DBL-003-1015027 Seat No. _____

B. Sc. (Physics) (Sem. V) Examination

June - 2022

P-503 : Solid State Electronics

(Old Course)

Faculty Code : 003
Subject Code : 1015027

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) Symbols and notations have their usual meaning.
(2) Total marks of the question is indicated on the right side of the question.
(3) Attempt any five questions out of the following ten.

1 (a) Answer the following questions in short: **4**
(1) 1 bel = _____ dB.
(2) Coupling capacitor is also known as _____.
(3) When the band width (BW) is multiplied by the gain at mid frequencies, gain band width (GBW) is obtained. (True / False)
(4) TC coupled amplifier is use for amplify low frequency signals. (True / False)

(b) Answer the following question : **2**
A two stage amplifier has a first stage voltage gain of 100, and second stage voltage gain of 200. Find the total voltage gain in dB.

(c) Explain frequency response of R–C coupled amplifier. **3**

(d) Write a short note on the role of capacitors in transistors amplifier. **5**

2 (a) Give answer in very short : **4**
(1) Power amplifier is meant to decrease the power level of the input signal. (True / False)
(2) In the voltage amplifier transistor with high β is used in the circuit. (True / False)
(3) The change of output wave shape from the input wave shape of an amplifier is known as _____.
(4) The unit of thermal resistance (θ) is _____.

(b) A power amplifier supplies 50W to an 8Ω speaker find : **2**
(i) ac output voltage
(ii) ac contput current.

(c) Explain thermal runaway. **3**

(d) Give the classification of power amplifier and explain in brief. **5**

3 (a) Give the answers in very short : **4**
(1) A circuit that can turn ON and OFF power to an electrical circuit is called _____.
(2) The transistor in saturation and cutoff states behaves as a switch. (True / False)
(3) A multivibrator that continually changes its states without external triggering is known as _____ multivibrator.
(4) In monostable multivibrator the width of duration of pulse at the collector of either transistor is given by $T=R_2C_1$.

(b) An astable multivibrator having $R_1 = R_2 = 12$ KΩ and $C_1 = C_2 = 0.02\ \mu F$. Find the time period and frequency of the output wave forms. **2**

(c) Explain a differential circuit. **3**

(d) Draw the neat circuit diagram of an astable multivibrator and explain its working. **5**

4 (a) Give answer in short : **4**
(1) The minimum Load resistance.
$R_{L(min)} = V_{FL}$ x I_{FL} (true / false)
(2) The Zener diode in voltage regulation must operate in the breakdown region. (True / False)
(3) In transistor series voltage regulator output voltage is given by $V_{out} = V_z - V_{BE}$. (True / False)
(4) In transistor shunt voltage regulator output voltage is equal to the _____.

(b) A negative shunt clipper made with 1 KΩ resistance and 3 KΩ load resistance, is applied with an input having peak voltage +10V. Find the peak output voltage. **2**

(c) Explain how a transistor works as switch. **3**

(d) Explain in detail biased clippers. **5**

5 (a) Give answer in short : 4

(1) An integrated circuit (1C) is also known as _____.

(2) The first IC was developed by _____

(3) The IC is not repairable. (True / False)

(4) In large scale of integration (LSI) component density is _____.

(b) Explain the basic idea of clamper. 2

(c) Explain the type of voltage regulators. 3

(d) Explain the Zener diode as a voltage regulator. 5

6 (a) Give answer in short : 4

(1) Draw symbol of operational amplifier.

(2) What is the full form of CMRR ?

(3) For ideal op-amp the open-loop gain Av is _____

(4) The adder circuit gives an output voltage equal to the algebraic sum of two or more input voltage. (True / False)

(b) If the dc output voltage is 400 V with no-load attached to power supply but decreases to 300 V at full load, find the percentage voltage regulation. 2

(c) Explain ordinary dc power supply. 3

(d) Write note on series voltage regulator. 5

7 (a) Give answer in short : 4

(1) _____ is device that converts energy in one form to the another form.

(2) Technometer is a device which converts _____ into an electrical signal.

(3) Give full form of LVDT.

(4) Strain gauge is _____ transducer.

(b) Explain common mode and differential mode signals. 2

(c) Explain : Op-Amp as unity follower. 3

(d) Derive an expression for the output voltage of an Op-amp differentiator. 5

8 (a) Give answer in short : 4

(1) Thernistar is the short form for _____

(2) What is the full form of RTD ?

(3) Gauge Factor (K) defined as the fractional ratio of the change in resistance to the change in length. True / False.

(4) Quartz crystal is used for high frequencies in crystal microphone. True/False

(b) If R_1 = 10 KΩ, R_f = 100 KΩ, V_1 = 5V and V_2 = 6V, find the output voltage for the op-amp subtractor circuit. **2**

(c) Explain resistance temperature detector. **3**

(d) Explain construction and working of LVDT. **5**

9 (a) Give answer in short : **4**

(1) The deflection type of instruments are analog instruments. (True / False)

(2) The multimeter is also known as _____.

(3) What is the full form of VTVM ?

(4) Give the full form of CRO.

(b) Describe the three ways of making measurements. **2**

(c) Explain analog and digital instruments. **3**

(d) Explain DVM with proper block diagram. **5**

10 (a) Write answer in short : **4**

(1) If Half-Adder the output of the Ex-OR gate is called _____.

(2) Multiplexer is also called _____

(3) In NIBBLE MULTIPLEXER when SELECT is high, the right nibble is select to the output. (True / False)

(4) BCD is an abbreviation for _____

(b) Determine the frequency of oscillation for the astable 555 timer. Circuit specifications are RA = RB = 47 KΩ and C = 1000 PF. **2**

(c) Explain R/S flip-flop with the circuit diagram and truth-table. **3**

(d) Write a note on multiplexer and demultiplexer. **5**
