in CRT.
  (2) Give the advanrtages of a digital voltmeter.
  (3) Define flip-flop.
  (4) Write the logic equations of SUM and CARRY for half-adder.

  (b) Answer in brief : (any one)   **2**
  (1) If $R_A = R_B = 50\,k\Omega$ and C=950 pF, calculate the frequency of oscillation of astable 555 timer.
  (2) Calculate the output pulse width for the 555 timer of monostable multivibrator given that $R_A = 8\,k\Omega$ and C=22 μF.

  (c) Answer in detail : (any one)   **3**
  (1) Describe various functions of instruments.
  (2) Write a note on encoder.

  (d) Write notes on : (any one)   **5**
  (1) Explain frequency determination using CRO.
  (2) Write a note on D flip flop.

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