BMH
PROVISIONAL ANSWER KEY

Name of the post	**Additional Assistant Engineer (Electrical), Class-3, Gandhinagar Municipal Corporation Class-3**
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THE LINK FOR ONLINE OBJECTION SYSTEM WILL START FROM 03-04-2025; 10:00 AM ONWARDS

Instructions / સૂચના

Candidate must ensure compliance to the instructions mentioned below, else objections shall not be considered: -

(1) Candidates have to pay fees of Rs.100/- for each objection. The fees can be paid from the link given herewith.

(2) The Candidate will be able to submit objection only after payment of the fees. The generation of the receipt will only be considered as final submission.

(3) The Candidate must retain the receipt of the payment of the fees. The fees, once paid, will not be refunded under any circumstances.

(4) All the objections should be submitted through **ONLINE OBJECTION SUBMISSION SYSTEM** only. Physical or submission through any other means will not be considered.

(5) All objections are to be submitted with reference to the Master Question Paper published with provisional answer key, published herewith on the website / online objection submission system. Objections should be sent referring to the Question No. & options of the Master Question Paper. Objections regarding question nos. and options other than provisional answer key (Master Question Paper) shall not be considered.

(6) Objections and answers suggested by the candidate should be in compliance with the responses given by him in his answer sheet. Objections shall not be considered, in case, if responses given in the answer sheet /response sheet and submitted objections are differed.

(7) Supportive document to the objection must be uploaded, without which objection will not be considered.

ઉમેદવારે નીચેની સૂચનાઓનું પાલન કરવાની તકેદારી રાખવી, અન્યથા વાંધા-સૂચન અંગે કરેલ રજૂઆતો ધ્યાને લેવાશે નહીં

(1) ઉમેદવારે દરેક વાંધા દીઠ રૂપિયા ૧૦૦/-ફી ભરવાની રહેશે. જે ફી આ સાથે આપેલ લીંક ઉપરથી ભરી શકાશે.

(2) ફી ભર્યા બાદ જ વાંધો સબમીટ થઈ શકશે. ફી ભર્યાની આખરી પહોંચ જ આખરી સબમીશન ગણાશે.

(3) ફી ભર્યાની પહોંચ ઉમેદવારે સાચવી રાખવાની રહેશે. એક વાર ભરેલ ફી કોઈ પણ પરિસ્થિતિમાં પરત આપવામાં આવશે નહિ.

(4) વાંધા ફક્ત **ઓનલાઈન ઓબ્જેકશન સબમીશન સીસ્ટમ** દ્વારા જ સબમીટ કરવાના રહેશે. રૂબરૂ, ટપાલ અથવા ઈ-મેઈલ કે અન્ય કોઈ રીતે આયોગને મોકલવામાં આવેલ વાંધા ધ્યાને લેવામાં આવશે નહીં, જેની ખાસ નોંધ લેવી.

(5) ઉમેદવારે પોતાને પરીક્ષામાં મળેલ પ્રશ્નપુસ્તિકામાં છપાયેલ પ્રશ્નક્રમાંક મુજબ વાંધા-સૂચનો રજૂ ન કરતાં, તમામ વાંધા-સૂચનો વેબસાઈટ પર પ્રસિધ્ધ થયેલ પ્રોવિઝનલ આન્સર કી (માસ્ટર પ્રશ્નપત્ર) ના પ્રશ્નક્રમાંક મુજબ અને તે સંદર્ભમાં રજૂ કરવા. માસ્ટર પ્રશ્નપત્રમાં નિર્દિષ્ટ પ્રશ્ન અને વિકલ્પ સિવાયના વાંધા ધ્યાને લેવામાં આવશે નહીં.

(6) ઉમેદવારે પ્રશ્નના વિકલ્પ પર વાંધો રજૂ કરેલ છે અને વિકલ્પ રૂપે જે જવાબ સૂચવેલ છે એ જવાબ ઉમેદવારે પોતાની ઉત્તરવહીમાં આપેલ હોવો જોઈએ. ઉમેદવારે સૂચવેલ જવાબ અને ઉત્તરવહીનો જવાબ ભિન્ન હશે તો ઉમેદવારે રજૂ કરેલ વાંધા ધ્યાને લેવાશે નહીં.

(7) વાંધા માટે સંદર્ભ જોડવો આવશ્યક છે, જેના વિના વાંધો ધ્યાને લેવામાં આવશે નહીં.

Website link for online objection submission system: https://www.formonline.co.in/GPSC_TRACK/SearchPage.aspx

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1. For a cylindrical parabolic concentrator of 2.27 meter-width and 7 meter-length, the outside diameter of the absorber tube is 0.07 meter. The concentration ratio of concentrator is

   (A) 20 (B) 10

   (C) 15 (D) 5

2. A 0.9 cm^2 solar cell receives solar radiation with photons of 1.8 eV energy having an intensity of 0.9 mW/cm^2. The efficiency of the solar cell is 25%. The maximum electric power output of the cell is

   (A) 0.2554 mW (B) 0.3545 mW

   (C) 0.4545 mW (D) 0.2025 mW

3. In a wind turbine, the angle of attack is the

   (A) angle made between the relative air flow and the chord of air-foil.

   (B) angle made between the blade chord and the plane of blade rotation.

   (C) angle made between the relative air flow and the plane of blade rotation.

   (D) angle made between the chord of air-foil and the plane of blade rotation.

4. The total power density available for a turbine of 100 meter diameter assuming wind speed 10 m/s and air density of 1.226 J/kg. K/m^3 at the standard atmospheric pressure is

   (A) 613 $\frac{W}{m^2}$ (B) 702 $\frac{W}{m^2}$

   (C) 221 $\frac{W}{m^2}$ (D) 382 $\frac{W}{m^2}$

5. Kaplan turbine is

   Statement-1: an axial flow turbine that is suitable for low heads, and therefore need a large quantity of water.

   Statement-2: it has adjustable runner blades and guide vanes for variable flow rates.

   (A) Statement-1 is True and Statement-2 is False

   (B) Statement-1 is False and Statement-2 is True

   (C) Both the Statements are True

   (D) Both the Statements are False

6. Biodiesel is a liquid fuel produced from non-edible oilseeds. The incorrect statement about it is

   (A) It can be mixed with petro-diesel in any percentage

   (B) It has a higher flash-point

   (C) It has high octane number

   (D) It has low viscosity than diesel

7. A solar azimuth angle is

Statement-1: an angle in the horizontal plane between the line due south and projection of beam radiation on the horizontal plane.

Statement-2: Conventionally, this angle is considered negative if the projection of the sun beam is west of south and positive if east of south in the northern hemisphere.

(A) Statement-1 is False and Statement-2 is True

(B) Statement-1 is True and Statement-2 is False

(C) Both the Statements are True

(D) Both the Statements are False

8. In central receiver power plants, solar radiations are reflected from arrays of mirrors called

(A) Heliostats installed in circular arcs around the central tower.

(B) Parabolic troughs positioned along a linear path.

(C) Fresnel reflectors arranged in flat arrays.

(D) Photovoltaic panels mounted on a fixed frame.

9. If the normal power system frequency is 50 Hz and is operating at 53 Hz, the equipment on this system most adversely affected is

(A) Alternator

(B) Power transformer

(C) Turbine

(D) All the above are equally affected

10. The per unit (p.u.) impedance value of an alternator corresponding to base values 13.2 kV and 30 MVA is 0.2 p.u. The p.u. impedance corresponding to the new base values 13.8 kV and 50 MVA will be

(A) 0.305 p.u.

(B) 0.33 p.u.

(C) 0.318 p.u.

(D) 0.328 p.u.

11. If the excitation of the synchronous generator fails, then it acts as a

(A) Synchronous motor

(B) Synchronous generator

(C) Induction motor

(D) Induction generator

12. Choose the correct statement:

(A) The insulators and lightning arresters should have high impulse ratio

(B) The insulators and lightning arresters should have low impulse ratio

(C) The impulse ratio of insulator should be high but low for lightning arrester

(D) The impulse ratio of lightning arrester should be high but low for insulator

13. In transmission line analysis, the stringing chart is useful for

(A) Finding the sag in the conductor

(B) In the design of tower

(C) In the design of insulator string

(D) Finding the distance between the tower

14. The equal area criterion method is useful in determining the critical clearing angle, i.e., the condition when the system will be stable provided the fault is cleared before the rotor angle exceeds the critical clearing angle.

Choose the correct statement:

(A) The higher the initial load, the larger the critical clearing angle

(B) The higher the initial load, the lower the critical clearing angle

(C) The initial load has nothing to do with the critical clearing angle

(D) The higher the operating time of the circuit breaker, the larger will be the critical clearing angle

15. Bundled conductors are used for EHV transmission lines primarily for reducing the

(A) corona loss

(B) surge impedance of the line

(C) voltage drop across the line

(D) I^2R losses

16. The surge impedance of a 3 phase, 400 kV transmission line is 400 Ω. The surge impedance loading (SIL) is

(A) 400 MW

(B) 100 MW

(C) 1600 MW

(D) 200 MW

17. The load factor of a continuously operating facility that consumed 800,000 kWh of energy during a 30-day billing period and established a peak demand of 2000 kW is

(A) 0.75

(B) 0.55

(C) 0.85

(D) 0.65

18. One British Thermal Unit (BTU) represents

(A) The energy required to raise the temperature of one kilogram of water by one degree Celsius at sea level.

(B) The energy required to raise the temperature of one pound of water by one degree Fahrenheit at sea level.

(C) The energy required to raise the temperature of one gallon of water by one degree Fahrenheit at sea level.

(D) The energy required to raise the temperature of one pound of water by one degree Celsius at sea level.

19. An industry pays heavy penalty on electric bill due to reduced power factor. One of the possible reasons is

(A) Motors run underload during their operation

(B) Three phase synchronous capacitor is installed with power circuits

(C) Capacitor bank is connected parallel to inductive load

(D) Efficient motors are used

20. An industry pays a more demand-charge. This implies

Statement-1: There is a big difference in average and peak electrical usage.

Statement-2: Installing the load shedder, timing devices and demand controller will reduce demand charge.

(A) Statement-1 is False but Statement-2 is True

(B) Statement-1 is True but Statement-2 is False

(C) Both the statements are True

(D) Both the statements are False

21. Choose correct option for the following two statements.

Statement-1: Cogeneration systems replace electricity consumption with less expensive fossil energy.

Statement-2: Cogeneration generally increases on peak demand of overall system.

(A) Statement-1 is True but Statement-2 is False

(B) Statement-2 is True but Statement-1 is False

(C) Both the statements are True

(D) Both the statements are False

22. In Cogeneration, the "Toping cycle" refers to

Statement-1: Fuel is consumed to process the heat, and waste heat is then utilised for power generation.

Statement-2: Fuel is burnt to generate electric power and the discharged heat is supplied as process heat.

(A) Statement-1 is True and Statement-2 is False

(B) Statement-1 is False and Statement-2 is True

(C) Both the statements are True

(D) Both the statements are False

23. In lighting audit of a building, the term "efficacy" is used which refers to

(A) amount of visible light produced from the amount of power consumed.

(B) measure of the colour of a light source related to a black body at a particular temperature expressed in degrees Kelvin.

(C) parameter that describes how a light source renders a set of coloured surfaces with respect to a black body light source at the same colour temperature.

(D) None of these

24. In order to have lower cost of electrical energy generation,

(A) The load factor and diversity factor both should be low

(B) The load factor should be low but diversity factor should be high

(C) The load factor should be high but diversity factor should be low

(D) Both the load factor and diversity factors should be high.

25. The effect of bonding the cable is to

(A) increase the effective resistance and inductance

(B) increase the effective resistance but reduce inductance

(C) decrease the effective resistance and inductance

(D) decrease the effective resistance but increase the inductance.

26. Choose the correct option.

Statement-1: A branch circuit is defined as a circuit that extends from the last overcurrent protective device of the power system.

Satement-2: According to National Electric Code, the loads larger than 50 amperes should be connected to a branch circuit.

(A) Statement-1 is True but Statement-2 is False.

(B) Statement-1 is False but Statement-2 is True.

(C) Both the Statements are True.

(D) Both the Statements are False.

27. The basic disconnect contact arrangements include three-pole single-throw (3PST) switch, four-pole single-throw (4PST) switch, three-pole double-throw (3PDT) switch and four-pole double-throw (4PDT) switch.

Statement-1: The first two switches can be used to connect three or four distinct outputs to three or four distinct inputs.

Statement-2: The last two switches can connect either three or four distinct inputs to three or four distinct outputs.

(A) Statement-1 is True but Statement-2 is False.

(B) Statement-1 is False but Statement-2 is True.

(C) Both the statements are True.

(D) None of these.

28. Three major terms that designate a switch's functions are pole, throw and break.

Statement-1: Pole refers to the number of circuits that can be controlled by the switch.

Statement-2: Throw indicates the opening of switch.

(A) Statement-1 is True but Statement-2 is False.

(B) Statement-1 is False but Statement-2 is True.

(C) Both the statements are True.

(D) None of these.

29. A room is 60 ft by 120 ft with 24 ft ceiling. A luminaire is suspended 5 ft below the ceiling and the work plan is 3 ft above the floor. The value of room cavity ratio (RCR) is

(A) 5 (B) 3

(C) 2 (D) 4

30. KCMIL is the unit used to measure

(A) Circular cross-section of conductor wire

(B) Temperature of conductor wire

(C) Conductivity of conductor wire

(D) Melting point of conductor wire

31. As per IES Lighting Handbook, 1987 (residential/commercial/institutional/public assembly interiors), the illuminance category C is for

(A) Lecture room area

(B) Science laboratory area

(C) Service Area

(D) Assembly area

32. For a power circuit, the current transformer is rated at 400 A/5A. The tap on the relay is set at 4 A. The current in power circuit at which the inverse time (induction) unit will pick up and begin its timing function is equal to

(A) 320 A

(B) 20 A

(C) 400 A

(D) 80 A

33. In synchronous drives, x_d is direct axis reactance and x_q is quadrature axis reactance.

Assertion: Slip-test is used to obtain only the ratio $\frac{x_q}{x_d}$.

Reason: Slip-test does not provide reliable value of x_d and x_q individually due to the measurement error.

(A) Both Assertion and Reason are False

(B) Assertion is True but Reason is False

(C) Assertion is False but Reason is True

(D) Both Assertion and Reason are True

34. In induction motor drives, the Field Oriented Control (FOC) decouples the stator current into i_{ds} and i_{qs} which are *d*-axis component and *q*-axis component respectively.

Statement-1: *d*-axis component is in quadrature with *q*-axis component electrically.

Statement-2: *d*-axis component is analogous to armature current and *q*-axis component is analogous to field current of separately excited dc motor.

(A) Both the statements are True

(B) Statement-1 is False but Statement-2 is True

(C) Statement-1 is True but Statement-2 is False

(D) Both the statements are False

35. The armature voltage of separately excited dc motor is controlled using a single-phase full-wave converters connected to a single-phase ac supply of 440 V, 50 Hz. The field current is 2.26 A and armature current is 45 A. Assuming a delay angle of armature converter of 60°, armature resistance 0.25 Ω and motor voltage constant 1.4 V/A rad/s, the speed of motor is (approximately)

(A) 65 rad/s
(B) 78 rad/s
(C) 95 rad/s
(D) 59 rad/s

36. In motor drives, the load torque is function of speed.
Choose the correct option for the following two statements

Statement-1: In frictional systems e.g. feed drives, the load torque is proportional to speed.

Statement-2: In pumps and fans, the load torque is proportional to square of speed.

(A) Both the statements are True
(B) Statement-1 is True but Statement-2 is False
(C) Statement-1 is False but Statement-2 is True
(D) Both the statements are False

37. Semi-converter dc motor drives operate in

(A) One quadrant only
(B) Two quadrants
(C) Three quadrants
(D) All the four quadrants

38. In Scalar control of AC drives,

(A) Only the phase of control variables is controlled.
(B) Only the magnitude of control variables is controlled.
(C) Both the magnitude and phase of control variables are controlled.
(D) Both the magnitude and phase cannot be controlled.

39. In brushless DC and AC motor drives, the speed control

(A) inverter frequency is independent of the motor speed.
(B) inverter frequency is inversely proportional to the square of motor speed.
(C) inverter frequency is changed in proportion to the speed of the motor.
(D) None of the above.

40. Choose the correct one.

Statement-1: Preferably, speed control from zero to base speed should be done at the maximum field by armature voltage control.

Statement-2: Control above base speed should be done by field weakening at the rated armature voltage.

(A) Both the statements are True

(B) Statement-1 is True but Statement-2 is False

(C) Statement-1 is False but Statement-2 is True

(D) Both the statements are False

41. The extra high tension cables has voltage rating range of

(A) 22 kV to 33 kV

(B) 33 kV to 66 kV

(C) up to 11 kV

(D) beyond 132 kV

42. In engineering contracting, under the labour contract, the contractor is asked to quote

(A) Rates for item of work, exclusive of elements of materials which is supplied by department or owner.

(B) A fixed sum for the execution of work to complete in all respect i.e. according to design, drawing and specifications within the specified time.

(C) The rates for individual items of work on the basis of scheduled quantities furnished by the department.

(D) The tenders on the basis of actual work plus some percentage in addition to allow some profit.

43. Consider the following statements for wiring systems and choose the correct option.

Statement-1: Cleat wiring system is used in motors in the industries

Statement-2: Concealed conduit wiring system is used in office buildings.

(A) Both the statements are False

(B) Both the statements are True

(C) Statement-1 is False but Statement-2 is True

(D) Statement-1 is True but Statement-2 is False

44. In overhead lines, the minimum vertical spacing between the conductors for 11 kV lines should be

(A) 137 cm

(B) 115 cm

(C) 590 cm

(D) 38 cm

45. The cable used with Vulcanized Indian Rubber (VIR) insulation has which of the following properties?

(A) These are suitable for low voltage 250-440 V only.

(B) These are suitable for internal wiring and service from poles to consumer's premises

(C) VIR reacts with copper, hence a coating of tin is required on copper wire

(D) All of the above

46. An overhead distribution line of 440 V, 3 phase, 50 Hz is passing straight 300 meters in the city along road side. Taking span of poles of 50 meters, the number of poles needed are

(A) 8 (B) 7

(C) 9 (D) 6

47. In design of street light, the term "silhouetting" refers to

(A) Reflection of a certain proportion of the incident light in the direction of the observer that makes the road surface appear brighter.

(B) Road surface illuminated by two lamps, and the resultant illumination is the sum of two lamps.

(C) Cutting off the reflection of rays reaching to observer due to an obstacle on the road making the obstruction to appear black against bright background.

(D) None of these.

48. An earth leakage current is

(A) The passage of a disruptive discharge around an insulating material.

(B) An accidental connection of conductor to earth.

(C) The current flowing to earth on account of imperfect insulation.

(D) Short-circuit current

49. In regenerative traction drives, a dc chopper device known as Crowbar is used with DC link capacitor to

(A) dissipate energy (B) store energy

(C) generate energy (D) none of the above

50. In railway traction, the incorrect statement about using 25 kV, 50 Hz is

(A) high voltage allows for sending high power levels with low current circulation. This helps to reduce Ohmic losses in the line.

(B) 25 kV–50 Hz systems can use the same 50 Hz conventional distribution grid.

(C) higher voltage isolation levels are required making AC catenary lines more expensive than DC ones.

(D) railway vehicles connected to 25 kV–50 Hz AC systems, suppress the disturbances on the three phase main grid as they are mono phase loads.

51. In locomotives, the spring-based pantographs and compressed air pantographs are generally used.

Statement-1: spring-based pantograph is better option than compressed air pantographs in high-speed locomotives

Statement-2: compressed air pantographs can maintain the pantograph in a raised condition in high-speed locomotives

(A) Statement-1 is False and Statement-2 is True

(B) Statement-2 is False and Statement-1 is True

(C) Both the statements are True

(D) Both the statements are False

52. Considering the following statement, choose the correct option.

Statement-1: Ground level power supply (GPLS) systems are characterized by supplying energy to locomotives from overhead catenary.

Statement-2: In GPLS systems, segmented power supplies between rails are used. These segments are energized only when the vehicle is over them.

(A) Statement-1 is False but Statement-2 is True

(B) Statement-2 is False but Statement-1 is True

(C) Both the statements are True

(D) Both the statements are False

53. Under constant torque region of the induction machine considering voltage and current limits. Choose the correct option for the following statements:

Statement-1: Maximum torque can be produced and machine operates at their current limits, but below their voltage limits.

Statement-2: Flux is normally kept constant and equal to its rated value.

(A) Statement-1 is False but Statement-2 is True

(B) Statement-2 is False but Statement-1 is True

(C) Both the statements are True

(D) Both the statements are False

54. The mechanical transmission system can be configured in several different ways in electric vehicles, the differential of mechanical transmission system is

(A) a mechanical device that permits the wheels to be driven at different speeds, when they move along curves.

(B) a mechanical device that connects and disconnects the power transmission from driving shaft to wheels.

(C) a mechanical device that has a set of gear ratios in order to adapt the speed/torque ratios from the driving shaft to the wheels.

(D) All of the above.

55. The dc series motors are mostly used in the traction applications.

Choose the correct option for the following statements:

Assertion: They have high-starting torque.

Reason : Torque is directly proportional to armature current in dc series motor.

(A) Assertion is False but Reason is True

(B) Assertion is True but Reason is False

(C) Both Assertion and Reason are True

(D) Both Assertion and Reason are False

56. The signalling used for controlling the movement of trains include

(A) Hand signals

(B) Semaphore signals

(C) Detonating signals

(D) All of the above

57. An analog signal has a bit rate of 10000 bits per second and a baud rate of 1000 baud. The number of different signal elements needed to carry the data elements will be

(A) 256

(B) 1024

(C) 512

(D) 2096

58. In pulse modulation, the number of samples required to ensure that no loss of information takes place is given by

(A) Parseval's theorem

(B) Fourier transform

(C) Nyquist theorem

(D) Carson's rule

59. Discrete sample of an analog signal is to be uniformly quantized for a PCM system. If the maximum value of the analog sample is to be represented within 0.04% accuracy, then the minimum number of binary digits required will be

(A) 10

(B) 11

(C) 12

(D) None of the above

60. Given the following statements, choose the correct option.

Statement 1: UDP is a suitable transport protocol for multicasting

Statement 2: TCP is connection-oriented and unreliable transport protocol

Statement 3: TCP is connectionless and unreliable transport protocol

Statement 4: UDP is connectionless and unreliable transport protocol

(A) Statements 1 and 4 are true

(B) Statements 2 and 3 are true

(C) Statements 2 and 4 are true

(D) Statements 1 and 2 are true

61. For a graded index fiber, the following statements are given:

Statement 1: the refractive index of core is not constant but increases gradually from its minimum value at core center to its maximum value at core-cladding interface

Statement 2: the refractive index of core is not constant but decreases gradually from its maximum value at core center to its minimum value at core-cladding interface

Statement 3: refractive index of core is constant

For the given statements, which of the following options is correct?

(A) Statement 2 is true

(B) Statement 1 is true

(C) Statement 3 is true

(D) None of the above

62. In an M-ary scheme, the duration of each signal is fixed independently of M the number of signals in the set. Increasing M produces the most degradation in the performance of

(A) ASK

(B) PSK

(C) FSK

(D) No change in the performance

63. Match Group 1 with Group 2 and choose the correct option.

Group 1	Group 2
1 : PCM	P : Capture effect
2 : DPSK Modulator	Q : μ-law
3 : FM	R : Hilbert transform
4 : Delta Modulation	S : Envelope detector
	T : Slope overload
	U : XNOR gate

(A) 1-R, 2-T, 3-P, 4-Q

(B) 1-U, 2-R, 3-P, 4-S

(C) 1-S, 2-T, 3-P, 4-U

(D) 1-Q, 2-U, 3-P, 4-T

64. If a telephone subscriber line must have an SNR above 40 dB, then the minimum number of bits per sample will be

(A) 4 (B) 7

(C) 2 (D) 15

65. Which of the following is an assembler directive?

(A) ADD A,R2 (B) MOV A,#12

(C) ORG 2000H (D) SJMP HERE

66. Which of the following file, lists the syntax errors?

(A) myprog.asm (B) myprog.obj

(C) myprog.hex (D) myprog.lst

67. The CY and AC flag bit for the following code are _____

```
MOV A, #0C2H
ADD A, #3DH
```

(A) CY = 0, AC = 1 (B) CY = 0, AC = 0

(C) CY = 1, AC = 0 (D) CY = 1, AC = 1

68. A 16 MHz 8051 system has a machine cycle of

(A) 1.33 µs (B) 1.5 µs

(C) 0.75 µs (D) 0.45 µs

69. Assuming a crystal frequency of 12 MHz, find the time delay associated with the loop section of the following DELAY subroutine.

```
DELAY:
        MOV R3, #100
HERE: NOP
        NOP
        NOP
        DJNZ R3, HERE
        RET
```

(A) 500 µs (B) 100 µs

(C) 50 µs (D) 120 µs

70. DS 5000-32 has how much bytes of on-chip NVRAM for programs?

(A) 2K (B) 12K

(C) 22K (D) 32K

71. Given the following statements for an 8051, choose the correct option.

Statement 1: There is only a single interrupt in the interrupt vector table assigned to both timer 0 and timer 1

Statement 2: Upon reset, all interrupts have same priority

(A) Both the statements 1 and 2 are true

(B) Statement 1 is true and Statement 2 is false

(C) Both the statements 1 and 2 are false

(D) Statement 1 is false and Statement 2 is true

72. Given the following statements, choose the correct option.

Statement 1: 8051 has a built-in UART

Statement 2: SCON is not a bit-addressable register

(A) Statement 1 is true and Statement 2 is false

(B) Both the statements 1 and 2 are true

(C) Statement 1 is false and Statement 2 is true

(D) Both the statements 1 and 2 are false

73. In hybrid electric vehicles, which type of battery is preferred, if the selection criteria is good performance?

(A) Nickel cadmium

(B) Lithium ion

(C) Nickel metal hydride

(D) Sodium metal chloride

74. In electric vehicles, the boost converters are also known as

(A) Stepdown switching regulators

(B) Stepup switching regulators

(C) AC/AC converters

(D) AC/DC converters

75. The principle behind energy generation in Sun is

(A) Nuclear fusion reaction

(B) Nuclear fission reaction

(C) Exothermal chemical reaction

(D) None of the above

76. In frequency modulation,

(A) the frequency of the carrier remains constant

(B) the amplitude of the carrier remains constant

(C) the amplitude of the carrier is varied

(D) none of the above

77. Candella is the unit of

(A) Power
(B) Luminous flux
(C) Luminous intensity
(D) Frequency

78. Out of the following, which IC is known as programmable peripheral interface?

(A) 8255
(B) 8259
(C) 8279
(D) 8251

79. Solar radiation received by the earth after its direction has been altered due to the scattering by the atmosphere is called as

(A) Effective radiation
(B) Diffuse radiation
(C) Global radiation
(D) Beam radiation

80. Which of the following is a renewable source of energy?

(A) Natural gas
(B) Coal
(C) Solar energy
(D) All of the above

81. Maximum Power Point (MPP) in the solar cell is where the

(A) voltage is maximum
(B) product of voltage and current is maximum
(C) current is maximum
(D) both voltage and current are maximum

82. The instrument used to measure total solar radiation is called as

(A) Hygrometer
(B) Pyrheliometer
(C) Anemometer
(D) Pyranometer

83. Energy capacity of a cell is measured in

(A) Ampere-hours
(B) Watt-hours
(C) Watts
(D) Amperes

84. Television broadcasting is an example of

(A) Simplex transmission
(B) Half-duplex transmission
(C) Full-duplex transmission
(D) None of the above

85. The connection establishment in TCP is called as

(A) two-way handshaking
(B) three-way handshaking
(C) four-way handshaking
(D) one-way handshaking

86. A state machine that goes through a limited number of states is called an

(A) infinite state machine
(B) finite state machine
(C) Both (A) and (B)
(D) None of the above

87. Given the following statements, choose the correct option.

Statement 1: Solar panel converts solar energy to electrical energy

Statement 2: Solar panel converts heat energy to light energy

Statement 3: Solar panel converts electrical energy to light energy

Statement 4: Solar panel converts solar energy to magnetic energy

(A) Statement 1 is true
(B) Statements 2 and 3 are true
(C) Statement 4 is true
(D) None of the above

88. Given the following statements, choose the correct option.

Statement 1: Specific gravity of the electrolyte in a lead-acid cell decreases as the charge in the cell decreases

Statement 2: Energy density of lithium-ion batteries is higher than the nickel-cadmium batteries

(A) Statement 1 is true and Statement 2 is false
(B) Both the statements 1 and 2 are false
(C) Statement 1 is false and Statement 2 is true
(D) Both the statements 1 and 2 are true

89. The typical function of delay line in CROs is to

(A) Delay the signal to reach the horizontal plates of CRTs
(B) Delay the signal drive for the vertical plates of CRTs
(C) Generate the appropriate time base in CROs
(D) Delay the horizontal sweep for CROs

90. If a digitizing oscilloscope is to have a 6-bit resolution in both horizontal and vertical axes, and it is to display transients at a rate of 1 μs per division for a display of 10 divisions, then what is the clock time-period required for input successive approximation A/D convertor (ADC). Assume ADC uses 7 clock pulses for conversion.

(A) 56 ns
(B) 93 ns
(C) 22 ns
(D) 38 ns

91. Read the following statements related to vector voltmeter and choose the correct option.

Statement 1: It can be used for the measurement of amplifier gain and phase shift

Statement 2: It can be used for the measurement of two-port network parameters

(A) Statement 1 is correct but statement 2 is incorrect

(B) Statement 1 is incorrect but statement 2 is correct

(C) Both the statements are incorrect

(D) Both the statements are correct

92. Q-factor of a coil is to be measured using a Q-meter. If the residual (insertion) resistance of Q-meter is 5% of coil resistance, then the indicated 'Q' will be

(A) Higher than the effective 'Q'

(B) Lower than the effective 'Q'

(C) Same as the effective 'Q'

(D) Insertion resistance has no effect on the effective 'Q' measurement.

93. A dual slope integrating type of A/D convertor has an integrating capacitor of 0.1 μF and resistance of 100 kΩ. If the reference voltage is 2V and the output of integrator is not to exceed 10 V, then the maximum time for which reference voltage can be integrated is

(A) 10 ms (B) 20 ms (C) 50 ms (D) 100 ms

94. If an energy meter makes 20 revolutions in 100 seconds when a load of 360 W is connected to it, then the meter constant is

(A) 500 revolutions/kWh (B) 1000 revolutions/kWh

(C) 2000 revolutions/kWh (D) 3600 revolutions/kWh

95. A moving coil ammeter has a fixed shunt of 0.02 Ω with a coil resistance of 1 kΩ and needs potential difference of 0.5 V across it for full-scale deflection. The input current causing full-scale deflection will be

(A) 25.0005 A (B) 20.0005 A

(C) 10.0005 A (D) 50.0005 A

96. Two resistors have the following ratings, $R_1 = 36\ \Omega \pm 5\%$ and $R_2 = 75\ \Omega \pm 5\%$. The limiting error in percent when the resistors are connected in series will be

(A) ± 5% (B) ± 2.5% (C) ± 10% (D) ± 1%

97. A PMMC instrument having full scale deflection current of 1 mA and internal resistance of 50 Ω is to be converted to a 100 V voltmeter. The resistance to be connected with this instrument will be

(A) 99.95 kΩ in series (B) 99.95 kΩ in parallel

(C) 0.05Ω in series (D) 0.05Ω in parallel

98. In a thermocouple vacuum gauge, if the input pressure decreases, then the output voltage of thermocouple

(A) Increases as the temperature of measuring junction increases

(B) Decreases as the temperature of measuring junction increases

(C) Increases as the temperature of reference junction increases

(D) Remains the same

99. A temperature compensated full bridge made by 4 strain gauges having gauge factor of 2.3 and a supply voltage of 10 V, is used for the strain measurement. If the applied strain is 10μ, then the output voltage of bridge is

(A) 0.23 mV

(B) 0.23 μV

(C) 0.92 mV

(D) 0.92 μV

100. Read the following statements related to Capacitive Differential Pressure Transmitters (DPTs) and choose the correct option.

Statement 1: Silicone oil is used as dielectric as it has lower dielectric constant than air.

Statement 2: Higher dielectric constant material leads to better sensitivity for capacitive DPTs.

(A) Statement 1 is correct but statement 2 is incorrect

(B) Statement 1 is incorrect but statement 2 is correct

(C) Both the statements are incorrect

(D) Both the statements are correct

101. Read the following statements related to Rotameters and choose the correct option.

Statement 1: Rotameters are used for the rotational speed of a body.

Statement 2: Rotameters are typically installed in vertical manner.

(A) Statement 1 is correct but statement 2 is incorrect

(B) Statement 1 is incorrect but statement 2 is correct

(C) Both the statements are incorrect

(D) Both the statements are correct

102. Read the following statements related to Liner Variable Differential Transformer (LVDT) and choose the correct option.

Statement 1: LVDT generates an AC output voltage which is proportional to core displacement.

Statement 2: The two secondary windings of LVDT are connected in parallel with each other.

(A) Statement 1 is correct but statement 2 is incorrect

(B) Statement 1 is incorrect but statement 2 is correct

(C) Both the statements are incorrect

(D) Both the statements are correct

103. When used under same conditions, which of the following flow measurement devices creates least permanent pressure loss?

(A) Venturi-tube
(B) Flow nozzle
(C) Dall tube
(D) Orifice plate

104. A typical orifice plate-based flow meter is typically useful in the input range of

(A) 10 % to 100 %
(B) 20 % to 80%
(C) 25% to 100 %
(D) 0 % to 100 %

105. A doped silicon wafer used as a Hall effect transducer, has a thickness of 0.5 mm and a Hall coefficient as 2×10^{-2} m^3/A-sec. If the current through the wafer is 7.5 mA and the applied magnetic flux density is 0.2 T, then the Hall voltage will be

(A) 0.02 V
(B) 0.04 V
(C) 0.06 V
(D) 0.08 V

106. Read the following statements related to Wein's bridge and choose the correct option.

Statement 1: The Wein's bridge is primarily used for the measurement of frequency.

Statement 2: There are 2 capacitors and 2 inductors to balance the bridge for identifying the applied frequency.

(A) Statement 1 is correct but statement 2 is incorrect
(B) Statement 1 is incorrect but statement 2 is correct
(C) Both the statements are incorrect
(D) Both the statements are correct

107. Read the following statements related to thermistors and choose the correct option.

Statement 1: Thermistors possess lower sensitivity than RTDs (Resistance Temperature Detectors)

Statement 2: Thermistors have higher linearity over RTDs in their entire operating range.

(A) Statement 1 is correct but Statement 2 is incorrect
(B) Statement 1 is incorrect but Statement 2 is correct
(C) Both the statements are incorrect
(D) Both the statements are correct

108. A strain gauge is cemented to an iron post of length 1 m, which is subjected to a compressible force. The nominal resistance of the gauge is 200 Ω. The change in resistance of strain gauge is measured to be 0.5 Ω. The final length of iron post is 999 mm. The gauge factor of strain gauge is

(A) 3.5 (B) 2 (C) 2.5 (D) 5

109. Read the following statements related to Resistance Temperature Detector (RTD) and choose the correct option.

Statement 1: Pt-100 RTD indicates that its resistance is 100 Ω at 100 °C.

Statement 2: A 4-wire connection of RTD is often used for eliminating the effect of lead wires on measurement.

(A) Statement 1 is correct but Statement 2 is incorrect

(B) Statement 1 is incorrect but Statement 2 is correct

(C) Both the statements are incorrect

(D) Both the statements are correct

110. Read the following statements related to industrial controllers and choose the correct option.

Statement 1: Uses only proportional controllers to introduce steady state errors for step setpoint changes.

Statement 2: Increasing proportional gain, increases speed of response of closed loop process.

(A) Statement 1 is correct but Statement 2 is incorrect

(B) Statement 1 is incorrect but Statement 2 is correct

(C) Both the statements are incorrect

(D) Both the statements are correct

111. Programmable Logic Controllers (PLCs) can be programmed using

1. Ladder diagram

2. Instruction list

3. Function block diagram

(A) Only 1

(B) Either 1 or 2

(C) Either 1 or 3

(D) Any of 1, 2 or 3

112. With respect to Proportional-Integral-Derivative (PID) control, an anti-windup control is used to avoid

(A) Accumulation of integral control action beyond controller saturation limits

(B) Accumulation of derivative control action beyond controller saturation limits

(C) High frequency noise from control signal

(D) Proportional kick effect

113. In the context of Programmable Logic Controller (PLC) programming, LWORD is referred for a data type having

(A) byte string of length 16

(B) byte string of length 32

(C) byte string of length 64

(D) byte string of length 128

114. Read the following statements related to a Programmable Logic Controller (PLC) relay output, and choose option which best describes the two statements?

Statement 1: It is used for only dc switching.

Statement 2: It can withstand transient overloads.

(A) Both the statements are correct

(B) Statement 1 is correct but Statement 2 is incorrect

(C) Statement 1 is incorrect but Statement 2 is correct

(D) Both the statements are incorrect

115. A diaphragm pressure sensor is required to give a measure of the gauge pressure present in a system. Such a sensor will need to have a diaphragm with

(A) Vacuum on one side.

(B) One side open to the atmosphere.

(C) The pressure applied to both sides.

(D) A controlled adjustable pressure applied to one side.

116. Read the following statements related to limit switches and choose the correct option.

Statement 1: Can be used to detect the presence of a moving part.

Statement 2: Is activated by contacts making or breaking an electrical circuit.

(A) Both the statements are correct

(B) Statement 1 is correct but Statement 2 is incorrect

(C) Statement 1 is incorrect but Statement 2 is correct

(D) Both the statements are incorrect

117. The cycle time of a PLC is the time it takes to

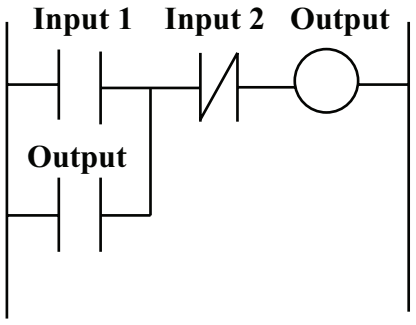
(A) Read an input signal.

(B) Read all the input signals.

(C) Check all the input signals against the program.

(D) Read all the inputs, run the program and update all outputs.

118. The given figure shows a ladder diagram rung.



The output will be activated to a high state from a low state, when

Condition 1: Input 1 is momentarily activated before reverting to its normally open state.

Condition 2: Input 2 is activated.

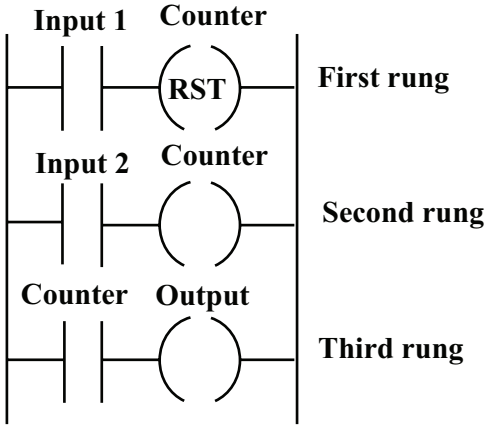
(A) Both the conditions are satisfied

(B) Condition 1 is satisfied but Condition 2 is not satisfied

(C) Condition 1 is not satisfied but Condition 2 is satisfied

(D) None of the conditions are satisfied.

119. For the ladder diagram shown in the figure, when the counter is set to 5, there is an output from output every time, when



Statement 1: Input 1 has closed 5 times.

Statement 2: Input 2 has closed 5 times.

(A) Both the conditions are satisfied

(B) Condition 1 is satisfied but Condition 2 is not satisfied

(C) Condition 1 is not satisfied but Condition 2 is satisfied

(D) None of the conditions are satisfied

120. In the context of SCADA, read the following statements and choose the correct option.

Statement 1: SCADA is a central system that monitors or controls a complete site or plant.

Statement 2: SCADA may have multiple Remoter Terminal Units (RTUs)

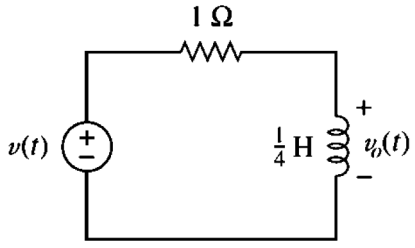
(A) Both the statements are correct

(B) Statement 1 is correct but Statement 2 is incorrect

(C) Statement 1 is incorrect but Statement 2 is correct

(D) Both the statements are incorrect

121. At what frequency will the output voltage, $\nu_o(t)$ in the figure, be equal to the input voltage?



(A) 0 rad/s

(B) 4 rad/s

(C) ∞ rad/s

(D) None of the above

122. A series RC circuit has a magnitude of 12V across R and 5V across C. What is the magnitude of the supply voltage?

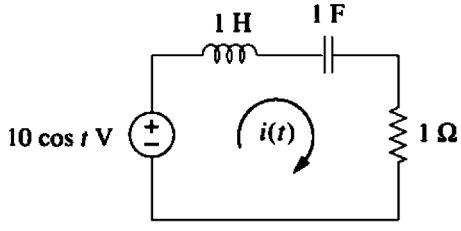
(A) – 7 V

(B) 7 V

(C) 13 V

(D) None of the above

123. For the circuit shown in the figure, the current i(t) is _____



(A) 10 cos (t) A

(B) 10 sin (t) A

(C) 5 cos (t) A

(D) None of the above

124. If the current and voltage are 90 degrees out of phase in an electric circuit, then the average power absorbed (P_{avg}) is _____.

(A) Infinite
(B) Maximum
(C) Minimum
(D) Zero

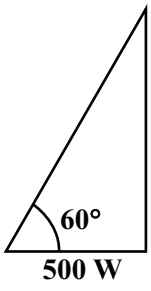
125. In a single phase AC circuit, which of the following specifies that the power factor (cos θ) = 1?

(A) Input power = Output power
(B) The circuit is resistive only
(C) The angle (θ) between voltage and current is zero
(D) None of the above

126. Thevenin's theorem is applicable to circuits containing which type of load?

(A) Linear only
(B) Non-linear only
(C) Time varying only
(D) All of the above

127. For the power triangle shown in e figure, the reactive power is

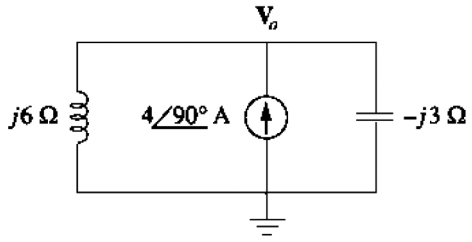


(A) 1000 VAR leading
(B) 1000 VAR lagging
(C) 866 VAR leading
(D) 866 VAR lagging

128. Which one of the following instruments is used for measuring average power in an electric circuit?

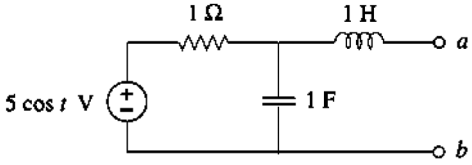
(A) voltmeter
(B) ammeter
(C) wattmeter
(D) kilowatt-hour meter

129. What is the value of the node voltage V_o for the circuit shown in the figure?



(A) – 24 V
(B) 8 V
(C) – 8 V
(D) 24 V

130. What is the value of Thevenin's impedance as seen from the terminals a-b, for the circuit shown in the figure?



(A) 1 Ω
(B) 0.5 Ω – j 0.5 Ω
(C) 0.5 Ω + j 0.5 Ω
(D) 2 + j 2 Ω

131. Which of the following statements is incorrect?

(A) Solar panels doesn't need direct sunlight to harness energy from sun; they just require some level of daylight in order to generate electricity.

(B) Solar panels can be less efficient in hot temperatures; however, this reduction is relatively small.

(C) Solar energy is expensive to produce

(D) Solar is actually the most affordable renewable energy

132. Concentrating Solar-thermal Power (CSP) technologies use mirrors to reflect and concentrate sunlight onto a _____

(A) Receiver
(B) Transmitter
(C) Amplifier
(D) Inverter

133. A single PV device is known as a cell. An individual PV cell is usually small, typically producing about 1 or 2 watts of power. Which of the following is used to make these cells?

(A) Semiconductor materials
(B) Inorganic materials
(C) Metals
(D) Insulators

134. Power electronic devices are used to convert electricity from one form to another. A common example of a power electronics device is an inverter which converts direct current (DC) electricity generated by solar photovoltaic (PV) panels into _____

(A) Alternating current (AC) electricity for use on the electrical grid.

(B) Direct current (DC) electricity for use on the electrical grid.

(C) Both (A) and (B)

(D) None of these

135. A grid-tied solar system is connected to the _____

(A) electrical grid

(B) mechanical grid

(C) thermal grid

(D) optical

136. Which type of Solar Energy System is completely independent from the grid?

(A) Off-Grid

(B) Grid-Tied

(C) Both (A) and (B)

(D) None of them

137. Which of the following is used to harness the energy in active solar techniques?

(A) Photovoltaic systems

(B) Concentrated solar power

(C) Solar water heating

(D) All of these

138. Which of the following is the source of solar radiant energy?

(A) Sun's light

(B) Sun's heat

(C) Both (A) and (B)

(D) None of them

139. Wind turbines convert _____

(A) kinetic energy into electrical energy

(B) potential energy into electrical energy

(C) electrical energy into kinetic energy

(D) All of the above

140. Wind is a form of solar energy.

Which of the following option justify this statement?

(A) The sun unevenly heats the atmosphere

(B) Irregularities of the earth's surface

(C) The rotation of the earth

(D) All of these

141. In wind turbines, the difference in air pressure across the two sides of the blade creates which of the following?

(A) lift
(B) drag
(C) both lift and drag
(D) none of these

142. Which of the following is the major application of wind energy?

(A) land-based application
(B) distributed application
(C) offshore application
(D) all of these

143. Which of the following is not the part of a Wind Power Plant?

(A) Wind Vane
(B) Nacelle
(C) Gearbox
(D) None of these

144. Match the following parts with their purpose in case of a Wind Power System.

(i)	The Nacelle	(a)	houses the gearbox and generator
(ii)	Hub	(b)	blades are bolted in, pitched and attached to the rotor
(iii)	The Turbine Blade	(c)	catches the wind to move the rotor
(iv)	Onshore Towers	(d)	houses computer controls, power cables, built-in sections and bolted together

(A) (i)-(a), (ii)-(b), (iii)-(d), (iv)-(c)
(B) (i)-(a), (ii)-(b), (iii)-(c), (iv)-(d)
(C) (i)-(d), (ii)-(b), (iii)-(c), (iv)-(A)
(D) None of these

145. Which of the following is a part of the small wind turbines?

(A) passive yaw systems as opposed to active ones
(B) a direct drive generator
(C) a tail fin to point into the wind
(D) All of these

146. Wind energy is used for which of the following?

(A) sailing boats
(B) pumping water
(C) generating electricity
(D) All of the above

147. Biomass resources that are available on a renewable basis and are used either directly as a fuel or converted to another form or energy product are commonly referred to as

(A) feedstocks
(B) stock exchange
(C) fields
(D) None of these

148. Which of the following is produced from the Biomass?

(A) fibres

(B) chemicals

(C) transportation fuels

(D) biochemicals

149. Which one of the following is an example of starch crops biomass feedstocks?

(A) corn stover

(B) wheat straw

(C) orchard prunings

(D) sugarcane

150. Which is the main component of a hydroelectric power plant that converts the energy of falling water into mechanical energy?

(A) Turbine

(B) Generator

(C) Transformer

(D) Condenser

151. Hydropower plants generate electricity using which of the following energy?

(A) Chemical energy

(B) Potential energy

(C) Nuclear energy

(D) None of them

152. Which of the following is/are sustainable energy sources?

(A) Hydropower

(B) Wind energy

(C) Solar energy

(D) All of the above

153. A generating station has a maximum demand of 300 MW, a load factor of 60% and plant capacity factor of 50%. The reserve capacity of the plant will be

(A) 50 MW

(B) 40 MW

(C) 60 MW

(D) 10 MW

154. On which cycle does a modern steam power plant work?

(A) Carnot

(B) Otto

(C) Bell-Coleman

(D) Rankine

155. Match List-I (Name of the power plants) with List-II (Plant characteristics) and select the correct answer using the codes given below:

List-I	List-II
a. Nuclear	1. High operating cost
b. Thermal	2. High capital cost
c. Diesel	3. High plant life
d. Hydro	4. High fuel transport cost

Codes:

(A)	a-2	b-4	c-1	d-3
(B)	a-1	b-2	c-3	d-4
(C)	a-3	b-4	c-1	d-2
(D)	a-2	b-1	c-4	d-3

156. A Pelton wheel turbine has rated speed of 240 rpm and is connected to an alternator to produce power at 60 Hz. The number of poles required in alternator will be

(A) 20
(B) 25
(C) 30
(D) 15

157. For variable heads close to but less than 30 meters, which type of turbines is used in hydropower plants?

(A) Kaplan
(B) Pelton
(C) Francis
(D) None of these

158. What is the approximate efficiency of a normal thermal power station?

(A) 60-70%
(B) 45-55%
(C) 15-25%
(D) 30-40%

159. Which one of the following fuels is used by the slow thermal nuclear reactors for electricity generation?

(A) U^{235}
(B) U^{238}
(C) Th^{232}
(D) Pu^{239}

160. The MMF waveform of the armature of a DC machine having densely placed conductors is

(A) Rectangular
(B) Triangular
(C) Pulsating
(D) Square-wave

161. The speed of a DC shunt motor decreases when

(A) Field current reduces and armature voltage is constant

(B) Armature voltage increases and field current is constant

(C) Field current increases and armature voltage is constant

(D) None of these

162. The internal characteristics of a DC generator is a plot between

(A) Terminal voltage and line current

(B) Generated EMF and armature current

(C) Terminal voltage and armature current

(D) Generated EMF and line current

163. A 240 V/ 120V, 50 Hz transformer is to be supplied by a 60 Hz source on 120 V side. Keeping the flux same as in rated conditions, the voltage of 60 Hz source should be

(A) 240 V (B) 120 V

(C) 144 V (D) 64 V

164. Which of the following parameters can be determined using the open-circuit test of a transformer?

1. Core loss

2. Magnetizing current

3. Equivalent shunt admittance

4. Copper losses

5. Equivalent series impedance

Select the correct option

(A) All (1,2,3,4 & 5)

(B) 1 and 3 only

(C) 1, 2 and 3 only

(D) 1, 2, 3 and 4 only

165. For a two-winding transformer underload, the voltage regulation can be zero when the load power factor is

(A) Lagging

(B) Zero

(C) Leading

(D) Either lagging or leading

166. Cores of large power transformers are made from

(A) Aluminum alloy

(B) Hot-rolled steel

(C) Cold-rolled non-grain-oriented steel

(D) Cold-rolled grain-oriented steel

167. The purpose of snubbers in Thyristor circuits is

(A) To turn on the device

(B) To turnoff the device

(C) dv/dt protection

(D) Phase shifting

168. Which of the following power electronic devices is most suitable for high frequency SMPS (Switched Mode Power Supply)?

(A) GTO

(B) IGBT

(C) MOSFET

(D) SCR

169. The turnoff time of a typical converter grade thyristor is normally in the range of

(A) 1 to 2 microseconds

(B) 50 to 200 microseconds

(C) 500 to 2000 microseconds

(D) 1 to 2 milliseconds

170. Triacs, generally used in AC voltage regulation, can't be used for

(A) Resistive load

(B) Resistive-inductive load

(C) Resistive-capacitive load

(D) Inductive load

171. Match List-I (type of device) with List-II (Application/characteristic), and select the correct answer using the codes given below:

List-I	List-II
a. IGBT	1. Turnoff by negative gate pulse
b. GTO	2. Medium speed switching
c. UJT	3. Bidirectional switching
d. TRIAC	4. Triggering circuit

Codes:

(A)	a-3	b-1	c-4	d-2
(B)	a-2	b-1	c-4	d-3
(C)	a-1	b-2	c-3	d-4
(D)	a-3	b-1	c-2	d-4

172. If the firing angle of a single phase fully controlled rectifier feeding a constant current dc load is 45°, then what is the Displacement Power Factor (DPF) of the rectifier?

(A) 1 (B) 1/2

(C) $1/\sqrt{2}$ (D) $\sqrt{3}/2$

173. The frequency of ripple in the output voltage of a three phase bridge rectifier is

(A) Two times supply voltage frequency

(B) Four times supply voltage frequency

(C) Six times supply voltage frequency

(D) Eight times supply voltage frequency

174. Reactive power generation of an alternator, having constant power input from prime mover can be changed by

(A) Varying the speed (B) Varying phase sequence

(C) Varying field excitation (D) None of these

175. Consider the following statements and choose the correct option.

Assertion: A synchronous motor is not self-starting.

Reason: At standstill, there is no rotating magnetic field.

(A) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(B) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

(C) Assertion is true but Reason is false.

(D) Assertion is false but Reason is true.

176. A 440 V, 3 phase, 10 pole and 50 Hz synchronous generator is driven by a torque of $100/\pi$ Nm. The power input to the generator will be

(A) 50 W (B) 500 W

(C) 2000 W (D) 1000 W

177. A three phase, 6 pole and 50 Hz induction motor is running at 4% slip. What will be the speed of rotor?

(A) 900 rpm (B) 960 rpm

(C) 940 rpm (D) 1000 rpm

178. In a 3-phase induction motor at slip of 0.05, the air-gap power is 3 kW. What will be the mechanical power developed?

(A) 2.85 kW (B) 3.0 kW

(C) 3.16 kW (D) 2.95 kW

179. A 3 phase induction motor has a rated slip of 5% and the starting current is 5 times full load current. The ratio of starting torque to full load torque is

(A) 0.6 (B) 0.8

(C) 1.0 (D) 1.25

180. Which of the following single phase induction motors has the highest power factor at full load?

(A) Shaded-pole type (B) Split-phase type

(C) Capacitor-start type (D) Capacitor-run type

181. Which of the following is not a short-circuit test of a circuit breaker?

(A) Making capacity test

(B) Breaking capacity test

(C) Operating duty test

(D) Impulse voltage dry withstand test

182. Line-type lightening arrestors, normally used for the protection of distribution transformers, have voltage rating as

(A) 20 kV to 73 kV (B) 8 kV to 15 kV

(C) 3 kV to 312 kV (D) 1 kV to 500 kV

183. Pin-type insulators can be used up to maximum of

(A) 50 kV (B) 10 kV

(C) 5 kV (D) 1 kV

184. Each insulator unit in a suspension-type insulators has spark over voltage of 20 kV and spark over voltage of whole string of 128 kV. If number of insulators in the string is 10, then the string efficiency will be

(A) 64% (B) 36%

(C) 12.8% (D) 80%

185. Indoor-type distribution substations (with atmospheric insulation) can have operating voltages between

(A) 400 V to 11 kV

(B) 11 kV to 33 kV

(C) 33 kV to 132 kV

(D) 33 kV to 66 kV

186. Consider the following statements and choose the correct option.

Assertion: Duplicate bus bar arrangement is better than single bus bar for large sub-stations.

Reason: The duplicate bus bar incorporates flexibility, reliability and allows periodic maintenance without shutdown.

(A) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(B) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

(C) Assertion is true but Reason is false.

(D) Assertion is false but Reason is true.

187. Match List-I (Type of diagram) with List-II (information contained/shown) and choose the correct answer using the codes given below.

List-I	List-II
a. Single line diagram	1. Locates and identifies electrical devices, terminals and interconnecting wires in an assembly.
b. Wiring diagram	2. Shows main power circuit and equipment therein by means of single lines and graphic symbols.
c. Block diagram	3. Shows all circuit and device elements of an equipment
d. Schematic	4. A group of interconnected blocks, each representing a device or subsystem.

Codes:

(A)	a-1	b-2	c-3	d-4
(B)	a-2	b-1	c-4	d-3
(C)	a-2	b-4	c-1	d-3
(D)	a-3	b-1	c-4	d-2

188. Which relay can anticipate the possible major fault in a transformer?

(A) Buchholz relay

(B) Differential relay

(C) Overcurrent relay

(D) Over-fluxing relay

189. Match List-I (Type of fault) with List-II (Type of protection) and select the correct answer using the codes given below.

List-I	List-II
a. Faults between phases	1. Differential relay
b. External phase fault	2. Earth fault relay
c. Over heating	3. Over-current relay
d. Phase to earth fault	4. Thermal relay

Codes:

(A)	a-1	b-3	c-4	d-2
(B)	a-1	b-4	c-3	d-2
(C)	a-4	b-1	c-3	d-2
(D)	a-1	b-2	c-3	d-4

190. Which type of connection is generally employed for current transformers for the protection of a three phase star-delta connected transformer?

(A) Delta-star
(B) Star-delta
(C) Star-star
(D) Delta-delta

191. While using air-blast circuit breaker, current chopping is a phenomenon often observed when

(A) A long overhead line is switched off
(B) A bank of capacitors is switched off
(C) A transformer on no-load is switched off
(D) A heavy load is switched off

192. The restriking voltage is measured in terms of

(A) RMS value
(B) Instantaneous value
(C) Peak value
(D) Average value

193. Which among the following is the main relay that can be used to protect up to 90% of the transmission line length in the forward direction?

(A) Mho relay
(B) Directional over-current relay
(C) Impedance relay
(D) Carrier current protective relay

194. In a 200 kV system, the inductance and capacitance (with respect to ground) up to the location of a circuit breaker are 5 mH and 5 nF respectively. If a magnetizing current of 50 A (instantaneous value) is interrupted by the breaker, then the voltage appearing across the poles of the breaker will be

(A) 5 kV
(B) 50 kV
(C) 500 kV
(D) 40 kV

195. Ten solar PV panels each having voltage at maximum power point as 30 V and current at maximum power point as 10 A are connected as an array of two parallel strings. Each string has five panels in series. Voltage and current at maximum power point of the whole array (considering standard operating conditions) will be _____ respectively.

(A) 300 V, 20 A
(B) 300 V, 10 A
(C) 150 V, 10 A
(D) 150 V, 20 A

196. Which of the following is a conventional source of electricity?

(A) Solar photovoltaics
(B) Wind turbine
(C) Geothermal energy
(D) Coal-based thermal power plant

197. A university campus has the following buildings:

1. Library
2. Hostel blocks
3. Faculty housing
4. Engineering college

Which of these buildings are applicable for Energy Conservation Building Code (ECBC) compliance?

(A) 1, 4
(B) 1
(C) 2, 3
(D) All of the above

198. A building has total built-up area of 1200 m^2, out of which 200 m^2 is of unconditioned basements. If total annual energy consumed is 12000 kWh, then the Energy Performance Index (EPI) will be

(A) 10 kWh/m^2

(B) 12 kWh/m^2

(C) 8 kWh/m^2

(D) 5 kWh/m^2

199. As per the Gujarat Wind Power Policy, 2016, which of the following voltage levels is not permitted for feeding wind power to the grid?

(A) 33 kV

(B) 66 kV

(C) 132 kV

(D) 220 kV

200. What is the abbreviation "RPO" used in Gujarat Solar Power policy, 2021?

(A) Renewable Purchase Obligation

(B) Renewable Practice Obligation

(C) Renewable Power Officer

(D) Renewable Purchase Officer

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