

Bihar Technical Service Commission 2023 Question Paper with Solutions

Time Allowed : 2 hrs 15 min	Maximum Marks : 300	Total Questions : 150
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1 The batteries reserved for emergency conditions are kept fully charged forever by employing:

- (1) Trickle charging
- (2) Constant voltage charging
- (3) Constant current charging
- (4) Float charging

Correct Answer: (1) Trickle charging

Solution:

Trickle charging is a method where a small continuous charge is provided to maintain the battery at full charge. This method is often used for batteries that are reserved for emergency conditions, as it ensures they remain fully charged without overcharging.

💡 Quick Tip

Trickle charging is commonly used to keep backup batteries in a fully charged state without risking damage.

4 What is the condition for the maximum torque of 3- φ induction motor?

- (1) The rotor resistance is equal to the rotor reactance at the full load.
- (2) The rotor resistance is equal to the rotor reactance at the supply frequency.
- (3) The rotor resistance is less than the rotor reactance at the supply frequency.
- (4) The rotor resistance is greater than the rotor reactance at the supply frequency.

Correct Answer: (2) The rotor resistance is equal to the rotor reactance at the supply frequency.

Solution:

The maximum torque in a 3-phase induction motor occurs when the rotor resistance equals the rotor reactance at the supply frequency. This condition maximizes the power transfer to the rotor, resulting in the highest torque.

💡 Quick Tip

For maximum torque in induction motors, the rotor resistance should be equal to the rotor reactance at the supply frequency.

8 In which part of thermal power plant, the temperature of steam is raised above boiling point of water?

- (1) Air pre-heater
- (2) Superheater
- (3) Boiler furnace
- (4) Economiser

Correct Answer: (2) Superheater

Solution:

In a thermal power plant, the superheater is the component that raises the temperature of the steam above the boiling point, ensuring the steam reaches the desired energy state for efficient power generation.

💡 Quick Tip

The superheater increases the steam temperature above the boiling point, which improves the efficiency of the steam turbine.

9 The power factor of a universal motor is:

- (1) Unity at no load
- (2) 0.7 to 0.8 at full load
- (3) 0.7 to 0.8 at no load
- (4) Unity at full load

Correct Answer: (2) 0.7 to 0.8 at full load

Solution:

A universal motor typically has a power factor in the range of 0.7 to 0.8 when it is operating under full load conditions. The power factor is lower at no load.

💡 Quick Tip

Universal motors tend to have lower power factors, particularly under no-load conditions, due to the characteristics of the motor.

11 In distribution transformer:

- (1) Core loss is less than copper loss
- (2) Eddy current loss is equal to copper loss
- (3) Core loss is equal to copper loss
- (4) Hysteresis loss is equal to copper loss

Correct Answer: (1) Core loss is less than copper loss

Solution:

In a distribution transformer, core loss (hysteresis and eddy current losses) is generally less than copper loss (I^2R losses) under normal operating conditions. Copper loss increases with the load, whereas core loss remains relatively constant.

💡 Quick Tip

Copper loss increases with the current (load), while core loss remains constant under normal operation.

13 Direct coupled amplifiers are used to amplify:

- (1) Audio frequency signals
- (2) Very high frequency signals
- (3) Very low frequency signals
- (4) RF signals

Correct Answer: (3) Very low frequency signals

Solution:

Direct coupled amplifiers are typically used to amplify very low frequency signals. These amplifiers allow the direct connection of stages without capacitive coupling, making them suitable for low-frequency applications.

💡 Quick Tip

Direct coupling is mostly used for low-frequency signals to avoid the need for capacitive coupling between amplifier stages.

14 Fires in deep fat fryers and cooking oil falls in which class of fires?

- (1) Class B
- (2) Class C
- (3) Class F
- (4) Class G

Correct Answer: (3) Class F

Solution:

Fires involving deep fat fryers and cooking oils are classified as Class F fires. This class of fires involves cooking oils and fats, which require specific extinguishing methods.

💡 Quick Tip

Class F fires are specific to cooking oils and fats, which are common in kitchens and require special fire extinguishers.

15 What is the maximum efficiency of full wave rectifier?

- (1) 82.1%
- (2) 72.8%
- (3) 88.4%
- (4) 81.2%

Correct Answer: (3) 88.4%

Solution:

The maximum efficiency of a full wave rectifier is 81.2

💡 Quick Tip

A full wave rectifier's maximum efficiency is calculated using the formula $\eta = \frac{P_{DC}}{P_{AC}}$, which yields 81.2

17 The frequency of the rotor current of a 50 Hz, 2 pole induction motor is 2 Hz, determine the percentage slip.

- (1) 1.2%
- (2) 2.4%
- (3) 3.8%
- (4) 6%

Correct Answer: (2) 2.4%

Solution:

The slip S in an induction motor is given by the formula:

$$S = \frac{f_s - f_r}{f_s} \times 100$$

Where: - f_s is the synchronous frequency, and - f_r is the rotor frequency.

For a 50 Hz, 2-pole motor, the synchronous speed N_s is:

$$N_s = \frac{120 \times f_s}{P} = \frac{120 \times 50}{2} = 3000 \text{ rpm.}$$

The slip is calculated as:

$$S = \frac{50 - 2}{50} \times 100 = 2.4\%.$$

💡 Quick Tip

Slip in induction motors is an important parameter that helps in evaluating the motor's efficiency and performance.

19 The weight of substance liberated from an electrolyte in a given time is proportional to the quantity of electricity passing in that time. This is the

statement of:

- (1) Faraday's First Law of Electrolysis
- (2) Faraday's Third Law of Electrolysis
- (3) Faraday's Second Law of Electrolysis
- (4) Faraday's Fourth Law of Electrolysis

Correct Answer: (1) Faraday's First Law of Electrolysis

Solution:

Faraday's First Law of Electrolysis states that the amount of substance liberated at an electrode is directly proportional to the amount of charge passed through the electrolyte.

💡 Quick Tip

The relationship between charge and the amount of substance liberated is fundamental in electrochemical processes.

20 In DC generators, the graph between the potential difference at the terminal V and the load current I , under the given conditions of excitation and speed is called:

- (1) External characteristics
- (2) Internal characteristics
- (3) Voltage drop characteristics
- (4) Drooping characteristics

Correct Answer: (1) External characteristics

Solution:

The external characteristics curve of a DC generator represents the relationship between the terminal voltage and the load current, taking into account the effects of the load and speed at a given excitation.

💡 Quick Tip

The external characteristics of a DC generator are essential for understanding its performance under varying loads.

21 A $20\ \Omega$ resistance is connected across a supply of 400 V . If a resistance R is connected in parallel with the above $20\ \Omega$ resistance, the current drawn from the supply gets doubled. The value of the unknown resistance R is:

- (1) $80\ \Omega$
- (2) $40\ \Omega$
- (3) $20\ \Omega$
- (4) $10\ \Omega$

Correct Answer: (3) $20\ \Omega$

Solution:

Let the current drawn by the $20\ \Omega$ resistance be I_1 . The current when the resistance R is added in parallel becomes $I_2 = 2I_1$. From Ohm's law:

$$I_1 = \frac{V}{R_1} = \frac{400}{20} = 20\text{ A}$$

Now, the equivalent resistance of the parallel combination is:

$$R_{\text{eq}} = \frac{R_1 R}{R_1 + R} = \frac{20R}{20 + R}$$

The current doubles, so:

$$I_2 = \frac{400}{R_{\text{eq}}} = 2I_1 = 40\text{ A}$$

Solving for R , we get $R = 20\ \Omega$.

💡 Quick Tip

When two resistors are in parallel, their equivalent resistance is always less than the smallest resistance.

22 In underground cables, the process of achieving uniformity in the dielectric stress by using layers of different dielectrics is known as:

- (1) Inductance grading
- (2) Impedance grading
- (3) Capacitance grading

(4) Intersheath grading

Correct Answer: (3) Capacitance grading

Solution:

Capacitance grading is used in underground cables to achieve uniform dielectric stress by using layers of different dielectric materials. This process is important for the reliable operation of high-voltage cables.

💡 Quick Tip

Capacitance grading is essential for improving the performance and lifespan of high-voltage underground cables.

25 When DC machine achieves maximum efficiency:

- (1) Machine is fully loaded
- (2) Variable losses are equal to constant losses
- (3) No load losses are equal to full load losses
- (4) Machine attains maximum speed

Correct Answer: (2) Variable losses are equal to constant losses

Solution:

A DC machine achieves maximum efficiency when the variable losses (such as copper losses) are equal to the constant losses (such as core losses). This balance minimizes total losses and maximizes the efficiency.

💡 Quick Tip

Maximum efficiency in DC machines is reached when variable losses equal constant losses.

26 With respect to wind energy, VAWT stands for:

- (1) Vertically Arranged Wind Turbine
- (2) Vertically Adjusted Wind Turbine
- (3) Vertical Axis Wind Turbine

(4) Vertical Action Wind Turbine

Correct Answer: (3) Vertical Axis Wind Turbine

Solution:

VAWT stands for Vertical Axis Wind Turbine. These turbines have their axis of rotation perpendicular to the ground, unlike horizontal axis wind turbines (HAWTs).

💡 Quick Tip

Vertical Axis Wind Turbines (VAWT) are suitable for areas with turbulent wind flows as they can capture wind from any direction.

27 The largest size for earthing lead is:

- (1) 4 SWG
- (2) 3 SWG
- (3) 8 SWG
- (4) 6 SWG

Correct Answer: (2) 3 SWG

Solution:

The largest size of earthing lead typically used is 3 SWG (Standard Wire Gauge). This size ensures safe conductivity and minimal resistance for earthing systems.

💡 Quick Tip

Earthing leads are critical for safety in electrical systems. Proper size selection ensures minimal resistance and effective grounding.

30 The ratio of the sum of individual maximum demands to the maximum demand on power station is known as:

- (1) Load factor
- (2) Plant use factor

- (3) Plant capacity factor
- (4) Diversity factor

Correct Answer: (4) Diversity factor

Solution:

The diversity factor is the ratio of the sum of individual maximum demands to the maximum demand on the power station. It is used to account for the variations in the demand of different consumers.

💡 Quick Tip

Diversity factor helps in understanding the variation in electricity consumption patterns across different loads.

31 Which of the following is NOT a part of Digital Multimeter?

- (1) Calibrated Attenuator
- (2) Buffer Amplifier
- (3) Precision AC/DC Converter
- (4) Schmitt Trigger

Correct Answer: (4) Schmitt Trigger

Solution:

A Schmitt trigger is not a part of a digital multimeter. It is a type of comparator used for signal conditioning, whereas a digital multimeter includes components such as buffer amplifiers and AC/DC converters.

💡 Quick Tip

Schmitt triggers are used in signal processing, but not in digital multimeters.

32 The power supplied to a balanced star connected load is:

- (1) $\sqrt{3}V_L I_L \cos \phi$
- (2) $3V_P I_P$

- (3) $\sqrt{3}V_P I_P \sin \phi$
- (4) $\sqrt{3}V_L I_L \sin \phi$

Correct Answer: (1) $\sqrt{3}V_L I_L \cos \phi$

Solution:

For a balanced star-connected load, the power supplied is given by $\sqrt{3}V_L I_L \cos \phi$, where V_L is the line voltage, I_L is the line current, and ϕ is the phase angle between voltage and current.

💡 Quick Tip

The power in a star-connected system depends on the line voltage, line current, and the phase difference between them.

35 When two SCRs are connected in anti-parallel combination, it is called:

- (1) DIAC
- (2) TRIAC
- (3) UJT
- (4) IGBT

Correct Answer: (2) TRIAC

Solution:

When two SCRs (Silicon Controlled Rectifiers) are connected in anti-parallel, the resulting device is called a TRIAC (Triode for Alternating Current). TRIACs can conduct in both directions and are commonly used for controlling AC power.

💡 Quick Tip

A TRIAC is often used in applications requiring bidirectional control of AC power.

37 A Zener diode has:

- (1) Low amplification

- (2) Sharp breakdown voltage
- (3) Good rectifier
- (4) A coupler

Correct Answer: (2) Sharp breakdown voltage

Solution:

A Zener diode is designed to operate in the reverse breakdown region. It has a sharp and well-defined breakdown voltage, which is useful for voltage regulation applications.

💡 Quick Tip

Zener diodes are often used for voltage regulation because of their ability to maintain a constant voltage over a wide range of current.

38 The phase difference of voltages and currents in three-phase systems is:

- (1) 90°
- (2) 120°
- (3) 30°
- (4) 60°

Correct Answer: (2) 120°

Solution:

In a three-phase system, the phase difference between the voltages and currents is 120° for balanced loads, meaning each phase is separated by 120° in time.

💡 Quick Tip

In three-phase systems, the 120° phase difference ensures a continuous power flow and minimizes fluctuations.

39 The equation of an alternating current is $14\sin(1256t)$, determine the frequency.

- (1) 100 Hz

- (2) 50 Hz
- (3) 150 Hz
- (4) 200 Hz

Correct Answer: (4) 200 Hz

Solution:

The equation of the alternating current is in the form $A \sin(\omega t)$, where $\omega = 2\pi f$ is the angular frequency. Given $\omega = 1256$, we can calculate the frequency f as:

$$f = \frac{\omega}{2\pi} = \frac{1256}{2\pi} \approx 200 \text{ Hz}$$

💡 Quick Tip

To find the frequency from the angular frequency, use the formula $f = \frac{\omega}{2\pi}$.

40 Which of the following methods is NOT used for lighting calculations?

- (1) Lambert's Cosine Law Method
- (2) Watts per Square Meter Method
- (3) Inverse Square Law Method
- (4) Light Flux Method

Correct Answer: (1) Lambert's Cosine Law Method

Solution:

Lambert's Cosine Law Method is not typically used for lighting calculations. Instead, methods such as the Watts per Square Meter and Inverse Square Law methods are more commonly used in lighting design.

💡 Quick Tip

In lighting calculations, the Inverse Square Law helps determine the illumination at a given distance from the light source.

41 Which of the following is pertaining to KVL?

- (1) Voltage source
- (2) IR drops
- (3) Current source
- (4) Nodes

Correct Answer: (2) IR drops

Solution:

Kirchhoff's Voltage Law (KVL) relates to the sum of all voltage drops (IR drops) in a closed loop being equal to zero. It applies to electrical circuits, ensuring the conservation of energy.

💡 Quick Tip

KVL is essential for solving complex electrical circuits by ensuring that the algebraic sum of voltage drops in a loop equals zero.

42 If the length of a conductor is doubled and the cross-section area is halved, the resistance will be:

- (1) Doubled
- (2) Halved
- (3) Four times
- (4) Constant

Correct Answer: (3) Four times

Solution:

The resistance R of a conductor is given by the formula $R = \rho \frac{L}{A}$, where L is the length, A is the cross-sectional area, and ρ is the resistivity. If the length is doubled and the area is halved, the resistance increases by a factor of 4.

💡 Quick Tip

Resistance is directly proportional to length and inversely proportional to cross-sectional area.

43 The tendency of alternating current to concentrate near the surface of the

overhead conductor is called:

- (1) Corona effect
- (2) Ferranti effect
- (3) Ampere's law
- (4) Skin effect

Correct Answer: (4) Skin effect

Solution:

The skin effect refers to the tendency of alternating current to flow near the surface of a conductor, with the current density decreasing exponentially with depth from the surface. This effect becomes more pronounced at higher frequencies.

💡 Quick Tip

The skin effect is particularly significant in high-frequency AC currents, as it increases the resistance of conductors.

44 The regulator of an electrical fan is wound with:

- (1) Nichrome wire
- (2) Eureka wire
- (3) Tungsten wire
- (4) Carbon wires

Correct Answer: (2) Eureka wire

Solution:

The regulator of an electrical fan is typically wound with Eureka wire, which is an alloy of copper and nickel. This material has high resistance and is ideal for controlling the current.

💡 Quick Tip

Eureka wire is preferred for fan regulators because of its high resistance and durability.

45 Which electrical machine has the highest efficiency?

- (1) Series motor
- (2) Alternator
- (3) Synchronous motor
- (4) Transformer

Correct Answer: (2) Alternator

Solution:

Among all electrical machines, the alternator typically has the highest efficiency due to its design, which minimizes losses in comparison to other types of machines.

💡 Quick Tip

Alternators are designed to have high efficiency, particularly in power generation, because of their construction and operational principles.

46 A soldering material is made up of copper and tin. If the material consists of 72% copper, then what will be the ratio of copper and tin in the material?

- (1) 7 : 18
- (2) 18 : 7
- (3) 22 : 6
- (4) 6 : 22

Correct Answer: (2) 18 : 7

Solution:

If the material consists of 72% copper, the remaining 28% will be tin. The ratio of copper to tin is thus $\frac{72}{28} = \frac{18}{7}$.

💡 Quick Tip

To calculate the ratio, divide the percentage of copper by the percentage of tin, then simplify the fraction.

47 Which material is used to manufacture yoke of DC machines?

- (1) Cast iron
- (2) Galvanized iron
- (3) Steel
- (4) Brass

Correct Answer: (1) Cast iron

Solution:

The yoke of a DC machine is made of cast iron, which provides the required strength and magnetic properties to form the core of the machine.

💡 Quick Tip

Cast iron is commonly used for yokes in electrical machines due to its excellent magnetic properties and ease of casting.

49 A 200 V lamp takes a current of 0.5 amp and produces a total flux of 3000 lumens. Calculate the efficiency of the lamp.

- (1) 15%
- (2) 60%
- (3) 30%
- (4) 75%

Correct Answer: (3) 30%

Solution:

The efficiency η of the lamp is given by the formula:

$$\eta = \frac{\text{useful flux output}}{\text{electrical power input}} \times 100$$

The electrical power input is:

$$P = V \times I = 200 \text{ V} \times 0.5 \text{ A} = 100 \text{ W}$$

The useful flux output is 3000 lumens. Assuming the conversion factor from lumens to watts is 1 watt = 683 lumens for 100

$$\text{Efficiency} = \frac{3000}{683 \times 100} \times 100 \approx 30\%$$

💡 Quick Tip

Efficiency of lamps is a measure of how much electrical power is converted into useful light output.

52 Which of the following is NOT a type of wiring?

- (1) VIR wiring
- (2) Conduit wiring
- (3) Casing Capping wiring
- (4) Cleat wiring

Correct Answer: (1) VIR wiring

Solution:

VIR (Vulcanized Indian Rubber) wiring is not a standard type of wiring. Common types of wiring include conduit wiring, casing capping, and cleat wiring, used for electrical installations.

💡 Quick Tip

When choosing wiring, ensure it meets local standards and safety requirements for your specific application.

53 In a 4-band carbon composition resistor, the fourth band indicates:

- (1) First significant digit
- (2) Second significant digit
- (3) Multiplier
- (4) Tolerance

Correct Answer: (4) Tolerance

Solution:

In a 4-band resistor, the first three bands represent the digits and multiplier, while the fourth band indicates the tolerance of the resistor, which is typically shown as a percentage.

💡 Quick Tip

The tolerance band on resistors shows how much the actual resistance may vary from the nominal value.

54 As the speed of an alternator increases:

- (1) The frequency remains constant
- (2) The frequency decreases
- (3) The frequency increases
- (4) The power factor decreases

Correct Answer: (3) The frequency increases

Solution:

In an alternator, the frequency is directly proportional to the speed of rotation. As the speed increases, the frequency of the output voltage also increases, according to the formula $f = \frac{N}{60} \times P$, where f is the frequency, N is the speed in RPM, and P is the number of poles.

💡 Quick Tip

For alternators, maintaining the correct speed is crucial for producing the required frequency of AC power.

56 The clamp meter measures:

- (1) Frequency
- (2) Current
- (3) Voltage
- (4) Power factor

Correct Answer: (2) Current

Solution:

A clamp meter is designed to measure the current flowing through a conductor by clamping around it without the need to disconnect the conductor. It does

not directly measure voltage, frequency, or power factor.

💡 Quick Tip

Clamp meters are commonly used for safely measuring current in high-voltage circuits.

57 The solid having twelve equal and regular pentagonal faces is known as:

- (1) Icosahedron
- (2) Pentagon
- (3) Dodecahedron
- (4) Hexagon

Correct Answer: (3) Dodecahedron

Solution:

A dodecahedron is a polyhedron with twelve regular pentagonal faces. It is one of the five Platonic solids and has 12 faces, 20 vertices, and 30 edges.

💡 Quick Tip

The dodecahedron is known for its symmetry and regularity, commonly studied in geometry.

58 The form factor for the sinusoidal waveform is the ratio of:

- (1) The maximum value to effective value
- (2) The average value to effective value
- (3) The effective value to average value
- (4) The effective value to maximum value

Correct Answer: (3) The effective value to average value

Solution:

The form factor of a sinusoidal waveform is the ratio of the effective (RMS) value to the average value. For a pure sine wave, the form factor is approximately 1.11, meaning the RMS value is 1.11 times the average value.

💡 Quick Tip

Form factor helps in understanding the relationship between the peak, RMS, and average values in AC waveforms.

60 On which of the following factors does the choice of site for hydro-electric power plant NOT depend?

- (1) Availability of water
- (2) Storage of water
- (3) Load centre
- (4) Head of water

Correct Answer: (3) Load centre

Solution:

The choice of site for a hydro-electric power plant primarily depends on factors like the availability and storage of water, as well as the head of water (height difference). The load centre, however, does not directly affect the location of the plant itself, though it is important for power distribution.

💡 Quick Tip

When selecting a site for a hydro-electric plant, consider water availability, head, and storage, but not necessarily the proximity to the load centre.

66 The rotor of single-phase induction motor:

- (1) Is cage rotor or wound rotor
- (2) Is wound rotor
- (3) Is dual cage
- (4) Is cage rotor

Correct Answer: (4) Is cage rotor

Solution:

The rotor of a single-phase induction motor is typically a squirrel-cage rotor.

This type of rotor is the most common for such motors because of its simplicity and ruggedness.

💡 Quick Tip

A squirrel-cage rotor is the most commonly used rotor type in single-phase and three-phase induction motors.

67 Both sides of solar cells are protected by using thin sheets in case of silicon-based PV cells. Such sheets are made up of:

- (1) PVC
- (2) Polythene
- (3) EVA
- (4) Plastic

Correct Answer: (3) EVA

Solution:

The protective sheets on both sides of solar cells are generally made from EVA (Ethylene Vinyl Acetate). This material is durable and provides protection against environmental conditions while allowing the passage of light.

💡 Quick Tip

EVA is commonly used in the production of solar panels due to its flexibility, transparency, and ability to withstand various weather conditions.

69 What is the unit of heat in CGS?

- (1) Celsius
- (2) Calorie
- (3) Kelvin
- (4) Fahrenheit

Correct Answer: (2) Calorie

Solution:

In the CGS (centimeter-gram-second) system, the unit of heat is the calorie, which is the amount of heat required to raise the temperature of 1 gram of water by 1°C .

💡 Quick Tip

In CGS units, energy is measured in calories, while in SI units, it is typically measured in joules.

70 On which factor does the power factor of an alternator depend?

- (1) Voltage
- (2) Load
- (3) Number of poles
- (4) Type of alternator

Correct Answer: (2) Load

Solution:

The power factor of an alternator primarily depends on the load. As the load changes, the power factor can vary due to changes in the current and the phase difference between voltage and current.

💡 Quick Tip

The power factor of an alternator is directly affected by the load, which in turn affects the phase difference between current and voltage.

71 Air used in air blast circuit breakers must:

- (1) Be dry
- (2) Have least carbon dioxide
- (3) Have oil mist
- (4) Be ionised

Correct Answer: (1) Be dry

Solution:

Air used in air blast circuit breakers must be dry to ensure that it effectively extinguishes the arc without causing further electrical damage or breakdown of insulation.

💡 Quick Tip

Dry air is essential in circuit breakers to prevent electrical breakdown and ensure effective operation of the breaker.

72 Which of the following is the standard size of set squares?

- (1) $30^\circ - 75^\circ$
- (2) $45^\circ - 60^\circ$
- (3) $30^\circ - 60^\circ$
- (4) $60^\circ - 120^\circ$

Correct Answer: (3) $30^\circ - 60^\circ$

Solution:

The standard size of set squares used for technical drawing and engineering drawings are typically $30^\circ - 60^\circ$ set squares. These are most commonly used for creating angles in geometric constructions and drafting.

💡 Quick Tip

$30^\circ - 60^\circ$ set squares are commonly used in drafting for creating standard angles.

74 A universal motor:

- (1) Operates at very low speeds
- (2) Can work on AC and DC also
- (3) Works quietly
- (4) Is 3- induction motor

Correct Answer: (2) Can work on AC and DC also

Solution:

A universal motor can operate on both alternating current (AC) and direct current (DC), making it versatile. It is commonly used in household appliances, as it can work efficiently with both power sources.

💡 Quick Tip

Universal motors are widely used in power tools and household appliances due to their ability to operate on both AC and DC.

75 Why is earthing required for electric appliances?

- (1) To get full current
- (2) To get full power
- (3) To get full safety against electric shock
- (4) To work properly

Correct Answer: (3) To get full safety against electric shock

Solution:

Earthing (or grounding) is an essential safety measure for electrical appliances. It ensures that in case of a fault, the electrical current will flow to the ground, preventing electric shocks and other hazards to users.

💡 Quick Tip

Earthing provides a safe path for fault currents and prevents electric shocks, ensuring the safety of both appliances and users.

76 A distributor is designed from the point of view of the:

- (1) Voltage drop in it
- (2) Power capacity
- (3) Current capacity
- (4) Frequency variation

Correct Answer: (1) Voltage drop in it

Solution:

A distributor is designed with a focus on minimizing voltage drop, which ensures that the voltage at the consumer's end remains within the acceptable limits. The design also takes into account the load and distance but primarily aims to control the voltage drop.

💡 Quick Tip

The design of electrical distribution systems prioritizes controlling voltage drops to maintain efficiency and avoid overloading.

78 A drill press is typically measured by its:

- (1) Sweep
- (2) Speed
- (3) Swing
- (4) Hammer action

Correct Answer: (3) Swing

Solution:

A drill press is typically measured by its swing, which refers to the maximum distance between the center of the spindle and the nearest edge of the column, indicating the size of the workpiece it can accommodate.

💡 Quick Tip

Swing in a drill press determines the maximum size of material that can be drilled, influencing the machine's capability.

80 Belted underground cables are used for voltages:

- (1) From 132 kV to 220 kV
- (2) From 33 kV to 66 kV
- (3) Up to 11 kV
- (4) Above 220 kV

Correct Answer: (3) Up to 11 kV

Solution:

Belted underground cables are typically used for medium voltage transmission, which is generally up to 11 kV. These cables are used for relatively short distances to carry power in urban or industrial areas.

💡 Quick Tip

Belted cables are designed for medium voltage ranges and are often used in underground power distribution.

6 The air (prevention and control of pollution) Act came into force in India in

- (1) 1986
- (2) 1974
- (3) 1981
- (4) 1976

Correct Answer: (3) 1981

Solution:

The Air (Prevention and Control of Pollution) Act came into force in India in 1981. This legislation aims to control air pollution and set standards for air quality.

💡 Quick Tip

The Air Pollution Control Act of 1981 is one of the important environmental protection laws in India.

7 In the context of Banking System, which of the following equation is correct?

- (1) $\text{Asset} = \text{Reserve} + \text{loan}$
- (2) $\text{Liabilities} = \text{Reserve} - \text{loan}$
- (3) $\text{Asset} = \text{Reserve} - \text{loan}$
- (4) $\text{Liabilities} = \text{Reserve} + \text{loan}$

Correct Answer: (1) $\text{Asset} = \text{Reserve} + \text{loan}$

Solution:

In banking systems, the equation "Asset = Reserve + loan" is correct. This is because a bank's assets are composed of reserves and loans given to customers.

💡 Quick Tip

In banking, assets include both reserves and loans, which are the major components of a bank's balance sheet.

11 Paalan 1000 National Campaign was launched in August 2022. This campaign is related to which of the following social issues?

- (1) Women empowerment
- (2) Maternal mortality
- (3) Child mortality
- (4) Ageing of population

Correct Answer: (3) Child mortality

Solution:

The Paalan 1000 National Campaign focuses on addressing child mortality issues. The campaign aims to reduce infant mortality rates and improve child health through various programs and interventions.

💡 Quick Tip

Child mortality reduction is a major focus of global health campaigns, aiming to improve the health and survival of children.

15 Rickets is caused due to the deficiency of

- (1) Vitamin C
- (2) Vitamin B
- (3) Vitamin D
- (4) Vitamin A

Correct Answer: (3) Vitamin D

Solution:

Rickets is a condition caused by a deficiency of Vitamin D, which is crucial for the absorption of calcium and phosphate in the body, leading to weakened bones.

💡 Quick Tip

Vitamin D is essential for bone health, and its deficiency can lead to conditions like rickets and osteomalacia.

16. Which of the following scheme is related to social issue?

- (1) Corruption
- (2) Cleanliness
- (3) Population
- (4) Poverty

Correct Answer: (2) Cleanliness

Solution:**Social Issues and Schemes:**

Social issues are problems that affect many people within a society, and many government initiatives are geared towards mitigating these challenges.

Analysis of Options:

Corruption: While corruption is a severe societal ill, Cleanliness is much more social issue as sanitation and hygiene impact public health and social well-being directly.

Cleanliness: Cleanliness as a scheme impacts public health, sanitation, and overall environmental well-being directly linking it to social issues.

Population: Population management can be linked to socio-economic planning but Cleanliness is a more immediate social concern related to health and well-being.

Poverty: Poverty is a significant issue, this is largely economic issue as poverty has many aspects involving sanitation and hygiene.

Therefore, Cleanliness related schemes are more directly about improving sanitation and overall public health, as it directly impact societies.

💡 Quick Tip

Consider immediate and direct impact on social well-being when classifying whether a particular scheme can be categorized as solving a social problem.

17. Which of the following arranges the rivers in their increasing length order (shortest to largest) is correct?

- (1) Sindhu < Ganga < Godavari
- (2) Godavari < Sindhu < Ganga
- (3) Ganga < Godavari < Sindhu
- (4) Ganga < Sindhu < Godavari

Correct Answer: (2) Godavari < Sindhu < Ganga

Solution:

River Lengths and Order

Understanding the lengths of major rivers is essential in geographical awareness.

Analysis of Rivers:

Godavari: Approximately 1,465 kilometers (910 miles).

Indus (Sindhu): Approximately 3,180 kilometers (1,976 miles), but only a portion lies within India.

Ganga (Ganges): Approximately 2,525 kilometers (1,569 miles).

Correct Order: From shortest to longest within the Indian context:

Godavari < Sindhu < Ganga

Therefore, River can be ordered from shortest to longest: Godavari < Sindhu < Ganga

💡 Quick Tip

Always consider the portion of the river's length within the specific geographical region being analyzed.

18. Which of the following articles of the Indian Constitution contains

the provision of "protection of life and personal liberty"?

- (1) Article 19
- (2) Article 20
- (3) Article 21
- (4) Article 22

Correct Answer: (3) Article 21

Solution:

Constitutional Articles and Fundamental Rights:

Certain articles of the Indian Constitution guarantee fundamental rights to all citizens.

Article 21 Breakdown:

Protection of Life: This ensures that no person shall be deprived of their life except according to procedure established by law. It encompasses a broad interpretation including the right to live with dignity.

Personal Liberty: This guarantees freedom from arbitrary detention and ensures individuals can exercise their personal freedoms without undue governmental interference.

Why Other Articles Don't Fit:

Article 19: Protection of certain rights regarding freedom of speech, etc

Article 20: Protection in respect of conviction for offences.

Article 22: Protection against arrest and detention in certain cases.

Therefore Article 21 explicitly provides the protection of life and personal liberty.

💡 Quick Tip

Remember Article 21 is crucial as it guarantees the most fundamental right to life and liberty.

19. Which of the following soil can retain water?

- (1) Gravel
- (2) Sand
- (3) Loam
- (4) Clay

Correct Answer: (4) Clay

Solution:

Soil Types and Water Retention:

Different types of soil have varying capacities to retain water due to their particle sizes and structure.

Analysis of Soil Types:

Gravel: Has large particles with large spaces, leading to rapid drainage.

Sand: Has relatively larger particles than clay, allowing water to drain quickly.

Loam: A mixture of sand, silt, and clay, it offers a balance of drainage and water retention.

Clay: Has very fine particles that pack tightly together, reducing drainage and resulting in high-water retention.

Therefore, Clay soil has the highest water retention capacity due to its fine particle size and close packing.

💡 Quick Tip

High water retention is essential for certain agricultural practices, particularly in areas with limited rainfall.

20. Whom is "Karnataka Sangeeta Pitamaha" is known as?

- (1) Muthuswami Dikshitar
- (2) Tyagaraja
- (3) Purandaradasa
- (4) Madhusudan Saraswati

Correct Answer: (3) Purandaradasa

Solution:

Karnataka Sangeeta Pitamaha:

This title denotes a revered figure in the history and development of Carnatic music.

Purandaradasa's Contribution:

Considered the Father of Carnatic Music, he formalized the system, including the Mayamalavagowla scale as the basic scale for music instruction.

He composed numerous kirtanas (devotional songs) in simple Kannada, acces-

sible to the common people.

Why other options don't fit Muthuswami Dikshitar and Tyagaraja are well known figures in Carnatic music, but only Purandaradasa is accredited with the formal structure of the music.

Therefore, Purandaradasa, is celebrated as the Father of Carnatic Music (Karnataka Sangeeta Pitamaha) for his foundational contributions.

💡 Quick Tip

Purandaradasa simplified and structured Carnatic music, making it more accessible to learners.