PaperCode: 2002 **Paper Name:** 2002-B.E. (LATERAL ENTRY) (SET III)-GROUP B **Set Name:** Original

Q-1 Aditya-L1 is dedicated mission of ISRO to study ------.

A Moon
B Mars
C Jupiter
D Sun

Correct Answer : D

Q-2 The Indus water treaty which has recently been suspended was between India and ---------.

A China
B Pakistan
C Bangladesh
D Nepal

Correct Answer : B

Q-3 Cellular jail is located in --------.

A Goa
B Shaheed dweep
C Pune
D Sri Vijaya Puram

Correct Answer : D

Q-4 The ratio of Sun's distance from earth to the diameter of Sun is approximately ---------.

A 100
B 104
C 108
D 112

Correct Answer : C

Q-5 As per the latest data released by the IMF World Economic Outlook, position of India among World largest economies is expected to be at ---------- in May/June 2025.

A 4th
B 5th
C 6th
D 3rd

Correct Answer : A

Q-6 What is the missing number in sequence 4,8,14,22,32,--------?

A 42
B 44
C 46
D 48

Correct Answer : B

Q-7 Choose the correct passive form of the sentence given below:
Had the police arrested the burglar.

A Had the burglar been arrested by the police.
B Have the burglar been arrested by the police.
C The burglar has been arrested by the police.
D Had the burglar was arrested by the police.

Correct Answer : A

I can't find my _____ bag.

Q-8

A lose

B loosing

C lost

D left

Correct Answer : C

Q-9 Identify the word which is similar in the meaning to the phrase (in inverted commas) of the sentence:
When she heard the news, she was "like a dog with two tails".

A very greedy

B very enthusiastic

C very morose

D very happy

Correct Answer : D

Q-10 Let's wait until it _____ raining.

A stops

B stopped

C stopping

D stop

Correct Answer : A

Q-11 Which element has the largest atomic radius?

A Li

B Na

C F

D I

Correct Answer : D

Q-12 In the following reaction, what happens to Mn ? It undergoes

$$2KMnO_4 + 5H_2C_2O_4 + 3H_2SO_4 \longrightarrow 2MnSO_4 + 10CO_2 + 8H_2O + K_2SO_4$$

A reduction

B oxidation

C Loss of electron

D no change

Correct Answer : A

Q-13 The correct order of orbitals in which electrons are filled is?

A 3d, 4s, 4p, 4d

B 4s, 3d, 4p, 5s

C 5s, 4p, 3d, 4d

D 3d, 4p, 4s, 4d

Correct Answer : B

Q-14 Which of the following is incorrect about 's' orbitals?

A They are spherical in shape

B They are found in all principal energy levels

C They can only hold one electron

D None of these

Correct Answer : C

Q-15 Which pair of metals has the same electronic configuration

A Cr^{3+}, Fe^{3+}

B Mn^{2+}, Fe^{3+}

C V^{3+}, Cr^{3+}

D Mn^{2+}, Ni^{2+}

Correct Answer : B

Q-16 The hybridisation of S in SF_6 molecule is

A **sp^3d^2**
B dsp^3
C d^2sp^3
D sp^3

Correct Answer : A

Q-17 Among the following compounds which one is most ionic?

A BeS
B BCl_3
C **$MgCl_2$**
D Al_2O_3

Correct Answer : C

Q-18 Which element has the highest first ionization energy?

A O
B **N**
C C
D B

Correct Answer : B

Q-19 The chemical formula of ammonium phosphate is

A $(NH_4)PO_4$
B $(NH_4)_2PO_4$
C **$(NH_4)_3PO_4$**
D None of these

Correct Answer : C

Q-20 Arrange the following in increasing order of their bond order He_2, O_2 , N_2 and NO

A $He_2<O_2<N_2<NO$
B $He_2>O_2>N_2>NO$
C $He_2<N_2<NO<O_2$
D **$He_2<O_2<NO<N_2$**

Correct Answer : D

Q-21 Which of the following is scalar physical quantity?

A Velocity
B Acceleration
C **Speed**
D Momentum

Correct Answer : C

Q-22 Newton's first law of motion is also known as:

A **Law of inertia**
B Law of acceleration
C Law of action-reaction
D Law of gravitation

Correct Answer : A

Q-23 If m is mass of the displaced object, x is displacement and k is spring constant, then the restoring force (F) in SHM (Simple harmonic motion) is given by:

A F = kx
B **F = -kx**
C F = ma
D F = mv

Correct Answer : B

Q-24 The distance between two consecutive crests or troughs in a transverse wave is called

A Amplitude
B Frequency
C Time period
D **Wavelength**

Correct Answer : D

Q-25 The ability of material to return to its original state after deformation is called:

A Plasticity

B Elasticity

C Ductility

D Malleability

Correct Answer : B

Q-26 Bernoulli's principle is based on the conservation of...

A Mass

B Momentum

C Charge

D Energy

Correct Answer : D

Q-27 The majority charge carriers in p-type semiconductor are....

A Electrons

B Holes

C Protons

D Positrons

Correct Answer : B

Q-28 The process of adding impurities to a semiconductor is called

A Diffusion

B Ionization

C Doping

D Recombination

Correct Answer : C

Q-29 Which quantum number is used to find energy of electron in an energy level

A Principle quantum number (n)

B Azimuthal quantum number (l)

C Magnetic quantum number (m)

D Spin quantum number (s)

Correct Answer : A

Q-30 Which of the following is not emitted during a radioactive decay?

A Alpha particle

B Gamma rays

C Beta particle

D Neutron

Correct Answer : D

Q-31 How many different ways can a team of five people be formed from a total of ten people so that two specific people are included in each team ?

A 56

B 55

C 57

D 58

Correct Answer : A

Q-32 The principal solutions of the equation $\sin x = \frac{-1}{\sqrt{2}}$ are

A $\frac{3\pi}{4}, \frac{5\pi}{4}$

B $\frac{5\pi}{4}, \frac{7\pi}{4}$

C $\frac{3\pi}{2}, \frac{5\pi}{2}$

D $\frac{3\pi}{4}, \frac{7\pi}{4}$

Correct Answer : B

Q-33 Evaluate the integral $\int \log(x)\, dx$

A $\frac{1}{x} + C$

B $x(\log x - 1) + C$

C $\log x + 1 + C$

D $\log x + \frac{1}{x} + C$

Correct Answer : B

Q-34 The order and the degree of the differential equation $\frac{d^4y}{dx^4} - x^2\left(\frac{d^2y}{dx^2}\right)^{\frac{1}{2}} = 0$ are

A 2,4

B 4,1

C 4,2

D 2,2

Correct Answer : C

Q-35 The solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = x^2$ is

A $y = \frac{x^4}{2} + \frac{C}{x}$

B $y = \frac{x^2}{2} + C$

C $y = \frac{x^4}{4} + \frac{C}{x}$

D $y = \frac{x^3}{4} + \frac{C}{x}$

Correct Answer : D

Q-36 If the mean of certain set of data is 25 and variance is 16, then the coefficient of variance is

A 15

B 16

C 17

D 18

Correct Answer : B

Q-37 For the matrix $M = \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$, find the value of a and b such that $M^2 + aM + bI = 0$.

A a=4,b=1

B a=1,b=4

C a=-4,b=1

D a=4,b=-4

Correct Answer : C

Q-38 If the matrix $\begin{bmatrix} 1+x & 3 & 0 \\ 1 & -1 & 2 \\ 2x & 1 & -5 \end{bmatrix}$ is singular, the value of x is

A 6/5

B 5/6

C (-5)/6

D (-6)/5

Correct Answer : D

Q-39 Find the equation of the line in cartesian form that passes through the point with position vector $2\hat{i} - \hat{j} + 4\hat{k}$ and is in the direction $\hat{i} + 2\hat{j} - \hat{k}$.

A $\frac{x-1}{2} = \frac{y-2}{-1} = \frac{z+1}{4}$

B $\frac{x-2}{1} = \frac{y+1}{2} = \frac{z-4}{-1}$

C $\frac{x-1}{1} = \frac{y+1}{2} = \frac{z-4}{-1}$

D $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z+1}{1}$

Correct Answer : B

Q-40 If a line has direction ratios 2,-1,-2, determine its direction cosines

A $\frac{2}{9}, \frac{-1}{9}, \frac{-2}{9}$

B $\frac{-2}{9}, \frac{1}{9}, \frac{2}{9}$

C $\frac{2}{5}, \frac{-1}{5}, \frac{-2}{5}$

D $\frac{2}{3}, \frac{-1}{3}, \frac{-2}{3}$

Correct Answer : D

Q-41 Which of the following is an intensive property of a thermodynamic system?

A Volume

B Temperature

C Mass

D Total energy

Correct Answer : B

Q-42 A closed system is one in which

A Does not permit any mass transfer across the boundary, but it permits transfer of energy

B Mass cross the boundary but not the energy

C Neither mass nor energy cross the boundaries of the system

D Both energy and mass cross the boundaries of the system

Correct Answer : A

Q-43 First law of thermodynamics deals with

A Conservation of heat

B Conservation of momentum

C Conservation of mass

D Conservation of energy

Correct Answer : D

Q-44 Heat and work are

A Point functions

B System properties

C Path functions

D Intensive properties

Correct Answer : C

Q-45 Specific heat of air at constant pressure Cp in kcal/kg is equal to

A 0.17

B 0.21

C 0.24

D 1.41

Correct Answer : C

Q-46 Change in entropy (δS) is equal to

A Heat supplied or rejected (δQ) divided by Absolute temperature (T)

B Absolute temperature (T) divided by Heat supplied or rejected (δQ)

C Maximum temperature(Tmax) divided by Minimum temperature (Tmin)

D Maximum temperature plus minimum temperature (Tmax+Tmin) divided by Maximum temperature (Tmax)

Correct Answer : A

Q-47 Internal energy of a substance depends on

A Volume

B Pressure

C Temperature

D Entropy

Correct Answer : C

Q-48 An engine working based on Carnot cycle and working between 650K and 310K, the thermal efficiency of the engine is

A 45.7%

B 65.2%

C 55.8%

D 52.3%

Correct Answer : D

Q-49 Otto cycle consists of

A Two isothermals and two isentropics processes

B Two isentropics and two constant volume processes

C Two isentropics, one constant volume and constant pressure processes

D Two isentropics and two constant Pressure processes

Correct Answer : B

Q-50 Dryness fraction of dry steam is

A 0.95

B 0.97

C 1

D 0.98

Correct Answer : C

Q-51 Which of the following does not relate to a spark ignition (S.I.) engine?

A Spark plug

B Fuel injector

C Ignition coil

D Distributor

Correct Answer : B

Q-52 In a reversible adiabatic process, the ratio of $\frac{T_1}{T_2}$ is equal to

A $\left(\frac{P_1}{P_2}\right)^{\frac{\gamma-1}{\gamma}}$

B $\left(\frac{P_2}{P_1}\right)^{\frac{\gamma-1}{\gamma}}$

C $\left(\frac{V_1}{V_2}\right)^{\frac{\gamma-1}{\gamma}}$

D $\left(\frac{V_2}{V_1}\right)^{\frac{\gamma-1}{\gamma}}$

Correct Answer : A

Q-53 In an isothermal process, the internal energy of an ideal gas is

A Decreases

B Increases

C Remains constant

D Initially decreases then increases

Correct Answer : C

Q-54 Diesel cycle consists of

A Two reversible adiabatic and two constant volume processes

B Two reversible adiabatic, a constant pressure and a constant volume processes

C Two reversible adiabatic and two constant pressure processes

D A reversible adiabatic, a constant pressure, a constant volume and an isothermal processes

Correct Answer : B

Q-55 According to the Clausius statement

A Heat cannot flow itself from a cold body to a hot body without the aid of the external work

B When two dissimilar metals are heated at one end and cooled at other end, e.m.f. is developed proportional to the difference of temperature at two ends

C Heat can flow itself from a cold body to a hot body without help of an external work

D It is possible to construct an engine working on a cyclic process, can convert whole of the heat supplied to it, into mechanical work

Correct Answer : A

Q-56 Units of strain are

A Dimensionless

B cm

C $Kg/cm^2/cm$

D Kg/cm

Correct Answer : A

Q-57 When a shaft is subjected to a bending moment M and twisting moment T, then the equivalent twisting moment is equal to

A M+T

B $M^2+ T^2$

C $\sqrt{(M^2+ T^2)}$

D $\sqrt{(M^2- T^2)}$

Correct Answer : C

Q-58 A column of length L is hinged at its both ends. Its equivalent length will be equal to

A 2 L

B L

C 0.5 L

D 0.707 L

Correct Answer : B

Q-59 In transverse fillet welded joint, the size of weld is equal to

A 0.5 x Throat of weld

B Throat of weld

C √(2) x Throat of weld

D 2 x Throat of weld

Correct Answer : C

Q-60 If the tearing efficiency of a riveted joint is 50%, then the ratio of diameter of rivet hole to the pitch of rivets is

A 0.20

B 0.30

C 0.50

D 0.60

Correct Answer : C

Q-61 Rankine's theory is used for

A Brittle materials

B Ductile materials

C Elastic materials

D Plastic materials

Correct Answer : A

Q-62 Stress concentration factor is defined as the ratio of

A Maximum stress to the endurance limit

B Nominal stress to the endurance limit

C Maximum stress to the nominal stress

D Nominal stress to the maximum stress

Correct Answer : C

Q-63 Factor of safety for fatigue loading is the ratio of

A Elastic limit to the ultimate stress

B Young's modulus to the ultimate tensile strength

C Endurance limit stress to the working stress

D Elastic limit to the yield point

Correct Answer : C

Q-64 The usual proportion for the width (w) of rectangular sunk key is (where, d = diameter of the shaft)

A d/8

B d/4

C d/6

D d/2

Correct Answer : B

Q-65 Two close coiled helical springs with stiffness k_1 and k_2 respectively are connected in series. The combined stiffness or stiffness of an equivalent spring is

A $\frac{k_1.k_2}{k_1+k_2}$

B $\frac{k_1-k_2}{k_1+k_2}$

C $\frac{k_1+k_2}{k_1.k_2}$

D $\frac{k_1-k_2}{k_1.k_2}$

Correct Answer : A

Q-66 The force of resistance per unit area offered by a body against deformation is known as

A Strain

B Compressive force

C Tensile force

D Stress

Correct Answer : D

Q-67 Shear stress induced in a shaft varies

A Linearly with maximum at the centre to zero at extreme fibre of the shaft

B Linearly with zero at the centre to maximum at extreme fibre of the shaft

C Non-linear with zero at centre and minimum at the extreme fibre of the shaft

D Linear with non-zero at the centre and minimum at the extreme fibre of the shaft

Correct Answer : B

Q-68 Static friction acts when object is

A Sliding on horizontal surface

B Sliding on vertical surface

C Resting on a surface

D Sliding on inclined surface

Correct Answer : C

Q-69 Linear momentum of an object 2000g-cm/s. If the velocity of the object is 4 m/s, then the mass of the object is

A 0.5g

B 1.5g

C 2.5g

D 5g

Correct Answer : D

Q-70 Torsional equation of a shaft is
[Where, τ_{max} = Maximum shear stress, R = Radius of shaft, G = Shear modulus, θ = Angle of twist, L = Length of shaft, T = Torque, J = Polar moment of inertia]

A $\frac{T}{J} = \frac{G\theta}{L} = \frac{\tau_{max}}{R}$

B $\frac{J}{T} = \frac{G\theta}{L} = \frac{\tau_{max}}{R}$

C $\frac{\tau_{max}}{J} = \frac{G\theta}{L} = \frac{T}{R}$

D $\frac{T}{J} = \frac{G}{L} = \frac{\tau_{max}}{R}$

Correct Answer : A

Q-71 Fluid is a substance that

A Can resist shear force

B Do not take the shape of their container

C Flows or deforms when an external force is applied to it

D Cannot deform continuously when shear stress is applied

Correct Answer : C

Q-72 The unit of viscosity is

A Newton-sec per square metre

B Metres² per sec

C Kg-sec²/metre²

D Newton-sec² per metre

Correct Answer : A

Q-73 Gauge pressure is equal to

A (Absolute pressure) + (Atmospheric pressure)

B (Absolute pressure) –(Atmospheric pressure)

C (Atmospheric pressure) – (Absolute pressure)

D (Atmospheric pressure) – (Vacuum)

Correct Answer : B

Q-74 The buoyancy depends on

A Mass of liquid displaced

B Viscosity of the liquid

C Pressure of the liquid displaced

D Depth of immersion

Correct Answer : A

Q-75 Metacentric height is the distance between

A The centre of gravity of the floating body and the metacentre

B The centre of gravity of the floating body and the centre of buoyancy

C The centre of gravity of the floating body and the centre of pressure

D centre of buoyancy and metacentre

Correct Answer : A

Q-76 The specific weight of one litre of a liquid fluid which weighs 7 N is

A 3500N/m³

B 4000N/m³

C 5000N/m³

D 7000N/m³

Correct Answer : D

Q-77 As per Pascal's law

A Intensity of pressure at a point in an open moving fluid is equal in the direction of applied force

B When pressure is applied to a confined fluid, the pressure change is transmitted undiminished to every part of the fluid and to the walls of its container, acting equally in all directions

C When pressure is applied to a confined fluid, the pressure does not change and not transmitted undiminished to every part of the fluid

D When pressure is applied to a confined fluid, the pressure change but not transmitted to every part of the fluid and to the walls of its container

Correct Answer : B

Q-78 A fluid is said to be ideal, if it is

A High viscosity and incompressible

B Viscosity and compressible

C Zero viscosity and incompressible

D High internal resistance to flow

Correct Answer : C

Q-79 Atmospheric pressure is

A The force exerted by the weight of the air above a surface

B The volume of air above a surface

C Gauge pressure

D Absolute zero pressure

Correct Answer : A

Q-80 Vacuum is pressure that is

A Upper than atmospheric pressure

B Lower than atmospheric pressure

C Positive pressure

D All are correct statements

Correct Answer : B

Q-81 The engineering materials are classified based on

A Ferrous, non-ferrous and bio-metals

B Thermoplastics, thermosets and elastomers

C Ceramics and composites

D All of the above

Correct Answer : D

Q-82 Which one is the Mechanical property of a metal ?

A Brittleness

B Oxidation

C Corrosion resistance

D Magnetic properties

Correct Answer : A

Q-83 The primary purpose of heat treatment is to

A Alter the size and shape of the material

B Alter the mechanical properties of a material, such as its hardness, strength, ductility and toughness

C Improve the density of the material by controlled heating and cooling processes

D Alter the chemical composition of a material

Correct Answer : B

Q-84 Which of the following is not the objective of the annealing?

A Remove internal stresses

B Refine grain size

C Improve machinability

D Destroy complete structure of the material

Correct Answer : D

Q-85 Cyaniding and nitriding are two methods of

A Softening the metal

B Case hardening

C Tempering

D Normalizing

Correct Answer : B

Q-86 Arc welding uses the electric supply

A Only A.C.

B Only D.C.

C Both A.C. and D.C.

D Spiral waveform

Correct Answer : C

Q-87 Core is used to

A Support the loose pieces of pattern

B Help to remove casting from mould cavity

C Strengthen moulding sand

D Make desire hole in casting

Correct Answer : D

Q-88 Negative allowance is provided on the pattern to take care of

A The distortion allowance
B The draft allowance
C The machining allowance
D The shake allowance

Correct Answer : D

Q-89 Which material is used to make pattern

A Aluminium
B Teak wood
C Cast iron
D Any of these

Correct Answer : D

Q-90 Which of the following point angles of a twist drill is used for general purpose work?

A 138°
B 128°
C 118°
D 108°

Correct Answer : C

Q-91 If the demand for an item is doubled and the ordering cost halved, the EOQ

A remains unchanged
B increases by factor of √2
C is doubled
D is halved

Correct Answer : A

Q-92 Boring operation in a lathe is used for

A Generating a plane surface
B Enlarging a hole
C Generating a serrated surface
D Generating threads

Correct Answer : B

Q-93 Lathe specification of swing over bed specifies

A Maximum diameter of job that can be turned in the lathe
B Minimum diameter of job that can be turned in the lathe
C Minimum length of job that can be turned in the lathe
D Minimum radius of job that can be turned in the lathe

Correct Answer : A

Q-94 In the following machining operations, the cutting tool reciprocates while the workpiece remains stationary during cutting

A Turning operation
B Milling operation
C Shaping operation
D Drilling operation

Correct Answer : C

Q-95 ABC analysis deals with

A Analysis of process chart
B Flow of material

C Ordering schedule of job

D Controlling inventory by categorizing the items based on their value and importance

Correct Answer : D

Q-96 Control charts for the attribute are concerned with

A Checking if the variable is out of control

B The actual measurement of the parameter, comparing with a standard

C Qualitative checking of defects

D Direct measurement of variables for control

Correct Answer : C

Q-97 What is TQM?

A Total Quality Maintenance

B Total Quality Managers

C Total Quantity Manager

D Total Quality Management

Correct Answer : D

Q-98 Which is the sequence of operations in a conventional powder metallurgy process?

A Atomization -Blending and Mixing – Compacting -Sintering

B Blending and Mixing – Sintering- Atomization -Compacting -

C Sintering - Compacting- Atomization - Blending and Mixing

D Compacting -Blending and Mixing – Atomization - Sintering

Correct Answer : A

Q-99 In the description of tool signature, nose radius is indicated

A in the beginning

B in the middle

C at the end

D not indicated

Correct Answer : C

Q-100 Line balancing is imperative in

A Mass production

B Batch production

C Unit production

D Job production

Correct Answer : A