ENTRANCE TEST-2021

SCHOOL OF ENGINEERING

B.TECH. LATERAL ENTRY

Question Booklet Series **D**

Roll No. : | 8 | 4 | 0 | 2 | | |

| Total Questions | : | 60 |
| Time Allowed | : | 70 Minutes |

Instructions for Candidates :

1. Write your Roll Number in the space provided at the top of this page of Question Booklet and fill up the necessary information in the spaces provided on the OMR Answer Sheet.

2. OMR Answer Sheet has an Original Copy and a Candidate's Copy glued beneath it at the top. While making entries in the Original Copy, candidate should ensure that the two copies are aligned properly so that the entries made in the Original Copy against each item are exactly copied in the Candidate's Copy.

3. All entries in the OMR Answer Sheet, including answers to questions, are to be recorded in the Original Copy only.

4. Choose the correct / most appropriate response for each question among the options A, B, C and D and darken the circle of the appropriate response completely. The incomplete darkened circle is not correctly read by the OMR Scanner and no complaint to this effect shall be entertained.

5. Use only blue/black ball point pen to darken the circle of correct/most appropriate response. In no case gel/ink pen or pencil should be used.

6. Do not darken more than one circle of options for any question. A question with more than one darkened response shall be considered wrong.

7. There will be '**Negative Marking**' for wrong answers. Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.

8. Only those candidates who would obtain positive score in Entrance Test Examination shall be eligible for admission.

9. Do not make any stray mark on the OMR sheet.

10. Calculators and mobiles shall not be permitted inside the examination hall.

11. Rough work, if any, should be done on the blank sheets provided with the question booklet.

12. OMR Answer Sheet must be handled carefully and it should not be folded or mutilated in which case it will not be evaluated.

13. Ensure that your OMR Answer Sheet has been signed by the Invigilator and the candidate himself/ herself.

14. At the end of the examination, hand over the OMR Answer Sheet to the invigilator who will first tear off the original OMR sheet in presence of the Candidate and hand over the Candidate's Copy to the candidate.

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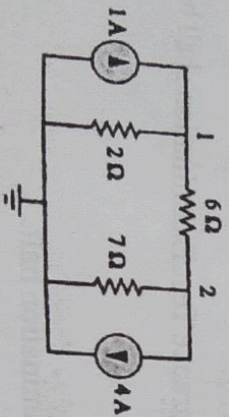1. How much energy does a 100 W electric bulb consume in 2 hours ?

   (A) 720 KJ
   (B) 300 Wh
   (C) 600 KJ
   (D) 100 Wh

2. Transform the wye network in Fig. to a delta network :
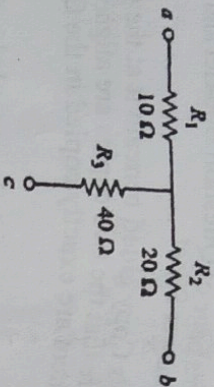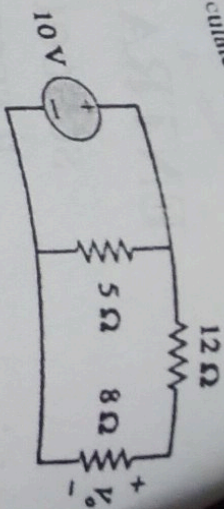

   (A) Ra = 140 ohm, Rb = 70 ohm, Rc = 35 ohm
   (B) Ra = 120 ohm, Rb = 60 ohm, Rc = 25 ohm
   (C) Ra = 100 ohm, Rb = 50 ohm, Rc = 35 ohm
   (D) Ra = 140 ohm, Rb = 40 ohm, Rc = 30 ohm

3. Obtain the node voltages in the circuit :

   (A) v1 = -2 V, v2 = -10 V
   (B) v1 = -2 V, v2 = -12 V
   (C) v1 = -4 V, v2 = -10 V
   (D) v1 = -4 V, v2 = -14 V

4. Calculate V_o :


   (A) 2 V
   (B) 3 V
   (C) 4 V
   (D) 5 V

5. Source transformation is :

   (A) A procedure for transforming a voltage source in parallel with a resistor to a current source in parallel with a resistor
   (B) A procedure for transforming a voltage source in series with a resistor to a current source in parallel with a resistor
   (C) A procedure for transforming a voltage source in series with a resistor to a current source in series with a resistor
   (D) A procedure for transforming a voltage source in parallel with a resistor to a current source in series with a resistor
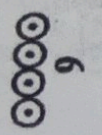
6. Find rms value of current waveform in figure :
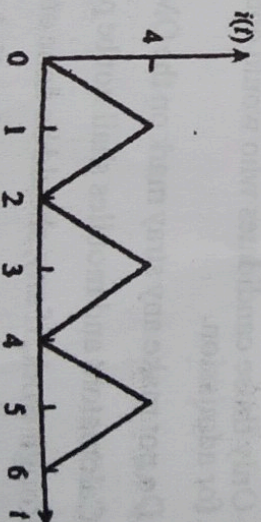
   (A) 3.309 A
   (B) 2.309 A
   (C) 4.509 A
   (D) 4 A

7. An electric iron draws 2 A at 120 V. Find its resistance:

(A) 30 ohm

(B) 40 ohm

(C) 50 ohm

(D) 60 ohm

8. Voltage is measured in:

(A) Watts

(B) Amperes

(C) Volts

(D) Joules per second

9. When the line intersects horizontal plane, it is called:

(A) Horizontal trace

(B) Vertical trace

(C) Trace of a line

(D) None of these

10. Isometric dimensioning uses DIM command with:

(A) Oblique option

(B) Horizontal option

(C) Both the above

(D) None of the above

11. If a block is to be used in another drawing file, the command to save the block is:

(A) INSERT

(B) BLOCK

(C) WBLOCK

(D) MINSERT

12. When a plane has its surface parallel to VP and perpendicular to HP. The top view is always a:

(A) Square

(B) Triangle

(C) Polygon

(D) Straight line

13. To draw a side view, an auxiliary vertical plane is imagined to be placed:

(A) Perpendicular to both H.P. and V.P.

(B) Perpendicular to H.P. and parallel to V.P.

(C) Perpendicular to V.P. and parallel to H.P.

(D) None of the above

14. The flank angle of a Buttress thread is:

(A) 55° and 45°

(B) 45°

(C) 47½°

(D) 45° and 7°

15. One of the uses of the concept of centroid is; as in the simplification of the loading system the net force acts at the _____ of the loading body.

(A) Centroid

(B) The centre axis

(C) The corner

(D) The base

16. A steel bar of 40 mm × 40 mm square section is subjected to an axial compressive load of 200 KN. If the length of the bar is 2 mm and E = 200 GPa, the elongation of the bar will be:

(A) 1.25 mm

(B) 2.70 mm

(C) 4.05 mm

(D) 5.40 mm

17. If the value of Poisson's ratio is zero, then it means that:

(A) The material is rigid

(B) The material is perfectly plastic

(C) There is no longitudinal strain in the material

(D) The longitudinal strain in the material is infinite

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18. What are the materials which show direction dependent properties, called?

(A) Homogeneous materials

(B) Viscoelastic materials

(C) Isotropic materials

(D) Anisotropic materials

19. A 100 mm × 5 mm × 5 mm steel bar free to expand is heated from 15°C to 40°C. What type of stress will be developed in the said bar?

(A) Tensile stress

(B) Compressive stress

(C) Shear stress

(D) No stress

20. A steel rod 10 mm in diameter and 1 m long is heated from 20°C to 120°C, $E = 200$ GPa and thermal coefficient of linear expansion is 12×10^{-6} per degree Celsius. If the rod is not free to expand, the thermal stress developed is:

(A) 120 MPa (tensile)

(B) 240 MPa (tensile)

(C) 120 MPa (compressive)

(D) 240 MPa (compressive)

21. Molecular orbitals are:

(A) Monocentric

(B) Bicentric

(C) Polycentric

(D) None of the above

22. Bonding in metals have been explained by:

(A) Electron pool theory

(B) Valence bond theory

(C) Molecular orbital theory (band theory)

(D) All of the above

23. A polymer made up of more than one type of monomer is termed as:

(A) Homopolymer

(B) Copolymer

(C) Homochain polymer

(D) Heterochain polymer

24. Rubber is vulcanised to improve its properties by heating with:

(A) Sulphur

(B) Carbon

(C) Silica

(D) Alumina

25. The number of signals and multiplicity of the signals in $CH_3-CH_2-CH_2-NH_2$ will be:

(A) 4 signals; singlet (2H), triplet (2H), triplet (3H), sextet (2H)

(B) 3 signals; singlet (2H), quartet (4H), quintet (3H)

(C) 4 signals; singlet (2H), triplet (2H), triplet (3H), quintet (2H)

(D) 2 signals; octet (2H), triplet (7H)

26. Which of the following compounds will exhibit NMR spectroscopy?

(A) $_6C^{12}$

(B) $_8O^{16}$

(C) $_{16}S^{32}$

(D) $_6C^{13}$

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27. The type of lubrication under conditions of low speed and high load is :

(A) Thick film or hydrodynamic lubrication

(B) Thin film or boundary lubrication

(C) High pressure lubrication

(D) All of the above

28. A good lubricating oil should have :

(A) High viscosity index

(B) Low viscosity index

(C) High/Low viscosity index

(D) Moderate viscosity index

29. The change in the wavelength (λp) of a scattered photon from an electron, such that the recoil electron makes an angle of zero degrees with the horizontal or moves parallel to the incident photon trajectory is :

(A) Maximum

(B) $2 \lambda p$

(C) $\frac{1}{2} \lambda p$

(D) 0

30. Stefan's law states that the energy radiated per unit time of black body is proportional to (Given A is the area and T is the temperature) :

(A) AT^3

(B) AT^{-4}

(C) AT^4

(D) AT^{-3}

31. The maximum probability of finding the particle between two limits is :

(A) Zero

(B) Less than one but greater than zero

(C) More than one

(D) One

32. The energy (E_0) of a harmonic oscillator, corresponding to $n = 0$ is equal to :

(A) $hv/2$

(B) $h\frac{v}{2}$

(C) $3hv$

(D) $3hv/2$

33. Heisenberg's uncertainty principle states that the :

(A) Uncertainties in energy and time $\geq \hbar / 2$

(B) Uncertainties in momentum and position $\geq \hbar / 2$

(C) Both (A) and (B)

(D) None of these

34. Electron Volt (eV) is the unit of :

(A) Power

(B) Potential difference

(C) Energy

(D) Force

35. The Planck's radiation law is given by :

(A) $\dfrac{8\pi h v^4 dv}{c^3 e^{\frac{hv}{kT}} - 1}$

(B) $\dfrac{8\pi h v^2 dv}{c^2 e^{\frac{hv}{kT}} - 1}$

(C) $\dfrac{8\pi h v^2 dv}{c^3 e^{\frac{hv}{kT}} - 1}$

(D) $\dfrac{8\pi h v^3 dv}{c^3 e^{hv/kT} - 1}$

36. Which law removed the ultraviolet catastrophe in Rayleigh-Jeans law ?

(A) Wien's Displacement Law

(B) Stefan's Radiation Law

(C) Planck's Radiation Law

(D) All of these

37. The solution of the differential equation $a(p + q) = z$ is :

(A) $\phi(x - y, y - az) = 0$

(B) $\phi(x + y, y + az) = 0$

(C) $\phi(x - y, y + az) = 0$

(D) $\phi(x + y, y - az) = 0$

38. The solution of the differential equation $(D^2 + a^2)y = 0$ is :

(A) $c_1 \cos ax + c_2 \sin ax$

(B) $c_1 \cos ax - c_2 \sin ax$

(C) $(c_1 + c_2 x) \sin ax$

(D) $(c_1 + c_2 x) \cos ax$

39. The particular integral of the differential equation $(D^2 + 1)y = \cos 2x$ is :

(A) $\frac{1}{3} \sin 2x$

(B) $-\frac{1}{3} \sin 2x$

(C) $-\frac{1}{3} \cos 2x$

(D) $\frac{1}{3} \cos 2x$

40. The solution of the differential equation $(x^2 D)^2 - xD + 2)y = 0$ is :

(A) $x(c_1 \cos(\log x) - c_2 \sin(\log x))$

(B) $x(c_1 \cos(\log x) + c_2 \sin(\log x))$

(C) $(c_1 \cos(\log x) - c_2 \sin(\log x))$

(D) $(c_1 \cos(\log x) + c_2 \sin(\log x))$

41. The Frobenius method can be used about a point $x = a$ if :

(A) $x = a$ is a regular point

(B) $x = a$ is an irregular point

(C) Both (A) and (B)

(D) None of these

42. The differential equation $x^2 y'' + xy' + (x^2 - n^2)y = 0$ where $2n$ is non integral is known as :

(A) Hermit's Equation

(B) Legendre's Equation

(C) Bessel's Equation

(D) None of the above

43. The most general solution of the wave equation is :

(A) $y = (A \cos c\sqrt{kt} + B \sin c\sqrt{kt})(C \cos\sqrt{kx} + D \sin\sqrt{kx})$

(B) $y = (A \cos c\sqrt{kt} + B \sin c\sqrt{kt}) + (C \cos\sqrt{kx} + D \sin\sqrt{kx})$

(C) $y = (A \cos c\sqrt{kt} - B \sin c\sqrt{kt})(C \cos\sqrt{kx} + D \sin\sqrt{kx})$

(D) None of the above

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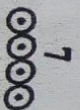
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44. The partial differential equation $\dfrac{\partial u}{\partial t} = c^2 \dfrac{\partial^2 u}{\partial x^2}$ represents :

(A) One dimensional wave equation

(B) One dimensional heat equation

(C) Two dimensional wave equation

(D) Two dimensional heat equation

45. Consider the following statements about direct and indirect band gap semiconductors :

1) Indirect band gap semiconductors can be used in solar cells because carrier recombination is harder due to the misalignment between the valence band maximum and conduction band minimum.

2) Direct band gap semiconductors can be used in solar cells because only energy is required (in the form of photons) to generate electron-hole pairs.

3) Indirect band gap semiconductors can be used in LEDs because carrier recombination is harder due to the misalignment between the valence band maximum and conduction band minimum.

4) Direct band gap semiconductors can be used in LEDs because carrier recombination is in LEDs because carrier recombination is easy.

Which of the following is correct ?

(A) 1), 2) and 4) are correct

(B) Only 1) is correct

(C) Only 3) and 4) are correct

(D) Only 1) and 2) are correct

46. Which of the following statement(s) accurately captures the difference in the origin of Zener breakdown and Avalanche breakdown ?

1) Electric field involved in Avalanche breakdown is high while electric field involved in Zener breakdown is low.

2) Zener breakdown involves a narrow depletion region while Avalanche breakdown involves a thick depletion region.

3) Zener breakdown involves a thick depletion region while Avalanche breakdown involves a narrow depletion region.

4) Electric field involved in Zener breakdown is high while electric field involved in Avalanche breakdown is low.

(A) 1), 3) and 4) are correct

(B) 2) and 4) are correct

(C) Only 1) is correct

(D) Only 4) is correct

47. Consider a silicon diode at room temperature, how much should the forward voltage increase to raise the current by a factor of 10 ?

(A) 100 mV

(B) 26 mV

(C) 60 mV

(D) 0.7 V

48. The ripple Amplitude of full wave Rectifier is _____ times the ripple amplitude of half wave Rectifier.

(A) 1/2

(B) 2

(C) 0.4

(D) 0.51
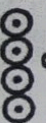
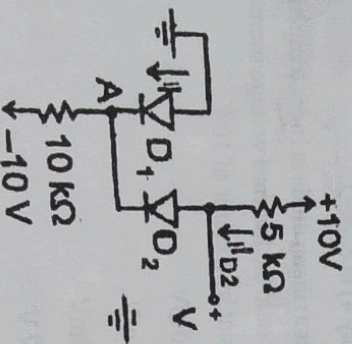49. In a BJT biased in the active mode, the base current is 6 μA, and the collector current is 510 μA. The value of α is :

(A) 0.5

(B) 0.92

(C) 0.988

(D) 0.965

50. Which of the following is correct for an npn transistor to act in Active region ?

(A) $V_{CE} < V_{BE}$

(B) $V_{BE} > V_{CE}$

(C) $V_{CE} - V_{BE} < 0$

(D) Option (B) and (C) are both correct

51. Assume the diodes are ideal, calculate the value of I and V for the circuit shown below :

(A) 2 mA, 0 V

(B) 2 mA, 3.3 V

(C) None of these

(D) 0 mA, 3.3 V

52. The drift velocity of electrons in silicon varies with applied electric field in which one of the ways ?

(A) It monotonically increases with increasing field

(B) It first increases, then decreases showing a negative differential region, again increases and finally saturates

(C) It first increases linearly, then sub-linearly and finally attains saturation with increasing field

(D) The direct velocity remains unchanged with increase in field

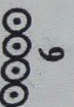53. Consider the following statements about computer memory :

I) RAM is an example of secondary storage device and stores data permanently.

II) USB Drive is an example of Solid-State storage device and is volatile in nature.

III) Hard disk and CD ROM belong to class of non-volatile memories.

Which of the above statements is True ?

(A) Only I) is True

(B) Only II) is True

(C) Only III) is True

(D) All three statements are True

54. Which of the following statements is True ?

(A) Windows and Linux are the examples of Application Software

(B) 'C' Language belongs to object oriented programming language category

(C) Compiler converts program written in machine code into high level language

(D) Microsoft Word and Adobe PageMaker are examples of application software

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55. Which of the following statement about computer ports is True ?

(A) USB stands for Universal Serial Bus and supports only single device at a time

(B) VGA connector is a standard connector used for computer video output

(C) HDMI stands for High Density Magnetic Interface and allows port to only send very low resolution videos to other compatible devices

(D) RJ-45 is not suitable Ethernet networking

56. Which of the following belongs to class of Operating System ?

(A) Mozilla Firefox

(B) Microsoft Word

(C) Adobe PageMaker

(D) Linux

57. What will be the output of the following C program ?

```
int main ()
{
    int a=0;
    a=5<2 ? 1 : 2;
    printf("%d", a);
    return 0;
}
```

(A) 5

(B) 2

(C) 1

(D) None of the above

58. What will be the output of the following C program ?

```
int main ()
{
    int a=1;
    while(a<10)
    {
        printf("hello");
        break;
    }
    return 0;
}
```

(A) Hello

(B) hello hello

(C) hello hellohellohello

(D) hello break

59. What will be the output of the following C program ?

```
int main ()
{
    int a=5;
    do
    {
        printf("%d", a);
        a=a+5;
        if (a>20)
        break;
    } while (1);
    return 0;
}
```

(A) 5 10

(B) 5 10 15

(C) 5 10 15 20

(D) None of these

60. The C language keyword which is used to transfer control from a function back to the calling function is :

(A) return

(B) goto

(C) getch()

(D) main

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