I PUC MID-TERM EXAMINATION, OCTOBER-2023 (SET-2)

Time : 3 Hrs. 15 Mins. SUBJECT : ELECTRONICS (40) Max. Marks : 70
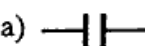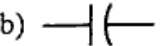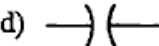
Instructions:
1. The question paper has four parts : A, B, C and D.
2. Part-A is compulsory.
3. Part-D consists of Section-I Essay type questions and Section-II problems.
4. Circuit diagrams and truth tables must be drawn wherever necessary.
5. Solve the problems with relevant formulae.

PART-A

I Select the correct answer from the choices given : 15x1=15

1) Vacuum tube diode was invented by
   a) Lee De Forest b) Shockley c) J. A. Fleming d) Jack Kilby

2) Most commonly used semiconductor material in device fabrication is,
   a) Silicon b) Germanium c) Aluminium d) Boron

3) For the invention of transistor in 1956 three scientists are awarded by
   a) Padmashri b) Padmavibhushana c) Padmabhushana d) Nobel

4) The SI unit of charge is
   a) Volt b) Ampere c) Ohm d) Coulomb

5) Number of electrons in coulomb of charge is
   a) 6.25×10^5 b) 6.25×10^2 c) 6.25×10^{18} d) 6.25×10^{19}

6) Internal resistance of an ideal voltage source is
   b) $0\,\Omega$ b) $1\,M\Omega$ c) $10k\Omega$ d) ∞

7) One kilowatt-hour is
   a) 3.6×10^{16} J b) 3.6×10^6 J c) 3.6×10^{18} J d) 36×10^6 J

8) The value of the resister if colour bands are Brown, Black, Red and Gold
   a) $1k\Omega \pm 10\%$ b) $1k\Omega \pm 20\%$ c) $10\,k\Omega \pm 5\%$ d) $1k\Omega \pm 5\%$

9) Symbol of an electrolytic capacitor is

   a) ⊣⊢ b) ⊣(⊢ c) ⤬ d) ⊣)(⊢

10) Expression for energy stored in a capacitor is
    a) $2\,CV^2$ b) $\frac{1}{2}C^2V$ c) $2\,C^2V$ d) $\frac{1}{2}C^2V$

11) Value of an SMD resistor marked as 6R5 is
    a) $65\,\Omega$ b) $65k\Omega$ c) $6.5\,\Omega$ d) $65 \times 10^{12}\,\Omega$

12) Pentavalent dopants are also known as
    a) acceptor impurity b) donor impurity c) Insulators d) conductors

13) Knee voltage for the germanium diode will be
    a) 3.3V b) 0.7V c) 0.3V d) 7.7V

14) PIV of a Half wave rectifier is
    a) $2V_m$ b) $\frac{2}{\pi}V_m$ c) $\frac{V_m}{\pi}$ d) V_m

15) Number of diodes used in Bridge rectifier is
    a) 4 b) 3 c) 2 d) 1

II Fill in the blanks by choosing appropriate answers from those given in the bracket: 5x1=5
    [a) Lithuim-ion battery b) Variable c) Electron Volt d) depletion region e) Hertz]

16) _____ is the unit of frequency.

17) An example for secondary DC source is _____.

(P.T.O)

18) Potentiometer is a _____ resistor

19) Energy gap is measured in _____.

20) The region near the junction where there is no free electrons and holes is _____.

PART-B

III Answer any FIVE questions: 5x2=10

21) Calculate the number of electrons flowing in a conductor in one second if 4 Amps or current flows through it.

22) Find the power consumed by a phone when operated with a 5 Volt and 15 mA of current.

23) What are primary DC sources ? Give one example.

24) State Super position theorem.

25) Define active and passive components.

26) Calculate the total capacitance if three capacitors $20\,\mu F$, $40\,\mu F$ and $60\,\mu F$ are connected in series.

27) Draw the crystalline structure of n-type semiconductor. https://www.karnatakaboard.com

28) What are the majority and minorities charge carriers of p-type semiconductors.

29) Calculate load voltage and load current for the circuit shown below.
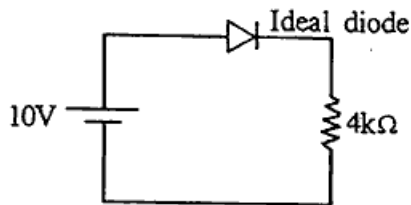
PART-C

IV Answer any FIVE questions: 5x3=15

30) Give a brief note on role of electronics in medical science.

31) Mention three applications of cellphone.

32) List the properties of charges.

33) State and explain KVL.

34) Explain current divider rule.

35) State Ohm's law and write it's limitations.

36) Explain the construction of metal film resistor.

37) Draw and explain the V-I characteristics of a p-n junction diode.

38) A silicon diode is used in the circuit. Determine V_D, V_R, I_D.
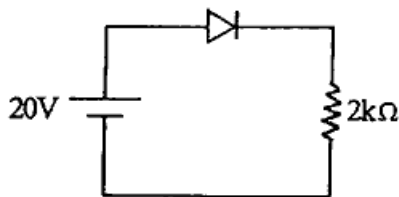
PART-D
(SECTION-I)

**V Answer any THREE questions:**   3x5=15

39) State and explain Maximum Power Transfer theorem with an example.

40) Define the following terms

    a) Node   b) Loop   c) Mesh   d) Linear Network   e) Bi-lateral Network

41) Write a note on colour code chart of a resistor.

42) Explain the principle of a capacitor.

43) With a relevant circuit diagram and input and output waveforms explain the working of centre tapped full wave Rectifier.

44) Classify solids based on energy band diagram.
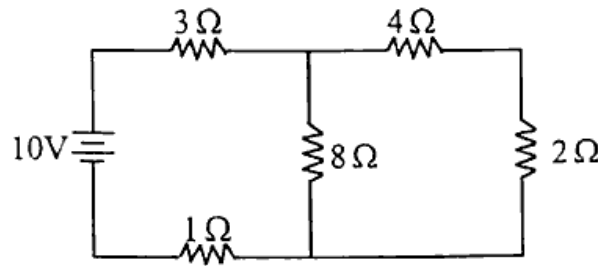
(P.T.O)

(SECTION-II)

VI **Answer any TWO questions:**

2x5=10

45) Determine the branch currents and voltage drops across each resistor.
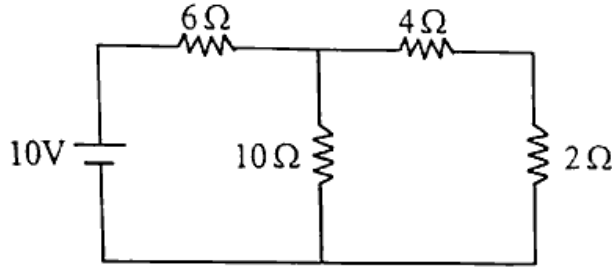
46) Find the current through and voltage across $2\,\Omega$ resistor using Thevenin's theorem.

47) A half-wave rectifier uses a diode with forward resistance $40\,\Omega$. If the input ac voltage is 220 V_{rms} and the load resistance is $10\,k\Omega$, determine

   (i) I_m

   (ii) I_{dc}

   (iii) Peak inverse voltage

   (iv) Load output voltage

   (v) DC output power.

48) A 230 V, 50 Hz AC voltage is applied to the primary of 4 : 1 step down transformer, which is used in bridge rectifier having a load resistance of $100\,\Omega$. Assuming the diodes to be an ideal determine,

   (i) Peak supply voltage

   (ii) I_{dc}

   (iii) V_{dc}

   (iv) P_{dc}

   (v) PIV.

*****