Question Booklet No.: Question Booklet Series: **A**

# ENTRANCE TEST - 2025

## School of Engineering

## B. Tech. Programme (Lateral Entry)

**Total Questions: 60** **Roll No.** | | | | | | |

**Time Allowed: 70 Minutes**

**Important Instructions for Candidates:**

1. Candidates shall compulsorily use only **blue/ black ball point pen**. In no case gel/ink pen or pencil should be used.
2. Compulsorily write your **roll number** in the space provided at the top of this page of the question booklet.
3. Fill up the necessary information in the spaces provided on OMR Answer sheet including **Question Booklet Number** and **Question Booklet Series**.
4. 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.
5. All entries in the OMR Answer Sheet, including answers to questions, are to be recorded in the Original Copy only.
6. **Choose only one correct/most appropriate response** for each question among the options A, B, C and D and darken the circle of the appropriate response completely. Incompletely darkened circle is not correctly read by the OMR scanner and no complaint to this effect shall be entertained.
7. **Do not darken more the one circle of option for any question. A question with more than one darkened response shall be considered wrong.**
8. **There will be negative marking for wrong answers. Each wrong answer will lead to deduction of 0.25 marks per wrong answer from the score.**
9. Only those candidates who obtain positive score in Entrance Test shall be eligible for admission.
10. Do not make any stray mark on the OMR sheet as this may lead to errors while scanning.
11. OMR answer sheet must be handled carefully and it should not be folded or mutilated, as in such case it will not be properly evaluated by the machine.
12. No Electronic gadgets including calculators, mobiles, smart watches, blue tooth etc. shall be permitted inside the examination hall.
13. Rough work, if any, should be done on the blank sheets provided with the question booklet.
14. Ensure that the OMR Sheet is signed by the Examinee as well as by the invigilator.
15. At the end of the examination, fold the OMR Sheet along the crease on the top and tear off the top strip to separate the Original OMR Sheet from the Duplicate Copy.
16. Hand over the Original OMR answer sheet to the invigilator and retain the candidate's copy of OMR, Question Booklet and Admit card for your reference.
17. If any of the information in the response Sheet/Question Paper has been found missing or not mentioned as stated above, the candidate is solely responsible for that lapse.
18. Any deficiency on the OMR shall be the responsibility of the candidate himself/herself.

Q1. Integrating factor of $(x^7y^2 + 3y)\,dx + (3x^8y - x)dy = 0$ is $x^m y^n$, then

A) m= -7, n= 2
B) m= -1, n= 7
C) m= -7, n= 1
D) m= -7, n= -2

Q2. The differential equation $\frac{d^2y}{dx^2} + sin\,sin\,(x+y) = sinx$ is

A) Linear
B) Homogeneous
C) Linear homogeneous
D) Non-linear homogeneous

Q3 Complete integral for the PDE $z = px + qy - sin\,sin\,pq$ is

A) $z = ax + qy - sin\,sin\,aq$
B) $z = ax + by - sin\,sin\,ab$
C) $z = ax - by + sin\,sin\,ab$
D) $z = bx + ay + sin\,sin\,ab$

Q4 A Complete integral of the equation $(p+q)(z - xp - yq) = 1$ is

A) $z = ax - by - \frac{1}{a+b}$
B) $z = ax + by + \frac{1}{a+b}$
C) $z = ax^2 - by - \frac{1}{a+b}$
D) $z = ax^2 + by^2 + \frac{1}{a+b}$

Q5 One dimensional wave equation is

A) $Z_{xx} = a^2 Z_{yy}$
B) $Z_x = a^2 Z_{yy}$
C) $Z_y = a^2 Z_{yy}$
D) $Z_{xx} + a^2 Z_{yy} = 0$

Q6 Solve $\frac{\partial u}{\partial x} = 6\frac{\partial u}{\partial t} + u$ using the method of separation of variables if $u(x,0) = 10\,e^{-x}$.

A) $10\,e^{-x}e^{-\frac{t}{3}}$
B) $10\,e^{x}e^{-\frac{t}{3}}$
C) $10\,e^{\frac{x}{3}}e^{-t}$
D) $10\,e^{-\frac{x}{3}}e^{-t}$

Q7 When solving a 1-Dimentional heat equation using variable separable method, we get the solution if

A) K is positive
B) K is negative
C) K is 0
D) K can be anything

Q8 The points where the series solution of the Legendre differential equation $(1-x^2)\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + \frac{3}{2}\left(\frac{3}{2}+1\right)y = 0$ will diverge are located at

A) 0 and 1
B) 0 and -1
C) -1 and 1
D) 3/2 and 5/2

Q9 Which of the following best defines a black body?

A) A body that does not reflect all radiation falling on it
B) A body that absorbs and emits all radiation incident on it perfectly
C) A body that does not emit any radiation
D) A body that transmits all radiation through it

Q10 If the temperature of a black body is doubled, its total radiated energy increases by a factor of:

A) 2
B) 4
C) 8
D) 16

Q11 The spectral radiance of a black body at a given temperature follows:

A) Kirchhoff's law
B) Stefan-Boltzmann law
C) Planck's radiation law
D) Newton's law of cooling

Q12 Rayleigh-Jeans law is a special case of

A) Planck's law
B) Newton's law
C) Kirchhoff's law
D) None of the above

Q13 Assuming MB-distribution of molecular speeds, the RMS velocity of the molecule is given by

A) $\sqrt{\frac{2kT}{m}}$

B) $\sqrt{\frac{4kT}{m}}$

C) $\sqrt{\frac{3kT}{m}}$

D) $\sqrt{\frac{8kT}{\pi m}}$

Q14 If 4 distinguishable particle are arranged in 2 compartments, then the thermodynamic probability for the macrostate (2, 2) is

A) 4
B) 6
C) 8
D) 10

Q15 The Compton Effect demonstrates the ..... nature of light.

A) Wave
B) Particle
C) Both wave and particle
D) None of the above

Q16 According to Heisenberg's Uncertainty Principle, decreasing the uncertainty in a particle's position will:

A) Increase the uncertainty in its momentum
B) Decrease the uncertainty in its momentum
C) Have no effect on its momentum
D) Make momentum exactly determinable

Q17 According to VSEPR Theory, what is the molecular geometry of a molecule with four bonding pairs and no lone pairs around the central atom?

A) Trigonal Bipyramidal
B) Tetrahedral
C) Trigonal Pyramidal
D) Bent

Q18 Based on Molecular Orbital Theory (MOT), which of the following molecules exhibits para magnetism due to the presence of unpaired electrons?

A) Oxygen
B) Nitrogen
C) Carbon monoxide
D) Iron

Q19 Which of the following is a thermosetting polymer?

A) Polyethylene
B) Bakelite
C) Polyvinyl chloride (PVC)
D) Teflon

Q20 Which of the following transitions is typically observed in UV-Visible Molecular Absorption Spectroscopy?

A) Rotational transitions
B) Vibrational transitions
C) Electronic transitions
D) Nuclear transitions

Q21 Which of the following types of electronic transitions is most commonly associated with chromophores in UV-Visible Spectroscopy?

A) $\sigma \rightarrow \sigma^*$
B) $n \rightarrow \sigma^*$
C) $n \rightarrow \pi^*$
D) $d \rightarrow d$

Q22 What does a low viscosity index (VI) indicate about a lubricant?

A) It maintains a stable viscosity across temperature changes
B) Its viscosity changes significantly with temperature
C) It is highly resistant to oxidation
D) It is suitable for high-temperature applications

Q 23 Which type of lubrication is used in high-load and extreme pressure conditions like gears?

A) Boundary lubrication
B) Hydrodynamic lubrication
C) Fluid-film lubrication
D) Electrostatic lubrication

Q24 Which of the following is the main component of natural rubber?
A) Polyvinyl chloride (PVC)
B) Polyisoprene
C) Polystyrene
D) Polyurethane

Q25 Which of the Section is not a type of section used in machine drawing?
A) Full section
B) Half Section
C) Quarter Section
D) Isometric Section

Q26 Which of the following is not a type of screw thread?
A) V-Thread
B) Square Thread
C) Helical Thread
D) Buttress Thread

Q27 The Foundation bolts are primarily used for?
A) Connecting gears
B) Holding machine parts in position
C) Joining two pipes
D) Fixing electrical circuits

Q28 What is the primary function of the "LAYDEL" command in AutoCAD?
A) Deletes all objects on a specified layer
B) Creates a new layer
C) Breaks a line into multiple segments
D) Splits a polyline into two parts

Q29 Which command in AutoCAD is used to display the name and properties of an entity?
A) DIST
B) LIST
C) LENGTHEN
D) MEASURE

Q 30 Which of the following is not a principal plane in orthographic projection?
A) Front plane
B) Side plane
C) Bottom plane
D) Top plane

Q31 Which projection technique is used for realistic views in engineering drawings
A) Orthographic
B) Axonometric
C) Perspective
D) Oblique

Q32 The solid flanged coupling is mainly used in
A) Low-speed and low-torque applications
B) High-speed and high-torque applications
C) Applications requiring flexibility
D) Applications with frequent disassembly

Q33 Which parameter opposes both steady and changing current in AC circuits?
A) Resistance
B) Reactance
C) Impedance
D) Conductance

Q34 A practical voltage source can be converted to current source using:
A) Series resistance
B) Parallel resistance
C) Dependent source
D) Open circuit

Q35 Which source type has output dependent on another circuit variable?
A) Ideal source
B) Dependent source
C) Practical source
D) Thevenin source

Q36 Power dissipated in 10Ω resistor with 5A current:
A) 50W
B) 250W
C) 25W
D) 500W

Q37 Resistor color code Red-Red-Brown-Gold indicates:
A) 220Ω ±5%
B) 2500Ω ±5%
C) 22Ω ±10%
D) 2.2kΩ ±5%

Q38 Ohm's Law formula is:

A) V = I/R
B) I = V*R
C) R = V/I
D) P = V*I

Q39 KVL states:

A) ΣI = 0 at node
B) ΣV = 0 in loop
C) V=IR
D) I = C*dv/dt

Q40 RMS value of 10V peak sine wave:

A) 7.07V
B) 10V
C) 14.14V
D) 6.37V

Q41 Which of the following statements correctly distinguish between direct and indirect bandgap semiconductors?

1. Direct bandgap semiconductors efficiently emit light because electron-hole recombination occurs without requiring a change in momentum.
2. Indirect bandgap semiconductors are preferred for LED applications due to their superior optical efficiency.
3. Silicon is an example of an indirect bandgap semiconductor, while gallium arsenide (GaAs) is a direct bandgap semiconductor.
4. In indirect bandgap semiconductors, phonons assist in the electron transition from the conduction band to the valence band.
5. Direct bandgap semiconductors are primarily used in photodetectors, while indirect bandgap semiconductors are essential for laser diodes.

Select the correct options:

A) 1, 3, and 4
B) 2 and 5
C) 1 and 4 only
D) 1, 2, and 3

Q42 In a Bipolar Junction Transistor (BJT), which of the following statements correctly describes the current gain in different configurations?

A) In the common-emitter (CE) configuration, the current gain (β) is higher than the common-base (CB) configuration.
B) In the common-collector (CC) configuration, the current gain (β) is approximately equal to 1.
C) In the common-base (CB) configuration, the current gain (β) is the highest compared to other configurations.
D) In the common-emitter (CE) configuration, the input current is supplied by the emitter, and the output current is taken from the base.

Q43 In a semiconductor, the conduction band is partially empty, and the valence band is full. Which of the following statements best describes the behavior of charge carriers in a semiconductor at room temperature?

A) Electrons in the valence band remain immobile, and holes in the conduction band conduct electricity.
B) Electrons in the conduction band contribute to electrical conduction, while holes in the valence band also act as charge carriers.
C) Electrons in the conduction band recombine instantly with holes, preventing any electrical conduction.
D) Electrons from the conduction band transfer to the valence band, leading to a decrease in the material's conductivity.

Q44 The capacitance of a p-n junction diode is primarily determined by the width of the depletion region. Which of the following factors will most likely decrease the capacitance of a p-n junction diode?

A) Increasing the forward bias voltage across the diode.
B) Decreasing the reverse bias voltage across the diode.
C) Increasing the doping concentration of both the p-type and n-type regions.
D) Decreasing the temperature of the diode.

Q45 In a half-wave rectifier circuit, when the diode is forward biased, what happens to the current flowing through the load resistor if the source voltage begins to increase beyond the diode's threshold voltage?
A) The current rapidly increases exponentially without any limit.
B) The current remains zero until the diode is reverse biased.
C) The current increases gradually and then stabilizes once the source voltage exceeds the peak forward voltage of the diode.
D) The current remains constant, unaffected by the increase in source voltage.

Q46 Which of the following statements about the volt-ampere characteristics of a Bipolar Junction Transistor (BJT) is correct?
1. In the active region, the collector current (Ic) is primarily controlled by the base-emitter voltage (Vbe) and is significantly affected by the collector-emitter voltage (Vce).
2. In the saturation region, the collector current (Ic) is mainly determined by the base-emitter voltage (Vbe) and remains nearly constant with increasing collector-emitter voltage (Vce).
3. In the cutoff region, both the base-emitter and base-collector junctions are forward biased, causing the collector current (Ic) to be large.
4. In the reverse-active region, the transistor operates with inverted polarity, and the current gain (β) is higher than in the active region.
5. The Early effect causes the base-emitter voltage (Vbe) to increase as the collector-emitter voltage (Vce) increases, leading to a decrease in the collector current (Ic).

Select the correct option:
A) 1, 2, and 3
B) 2, 4, and 5
C) 1, 3 and 4
D) 2 and 5

Q47 A Silicon diode has a forward voltage of 0.7V at a current of 10mA. Using the ideal diode equation $I = I_s\left(e^{\frac{V}{\eta V_T}} - 1\right)$, where Is is the saturation current, □ is the ideality factor (assumed to be 1), and $V_T$ is the thermal voltage. The saturation current of the diode is.....?
A) $1.15 \times 10^{-12}\ A$
B) $1.23 \times 10^{-14}\ A$
C) $2.67 \times 10^{-13}\ A$
D) $5.45 \times 10^{-10}\ A$

Q48 A computer basically understands only
A) machine language
B) assembly language
C) high level language language
D) foreign language

Q49 The final step in executing a program is
A) linking
B) interpreting
C) loading
D) compiling

Q50 USB 3.0 supports data rates of the order of
A) Kbps
B) Mbps
C) Gbps
D) Tbps

Q51 Which of the following symbols represents the decision condition in a flowchart?
A) Ellipse
B) Diamond
C) Rectangle
D) Arrow

Q52 Which of the following LINUX commands is used to know the type of a file?

A) file
B) filetype
C) pwd
D) cd

Q53 MS-PowerPoint is a class of

A) system software
B) application Software
C) malware
D) firmware

Q 54 Which of the following is not a valid operator in C language?

A) <
B) <=
C) ≤
D) = =

Q55 Which of the following is used for repeated execution of statements based on a condition?

A) *for*
B) if-else
C) switch-case
D) *struct*

Q56 Tensile stress occurs when a material is subjected to

A) Compressive force
B) Shearing force
C) Axial Stretching force
D) Torsional force

Q57 The shear stress distribution in a circular shaft under pure torsion is

A) Uniform throughout the section
B) Maximum at the centre
C) Zero at the outer surface
D) Maximum at the outer surface

Q58 Which of the following is not an elastic constant

A) Young's Modulus
B) Bulk Modulus
C) Poisson's ratio
D) Density

Q59 A hollow shaft transmits the same torque as a solid shaft of equal weight. The ratio of their diameters (outer to inner) is:

A) 1.5
B) 2
C) 2.5
D) 3

Q60 If the bulk modulus (K) and modulus of rigidity (G) of an isotropic material are given, what is the Young's modulus (E) in terms of K and G?

A) $E = 9KG / (3K + G)$
B) $E = 2G (1 + \nu)$
C) $E = 3K (1 - 2\nu)$
D) $E = 3G (1 - 2\nu)$

Sr. No. ..... 3193

# ENTRANCE TEST-2024

## B.Tech/BE (Lateral Entry) Programme

Total Questions : 60
Time Allowed : 70 Minutes

Roll No. | | | | | | |

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All questions have equal weightage. Attempt all questions

Q 1 Let x be the order and y be the degree of the partial differential equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0$. Then which of the following is correct?

a) x=2, y=2

b) x=1, y=2

c) x=2, y=1

d) x=1, y=1

Q 2 What is the partial differential equation of $z = f(x + 5y)$, where $f$ is any arbitrary function

a) $\frac{\partial z}{\partial x} = 5\frac{\partial z}{\partial y}$

b) $\frac{\partial z}{\partial y} = 5\frac{\partial z}{\partial x}$

c) $\frac{\partial y}{\partial x} = 5\frac{\partial z}{\partial x}$

d) $\frac{\partial z}{\partial y} = 5\frac{\partial y}{\partial x}$

Q 3 Which of the following is the general solution of the partial differential equation $x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y} = z$.

a) $\emptyset\left(\frac{x}{y}, \frac{y}{z}\right) = 0$

b) $\emptyset\left(\frac{x+1}{z}, \frac{y}{z}\right) = 0$

c) $\emptyset\left(\frac{z+1}{x}, \frac{y}{z}\right) = 0$

d) None of these

Q 4 The Lagrange's auxiliary equations for the equation $x^2p + y^2q + z^2 = 0$ are

a) $\frac{dx}{x^2} = \frac{dy}{y^2} = \frac{dz}{-z^2}$

b) $\frac{dx}{x^2} = \frac{dy}{y^2} = \frac{dz}{z^2}$

c) $\frac{dx}{y^2} = \frac{dy}{-x^2} = \frac{dz}{-z^2}$

d) None of these

Q 5 What is the form of second order linear differential equation with variable coefficients ?

a) $p_0(x)\frac{d^2y}{dx^2} + p_1(x)(\frac{dy}{dx})^2 + p_2(x)y = 0$

b) $p_0(x)(\frac{dy}{dx})^2 + p_1(x)\frac{dy}{dx} + p_2(x)y = 0$

c) $p_0(x)\frac{d^2y}{dx^2} + p_1(x)\frac{dy}{dx} + p_2(x)y^2 = 0$

d) $p_0(x)\frac{d^2y}{dx^2} + p_1(x)\frac{dy}{dx} + p_2(x)y = 0$

Q 6 The complementary function of the differential equation $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = e^x$ is

a) $(c_1 + xc_2)e^x$

b) $c_1e^x + c_2e^{2x}$

c) $c_1 + xe^{2x}$

d) $(c_1 + x^2c_2)e^x$

Q 7 What is the particular integral of the differential equation $(D^2 - 4)y = 2e^{3x}$ ?

a) $\frac{2}{5}e^{2x}$

b) $\frac{2}{3}e^{5x}$

c) $\frac{3}{5}e^{2x}$

d) $\frac{2}{5}e^{3x}$

Q 8 The differential equation $\left(3x^2 + y\right)dx + \left(x + 3y^2\right)dy = 0$ is

a) Not exact

b) Non-homogeneous

c) Exact

d) None of these

Q 9 The laws of black body is /are

a) Stefan-Boltzmann law

b) Wien's displacement law

c) Plank's radiation Law

d) All of these

Q 10 Which among the following has the most penetrating power

a) IR radiation

b) X-rays

c) Gamma rays

d) UV radiations

Q 11 The law" Good absorber of radiations is a good radiator too" is

a) Stefan's Law

b) Kirchhoff's law

c) Wien's law

d) Plank's law

Q 12 The change in the wavelength of incident photon equals the Compton wavelength, when the scattering angle ($\varphi$) is

a) Zero

b) $\pi$

c) $2\pi$

d) $\frac{\pi}{2}$

Q 13 The Heisenberg's uncertainty principle cannot be applied to

a) Quantum particles

b) Moving particles

c) Stationery particles

d) None of these

Q 14 According to Bohr quantization condition, the angular momentum (L), for an electron to move in a circular orbit, is

a) $\frac{h}{2\pi}$

b) $\frac{2h}{n\pi}$

c) $\frac{nh}{2\pi}$

d) $\frac{2\pi}{nh}$

Q 15 The function that represents the matter waves must be

a) Real and infinite

b) Real and finite

c) Zero and finite

d) Complex and finite

Q 16 The harmonic oscillator is a system where the restoring force is proportional to

a) Displacement from equilibrium

b) Force constant (k)

c) Displacement from one extreme point to other

d) All of these.

Q 17 The square planar molecules undergoes which type of hybridization?

a) $sp^3d$

b) $dsp^3$

c) $dsp^2$

d) $sp^3d^2$

Q 18 Which of the following molecular orbitals has the lowest energy?

a) $\sigma$ 2pz

b) $*\pi$ 2py

c) $*\sigma$ 2pz

d) $*\sigma$ 2s

Q 19 Polymer that can be softened on heating and hardens when cooled are called as?

a) Thermoplastics

b) Fibres

c) Thermosetting plastics

d) Elastomers

Q 20 Rubber can be vulcanised to improve its properties by heating it with

a) Sulphur

b) Carbon powder

c) Silica

d) Alumina

Q 21 Visible light lies between the wavelength range?

a) 3800–7600 Å

b) 2500–3800 Å

c) 3000–7000 Å

d) 7500– 8000 Å

Q 22 The number of NMR signals given by equivalent protons in a molecule is/are?

a) 1

b) 2

c) 3

d) 4

Q 23 The type of lubrication under conditions of slow speed and high load is

a) Thick film or hydrodynamic lubrication

b) Thin film or boundary lubrication

c) Extreme pressure lubrication

d) All the above

Q 24 As temperature increases the viscosity of a lubricating oil

a) Increases

b) Decreases

c) Neither increases nor decreases

d) Either increases or decreases

Q 25 Which file extension is used for AutoCAD drawing files?

a) .pdf

b) .dwg

c) .txt

d) .doc

Q 26 Ssname command is used with:

a) Name of selection and index number

b) Name of entity and its length

c) Only name of selection set

d) Only index number

Q 27 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

Q 28 If the drawing exceeds the drawing limits it is:

a) Not possible to plot a full drawing

b) Possible to plot only if the limits are increased

c) Possible to plot by zooming out the drawing

d) Possible to plot by making proper settings in additional parameter in Plot dialog box

Q 29 In the orthographic projection, the projectors are _____ to the plane of projection:

a) Parallel

b) Perpendicular

c) Inclined

d) None of The Above

Q 30 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

Q 31 Which of the following is NOT included in title block.

a) Name of Organization

b) Title of Drawing

c) Abbreviations

d) None of the Above

Q 32 In the solid flanged couplings, the flange is:

a) Separate. mounted using a sunk key

b) Integral with the shaft

c) Fitted with interference fit

d) None of the above

Q 33 Which of the following statements is true about a parallel combination of Ohmic resistors?

a) The total resistance is the sum of individual resistances.

b) The total resistance is the product of individual resistances.

c) The total resistance is always smaller than the smallest individual resistance.

d) The total resistance is always larger than the largest individual resistance.

Q 34 An electric appliance at unity power factor consumes 1000 watts of power when connected to a 100-volt AC source. What is the peak current (in A) flowing through the appliance?

a) 10

b) 14.14

c) 7.07

d) None of the above

Q 35 A resistor has a conductance of 0.01 S. If a current of 0.5 amperes flows through it, what is the voltage across the resistor in Volts?

a) 0.005

b) 50

c) 0.02

d) 200

Q 36 What is the SI unit of electric current?

a) Volts (V)

b) Watts (W)

c) Amperes (A)

d) Ohms (Ω)

Q 37 3 resistors having resistances 1, 2, and 3 Ωs respectively, are connected in parallel across a 6 V dc source. What is the current drawn from the source in A?

a) 1

b) 11

c) 36

d) 36/11

Q 38 According to Ohm's Law, the relationship between voltage (V), current (I), and resistance (R) is given by:

a) $V = I/R$

b) $I = V/R$

c) $R = I/V$

d) $V = R/I$

Q 39 Which of the following statements is correct regarding Kirchhoff's Current Law (KCL)?

a) The algebraic sum of currents at any node is zero.

b) The algebraic sum of currents in any closed loop is zero.

c) The algebraic sum of voltages in any closed loop is zero.

d) The algebraic sum of voltages at any node is zero.

Q 40 A circuit contains a 12-volt battery, a 1-Ω resistor, and a 5-Ω resistor connected in series. What is the total power supplied by the battery in W?

a) 2

b) 24

c) 6

d) 48

Q 41 In a semiconductor fabrication, the activation energy of dopants:

a) Determines the intrinsic carrier concentration

b) Affects the dielectric constant of the material

c) Influences the depth of the depletion region in a pn junction

d) Determines the temperature coefficient of resistance

Q 42 In the input-output characteristics of BJT Common Emitter (CE) configuration, which statement is true?

a) The input characteristics curve shows the relationship between base current I_B and collector emitter voltage (V_CE) for a constant collector current (I_C).

b) The output characteristics curve shows the relationship between collector current (I_C) and base-emitter voltage (V_BE) for constant base current (I_B).

c) The Early effect causes the output characteristic curve to shift horizontally.

d) The input characteristic curve is linear because the BJT operates in the active region.

Q 43 In an indirect bandgap semiconductor, which process is less probable due to momentum conservation rules?

a) Absorption of photons

b) Emission of photons

c) Electron transitions between conduction and valence bands

d) Carrier recombination

Q 44

**Assertion:** Avalanche breakdown in a diode occurs when the reverse bias voltage exceeds a critical value.

**Reason:** This critical voltage causes a rapid increase in current due to the generation of electron-hole pairs through collision processes.

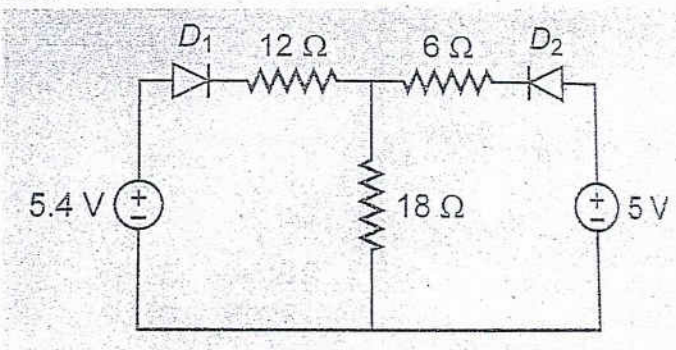
a) Both the assertion and reason are correct, and the reason is a correct explanation of the assertion.

b) Both the assertion and reason are correct, but the reason is NOT a correct explanation of the assertion.

c) The assertion is correct, but the reason is incorrect.

d) The assertion is incorrect, but the reason is correct

Q 45 In the circuit shown below, diode have cut-in voltage of 0.6V. The diode in ON state is/are




a) Only D1

b) Only D2

c) Both D1 and D2

d) None of these.

Q 46 Which of the following factors does NOT significantly affect the junction capacitance of a pn-junction diode?

a) Doping concentration

b) Applied reverse-bias voltage

c) Temperature

d) The material of the semiconductor (e.g., silicon, germanium)

Q 47 Which of the following statements is true regarding the temperature coefficient of a Zener diode with a breakdown voltage below 5V?

a) It has a positive temperature coefficient, meaning the breakdown voltage increases with temperature.

b) It has a negative temperature coefficient, meaning the breakdown voltage decreases with temperature.

c) It has zero temperature coefficient, meaning the breakdown voltage remains constant with temperature.

d) It has both positive and negative temperature coefficients depending on the current through the diode.

Q 48 What effect does increasing the load resistance have on the output voltage of a rectifier circuit?

a) It increases the ripple frequency of the output.

b) It decreases the output voltage due to increased voltage drop across the diodes.

c) It increases the output voltage due to reduced voltage drop across the diodes.

d) It decreases the ripple amplitude of the output.

Q 49 Consider the following statements about computer memory:
(I) Cache memory is used to store frequently accessed data.
(II) RAM is used to store the BIOS and firmware.
(III) Hard disk and CD-ROM are examples of secondary storage devices and belong to class of non-volatile memories.
Which of the above statement(s) is TRUE?

a) Only I is True.

b) Only II is True.

c) Only II and III are True.

d) Only I and III are True.

Q 50 Which of the following statement about computer ports is False?

a) A USB hub can be used to expand one USB port into several so that multiple devices can connect simultaneously.

b) VGA (Video Graphics Array) connector is a standard connector used for computer video output.

c) RJ-45 is not suitable for Ethernet networking.

d) HDMI stands for High-Definition Multimedia Interface, and it allows for the transmission of high-resolution audio and video signals to compatible devices.

Q 51 Consider the following statements about software:

(I) Operating System belongs to a class of Application software.
(II) Complier converts program written in High level language into Low level language.
(III) Microsoft Word and PDF reader are examples of application software.

Which of the above statements is TRUE?

a) Only I is True.

b) Only II is True.

c) Only I and II are True.

d) Only II and III are True.

Q 52 Which type of programming language allows for faster development and easier maintenance of large software projects?

a) High-Level language

b) Assembly language

c) Machine language

d) Low-Level language

Q 53 What will be the output of the following C program?

```
#include<stdio.h>
int main ()
{
        int i=0, a=10, b=20;
        if (a>b); {
        printf("a is greater than b");
        else
        printf("a is lesser than b");
        return 0;
}
```

a) Program will print "a is greater than b"

b) Program will print "a is lesser than b"

c) Program has some syntax error

d) None of the above

Q 54 What will be the output of the following C program?

```
#include <stdio.h>
int main()
{
int a=1;
while(a<5)
        {
         printf("hello ");
         i++;
        }
return 0;
}
```

a) hello hello

b) hello hello hello hello

c) hello hello hello hello hello

d) None of the above

Q 55 What is the purpose of the **scanf** function in C-Programming language?

a) To output data to the console

b) To read formatted input from the keyboard

c) To define a new variable

d) To perform arithmetic operations

Q 56 Which statement is used to exit a loop prematurely in C-Programming language?

a) exit

b) continue

c) break

d) return

Q 57 The ratio of elongation of a prismatic bar due to its total self weight W to that of a similar bar with an additional weight W attached at its free end is:

a) 1/3

b) 2/3

c) 3/4

d) 1/2

Q 58 A rod of length L and diameter D is subjected to a tensile load P. Which of the following is sufficient to calculate the resulting change in diameter?

a) Young's modulus

b) Shear modulus

c) Poisson's ratio

d) Both Young's modulus and shear modulus

Q 59 The Product of inertia of a rectangle of base b and height h with respect to an axis through the centroid would be:

a) Zero

b) $bh^3/8$

c) $bh^3/12$

d) $bh^3/36$

Q 60 For a composite bar consisting of a bar enclosed inside a tube of another material is compressed under a load $W$ as a whole through rigid washers at the end of the bar. The equation of compatibility is given by (suffixes 1 and 2 refer to the bar and tube respectively):

a) $W = W_1 + W_2$

b) $W_1 + W_2 = constant$

c) $\frac{W_1}{A_1 E_1} = \frac{W_2}{A_2 E_2}$

d) $\frac{W_1}{A_1 E_2} = \frac{W_2}{A_2 E_1}$