

INSPECTOR OF FACTORIES IN A.P FACTORIES SERVICE

GENERAL RECRUITMENT - 2012

Held on 19-08-2012

B

ELECTRICAL ENGINEERING

Paper II

Time : 150 Minutes

Max. Marks : 300

INSTRUCTIONS

1. Please check the Test Booklet and ensure that it contains all the questions. If you find any defect in the Test Booklet or Answer Sheet, please get it replaced immediately.
2. The Test Booklet contains **150** questions. Each question carries **two** marks.
3. The Test Booklet is printed in four (4) Series, viz. **A** **B** **C** **D**. The Series, **A** or **B** or **C** or **D** is printed on the right-hand corner of the cover page of the Test Booklet. Mark your Test Booklet Series **A** or **B** or **C** or **D** in Part C on side 1 of the Answer Sheet by darkening the appropriate circle with Blue/Black Ball point pen.

Example to fill up the Booklet Series

If your Test Booklet Series is **A**, please fill as shown below :

If you have not marked the Test Booklet Series at Part C of side 1 of the Answer Sheet or marked in a way that it leads to discrepancy in determining the exact Test Booklet Series, then, in all such cases, your Answer Sheet will be invalidated without any further notice. No correspondence will be entertained in the matter.

4. Each question is followed by 4 answer choices. Of these, you have to select one correct answer and mark it on the Answer Sheet by darkening the appropriate circle for the question. If more than one circle is darkened, the answer will not be valued at all. Use Blue/Black Ball point pen to make heavy black marks to fill the circle completely. Make **no** other stray marks.

e.g. : If the answer for Question No. **1** is Answer choice (2), it should be marked as follows :



(2)

- Mark Paper Code and Roll No. as given in the Hall Ticket with Blue/Black Ball point pen by darkening appropriate circles in Part A of side 1 of the Answer Sheet. Incorrect/not encoding will lead to **invalidation** of your Answer Sheet.

Example : If the Paper Code is 027, and Roll No. is 95640376 fill as shown below :

Paper Code

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Roll No.

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- Please get the signature of the Invigilator affixed in the space provided in the Answer Sheet. An Answer Sheet without the signature of the Invigilator is liable for **invalidation**.
- The candidate should **not** do rough work or write any irrelevant matter in the Answer Sheet. Doing so will lead to **invalidation**.
- Do **not** mark answer choices on the Test Booklet. Violation of this will be viewed seriously.
- Before leaving the examination hall, the candidate should hand over the original OMR Answer Sheet (top sheet) to the Invigilator and carry the bottom sheet (duplicate) for his/her record, failing which disciplinary action will be taken.
- Use of whitener is prohibited. If used, the answer sheet is liable for invalidation.

(3)

1. On a transmission line, whenever the conductors are dead ended or there is change in the direction of transmission lines, the insulators used are
- (1) strain type
 - (2) suspension type
 - (3) pin type
 - (4) None of these
2. An advantage of corona on transmission line is
- (1) it minimises power loss
 - (2) it works as a surge modifier during overloads
 - (3) it reflects electrical surges
 - (4) None of these
3. The string efficiency of an insulator can be increased by
- (1) reducing the number of strings in the insulator
 - (2) correct grading of the insulators of various capacities
 - (3) increasing the number of strings in the insulator
 - (4) None of these
4. Transposition of conductors is done when
- (1) the conductors are not spaced equilaterally
 - (2) the conductors are spaced equilaterally
 - (3) a telephone line runs parallel to power line
 - (4) None of these
5. Inductance and capacitance of a transmission line depend upon
- (1) current in the line alone
 - (2) voltage in the line alone
 - (3) both (1) and (2)
 - (4) physical configuration of conductors in space
6. Use of bundle conductors causes the critical voltage for corona formation
- (1) to decrease
 - (2) to increase
 - (3) to remain unaltered
 - (4) not existent
7. For high voltage applications, the insulators used are of
- (1) suspension type
 - (2) pin type
 - (3) strain type
 - (4) None of these
8. The effect of earth on line capacitance is as follows
- (1) to increase it slightly
 - (2) to decrease it slightly
 - (3) no effect on capacitance
 - (4) depends on the length of the line
9. For transmission line span of $2L$, horizontal tension at tower supports is T and weight of conductor per unit length is w . The maximum sag equals
- (1) $\frac{2 w L^2}{T}$
 - (2) $\frac{w L^2}{2T}$
 - (3) $\frac{w L}{2T}$
 - (4) $\frac{2 w L}{T}$
10. During rains, the direct capacitance of suspension type insulator
- (1) decreases
 - (2) increases
 - (3) remains the same
 - (4) may increase or decrease

(4)

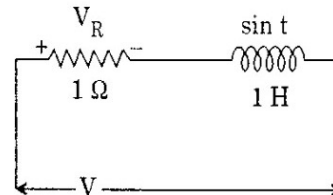
11. Sheaths are used in power cables to
- (1) provide adequate insulation
 - (2) ~~increase the strength of the cable~~
 - (3) prevent moisture from entering the cable
 - (4) None of these
12. The inductance is introduced in cables in the form of
- (1) wire wound on the length of the cable
 - (2) ~~armour with the cable~~
 - (3) lumped inductance introduced at regular intervals
 - (4) inductance bridge at the receiving end
13. In a cable, the voltage stress is maximum at
- (1) ~~core of the conductor~~
 - (2) surface of the conductor
 - (3) sheath
 - (4) insulator
14. When the diameter of the core and cable is doubled, the value of capacitance
- (1) will be reduced to one-fourth
 - (2) ~~will be reduced to half~~
 - (3) ~~will be doubled~~
 - (4) ~~will become four times~~
15. Cables with aluminium conductor can be joined by
- (1) soldering
 - (2) gas welding
 - (3) compression
 - (4) None of these
16. Insulation resistance of cables is usually measured in terms of
- (1) micro ohms ($\mu\Omega$)
 - (2) ohms (Ω)
 - (3) kilo ohms ($k\Omega$)
 - (4) mega ohms ($M\Omega$)
17. The disadvantage with paper as insulating material is
- (1) it has low insulation resistivity
 - (2) it has high capacitance
 - (3) it is hygroscopic
 - (4) it is organic material
18. Capacitance grading of cables implies
- (1) grading according to capacitance of cables per km length
 - (2) cables using single dielectric in different concentrations
 - (3) use of dielectric of different permittivities
 - (4) capacitance required to be introduced at different lengths to counter the effect of inductance
19. The advantage of cables over overhead transmission lines is
- (1) easy maintenance
 - (2) low cost
 - (3) can be used in congested areas
 - (4) can be used in high voltage circuits
20. A certain cable has an insulation of relative permittivity 4. If the insulation is replaced by one of relative permittivity 2, the capacitance of the cable will become
- (1) one-half
 - (2) double
 - (3) four times
 - (4) None of the above

(5)

21. Current reactors are used
- (1) to improve the voltage regulation
 - (2) to reduce the fault level
 - (3) to improve efficiency
 - (4) to improve power factor
22. Series reactors usually have
- (1) low resistance
 - (2) high resistance
 - (3) low impedance
 - (4) high impedance
23. The following type of reactors are popularly used in power system .
- (1) Compensation reactors
 - (2) Current limiting reactors
 - (3) Suppression or Peterson reactors
 - (4) All of these
24. The various power system faults in increasing order of severity are as follows .
- (1) LG, LL, LLG, LLLG
 - (2) LLLG, LLG, LG, LL
 - (3) LLG, LLLG, LL, LG
 - (4) LL, LG, LLLG, LLG
25. The fault MVA is given by
- (1) $\frac{\text{Base MVA}}{\text{P.U. } X_{eq}}$
 - (2) $\text{Base MVA} \times \text{P.U. } X_{eq}$
 - (3) $\frac{\text{Base MVA}}{(\text{P.U. } X_{eq})^2}$
 - (4) None of the above
26. A circuit breaker will normally operate
- (1) when the switch is put on
 - (2) when the line is to be checked
 - (3) when the power is to be supplied
 - (4) whenever fault in the line occurs
27. During arc extinction, SF_6 gas
- (1) decomposes into S and F ions
 - (2) decomposes into SF_4 and SF_2
 - (3) reduces into SF_3
 - (4) gets oxidized
28. Which of the following is **not** a part of the circuit breaker ?
- (1) Explosion pot
 - (2) Fixed and moving contacts
 - (3) Operating mechanism
 - (4) Conservator
29. The rate of rise of restriking voltage depends upon
- (1) switching condition only
 - (2) circuit power factor only
 - (3) Both (1) and (2)
 - (4) None of these
30. The circuit breaker which has high reliability and negligible maintenance is
- (1) Air blast CB
 - (2) Minimum oil CB
 - (3) Circuit breaker using SF_6 gas
 - (4) Vacuum CB

(6)

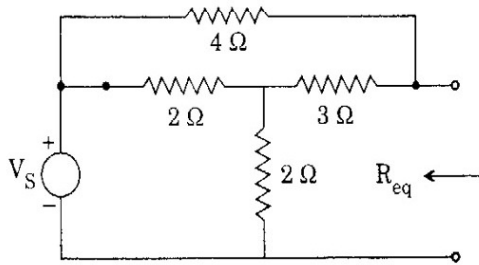
31. To neglect a current source, the terminals across the source are
- (1) open circuited
 - (2) short circuited
 - (3) replaced by some resistance
 - (4) replaced by an inductor
32. Kirchoff's voltage and current laws apply to
- (1) resistive circuits only
 - (2) linear circuits only
 - (3) non-linear circuits only
 - (4) both linear and non-linear circuits
33. A capacitor of $\frac{1}{2\pi}$ farads is connected in series with a 1 ohm resistance to a voltage source of 1 volt, 2π hertz. The voltage drop across the capacitance would be
- (1) 2 volts, leading applied voltage by 90°
 - (2) $\frac{1}{\sqrt{2}}$ volt, lagging applied voltage by 45°
 - (3) $\frac{1}{\sqrt{2}}$ volt, leading applied voltage by 45°
 - (4) $\sqrt{2}$ volts, lagging applied voltage by 90°
34. In the differential equation governing a certain circuit is $RC \frac{dv}{dt} + v = \sqrt{2} E \cos \omega t$. The corresponding phasor equation is
- (1) $(-j\omega RC + 1) \bar{r} = E \angle 90^\circ$
 - (2) $(j\omega + RC) \bar{r} = E \angle 0^\circ$
 - (3) $(j\omega CR + 1) \bar{r} = E \angle 0^\circ$
 - (4) $(jRC\omega + 1) \bar{r} = E \angle 90^\circ$
35. In the two wattmeter method of measuring 3-phase power in a balanced 3-phase circuit, the readings of two wattmeters are in the ratio of 1 : 2. The power factor of the circuit is
- (1) $\frac{1}{\sqrt{2}}$
 - (2) $\frac{1}{2}$
 - (3) $\frac{\sqrt{3}}{2}$
 - (4) 1
36. Three resistances of R ohms each are connected in delta. Their equivalent star resistance per phase will be
- (1) $\frac{R}{\sqrt{3}}$
 - (2) $\sqrt{3} R$
 - (3) $\frac{R}{3}$
 - (4) 3 R
37. A linear system with system function $H(s) = \frac{1}{s}$ is excited with unit step input. The output for $t > 0$ is given by
- (1) 1
 - (2) $\delta(t)$
 - (3) t
 - (4) t^2
38. In the circuit of series RL given in the figure below, V is given by



- (1) $2 \sin t$
- (2) $2 \cos t$
- (3) $\sin(t + 45^\circ)$
- (4) $\sqrt{2} \sin(t + 45^\circ)$

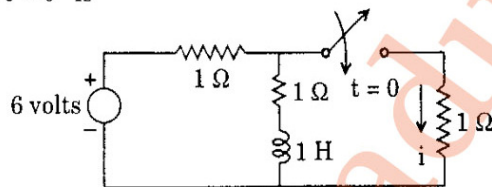
(7)

39. In the circuit shown in the figure below, R_{eq} is given by



- (1) 2Ω
 (2) 4Ω
 (3) 5Ω
 (4) 6Ω

40. In the circuit of figure shown below, steady state has been reached with the switch open. The switch is closed at $t = 0$. The current i at $t = 0^+$ is



- (1) $\frac{3}{2}$ Amp
 (2) $\frac{9}{2}$ Amp
 (3) 2 Amp
 (4) 4 Amp

41. Maximum operating frequency of CRO is mainly governed by its

- (1) vertical amplifier
 (2) horizontal amplifier
 (3) cathode ray tube
 (4) time base circuit

42. The function of shunt in an ammeter is to

- (1) increase the instrument resistance
 (2) bypass the current
 (3) reduce the voltage drop across the instrument coil
 (4) increase the current flowing through the instrument coil

43. Loop tests in a cable *cannot* locate the

- (1) open circuit faults
 (2) short circuit faults
 (3) earth fault
 (4) None of the above

44. The controlling torque in gravity controlled meter is proportional to

- (1) $\cos \theta$
 (2) $\sin \theta$
 (3) $\tan \theta$
 (4) θ

45. Varley loop tests are preferred over Murray loop tests because

- (1) Varley loop test can locate open circuit fault
 (2) Varley loop test gives higher accuracy
 (3) in Varley loop test, provision is made for the measurement of total loop resistance instead of obtaining it from the relation $R = \frac{\rho l}{a}$
 (4) Varley loop test can locate the earth fault

(8)

46. Which of the following is the absolute instrument ?
- (1) Power factor meter
 - (2) Ammeter
 - (3) Wattmeter
 - ✓(4) Tangent galvanometer
47. The deflecting torque of the moving iron instrument is
- (1) $I^2 \frac{dL}{d\theta}$
 - ✓(2) $\frac{1}{2} I^2 \frac{dL}{d\theta}$
 - (3) $I \frac{dL}{d\theta}$
 - (4) $\frac{1}{2} I \frac{dL}{d\theta}$
48. The range of an electrostatic voltmeter can be extended by using
- (1) an inductor in series
 - ✓(2) a resistor in series
 - (3) a capacitor of capacitance smaller than that of voltmeter, in series
 - (4) a capacitor of capacitance larger than that of voltmeter, in series
49. Two holes are drilled in the disc of energy meter on the opposite side of the spindle
- (1) to increase the deflection torque
 - ✓(2) to eliminate the creeping on no load
 - (3) for proper ventilation
 - (4) to reduce the weight of the disc for easy rotation
50. A DVM measures
- (1) peak value
 - ✓(2) r.m.s. value
 - (3) peak-to-peak value
 - (4) average value
51. A cumulatively compounded long shunt generator when operating as a motor would be
- (1) differentially compounded short shunt
 - (2) differentially compounded long shunt
 - ✓(3) cumulatively compounded long shunt
 - (4) cumulatively compounded short shunt
52. Which figure represents the speed - torque characteristic of a d.c. shunt motor ?
- Speed Speed Speed Speed
-
- Torque Torque Torque Torque
- Fig. A Fig. B Fig. C Fig. D
- ✓(1) Fig. A
 - (2) Fig. B
 - (3) Fig. C
 - (4) Fig. D
53. If the d.c. shunt generator delivers 100 Amp at 200 volts and the resistance of the shunt field and armature are 100Ω and 0.01Ω respectively, the generated e.m.f. will be
- ✓(1) 201.02 volts
 - (2) 205 volts
 - (3) 210 volts
 - (4) 212 volts

(9)

54. A 220 volts d.c. machine has an armature resistance of 1 ohm. If the full load armature current is 20 Amp, the difference in the induced voltage when the machine is run as a motor and as a generator is
- (1) zero
(2) 20 volts
(3) 40 volts
(4) 50 volts
55. The following statements relate to compensating winding (CW) and interpole winding (IW) of a d.c. machine :
- A. CW neutralizes the armature reaction under a pole pitch.
B. IW is connected in series with armature circuit.
C. IW produces m.m.f. in the commutating zone only.
D. CW m.m.f. is directed along the brush axis.
E. m.m.f. produced by IW is equal to armature m.m.f.
- From these, the correct statements are
- (1) A, B, C, D and E
(2) A, C, D and E
(3) B, C, D and E
(4) B, C and D
56. A d.c. motor delivering constant power output initially operates at 1500 rpm with torque delivered as 200 N-m. The torque delivered at 1200 rpm is
- (1) 160 N-m
(2) 200 N-m
(3) 230 N-m
(4) 250 N-m
57. The purpose of providing dummy coils in the d.c. machine armature is to
- (1) reduce eddy currents
(2) increase induced voltage
(3) decrease armature resistance
(4) provide mechanical balance for the machine
58. During normal running conditions, the armature current drawn by a d.c. shunt motor is given by
- (1) $\frac{V}{R_a}$
(2) $\frac{V - E_b}{R_a}$
(3) $\frac{V + E_b}{R_a}$
(4) $\frac{E_b - V}{R_a}$
59. The effect of armature reaction in a d.c. machine operating in the saturation region is
- (1) demagnetizing only
(2) demagnetizing and cross magnetizing
(3) cross magnetizing only
(4) magnetizing and cross magnetizing
60. Equalizer ring can be used by
- (1) lap wound armatures only
(2) wave wound armatures only
(3) both lap and wave wound armatures
(4) None of the above

(10)

Impedance relays are used for the protection of

- (1) Motors
- (2) Alternators
- (3) Transformers
- (4) Transmission lines

In circuit breaker, the time duration from the instant of fault to the instant of closing of contact is known as

- (1) Recycle time
- (2) ✓ Total time
- (3) Gross time
- (4) Reclosing time

Impedance relay is used on

- (1) Short transmission lines
- (2) Medium transmission lines
- (3) Long transmission lines
- (4) None of the above

Arc voltage produced in a.c. circuit breaker is always

- (1) in phase opposition to the arc current
- (2) ✓ leading the arc current by 90°
- (3) lagging the arc current by 45°
- (4) in phase with the arc current

If the fault occurs near an impedance relay, the $\frac{V}{I}$ ratio is

- (1) ✓ constant for all the locations of fault
- (2) lower than the value if fault occurs away from the relay
- (3) higher than the value if fault occurs away from the relay
- (4) may be lower or higher than the value if fault occurs away from the relay

66. Maximum short circuit current occurs due to

- (1) ✓ line-to-line fault
- (2) line-to-ground fault
- (3) dead short circuit
- (4) Both (1) and (2) occurring simultaneously

67. Directional relays respond to the

- (1) flow of current
- (2) voltage properties
- (3) flow of power
- (4) ✓ All of these

68. The basic problem in a Circuit Breaker is to

- (1) maintain the arc
- (2) ✓ extinguish the arc
- (3) emit ionization electrons
- (4) None of these

69. The voltage appearing across the contacts after the opening of the circuit breaker is called

- (1) surge voltage
- (2) recovery voltage
- (3) arc voltage
- (4) ✓ break open voltage

70. Protection method used for large internal faults below oil level is

- (1) ✓ Earth fault relay
- (2) Horn gap
- (3) Merz price percentage differential relay
- (4) None of these

(11)

71. Neglecting losses in a transmission system, if the voltage is doubled, for the same power transmission, the weight of the conductor material required will be
- (1) four times
 - (2) ✓ double
 - (3) half
 - (4) one-fourth
72. Which distribution system is more reliable ?
- (1) Ring Main System
 - (2) Tree System
 - (3) ✓ Radial System
 - (4) All are equally reliable
73. In a substation, the equipment used to limit short circuit current level is
- (1) • Series reactor
 - (2) Coupling capacitor
 - (3) Lightning switch
 - (4) Isolator
74. Which of the following equipment is **not** installed in a substation ?
- (1) Shunt reactors
 - (2) Exciters
 - (3) Voltage transformers
 - (4) ✓ Series capacitors
75. Which of the following is preferred for good efficiency and high economy in distribution systems ?
- (1) Single-phase system
 - (2) Two-phase 3-wire system
 - (3) Three-phase 3-wire system
 - (4) ✓ Three-phase 4-wire system
76. Earthing of transmission line is necessary to provide protection against
- (1) overloading
 - (2) ✓ electric shock
 - (3) ✓ voltage fluctuation
 - (4) temperature rise of conductors
77. In 3-phase supply, floating neutral is undesirable because it causes
- (1) unequal line voltages across the load
 - (2) ✓ high voltage across the load
 - (3) low voltage across the load
 - (4) None of these
78. Resistance grounding is used for voltages between
- (1) 3.3 KV to 11 KV
 - (2) ✓ 11 KV to 33 KV
 - (3) 33 KV to 66 KV
 - (4) None of the above
79. Solid grounding is adopted for voltages below
- (1) 100 volts
 - (2) 200 volts
 - (3) 400 volts
 - (4) 660 volts
80. Grounding is generally done in transmission line at
- (1) the supply end
 - (2) ✓ the receiving end
 - (3) middle of the line
 - (4) None of these

(12)

81. Which method is appropriate for heating non-ferrous metals ?
- (1) • Dielectric heating
 - (2) Indirect arc heating
 - (3) • Radiant heating
 - (4) Indirect resistance heating
82. Steel rails welded by
- (1) Resistance welding
 - (2) Argon arc welding
 - (3) Thermit welding
 - (4) Gas welding
83. In electric discharge lamps, light is produced by
- (1) ✓ cathode ray emission
 - (2) ionization in a gas or vapours
 - (3) heating effect of current
 - (4) magnetic effect of current
84. Carbon arc lamps are commonly used in
- (1) . photography
 - (2) . cinema projectors
 - (3) domestic lighting
 - (4) street lighting
85. Which of the following need lowest level of illumination ?
- (1) Auditoriums
 - (2) • Railway platforms
 - (3) Displays
 - (4) Fine engravings
86. High diversity factor reduces
- (1) • load factor
 - (2) overall cost per unit
 - (3) fuel consumption
 - (4) maximum demand
87. An electric drive consists of
- (1) motor, transmitting shaft and control equipment
 - (2) motor and load
 - (3) ✓ motor, control equipment and load
 - (4) motor, supply system and load
88. $\frac{1}{2}$ hour rated motors are used for
- (1) ✓ Light duty cranes
 - (2) Medium duty cranes
 - (3) Heavy duty cranes
 - (4) None of the above
89. Neon tubes are usually used in
- (1) Railway coaches
 - (2) Road signalling
 - (3) Advertising
 - (4) ✓ Airport lighting
90. Which of the following types of heating process is used for surface hardening of steel ?
- (1) Dielectric heating
 - (2) ✓ Infra-red heating
 - (3) Induction heating
 - (4) Resistance heating

(13)

91. For the normal working range of a 3-phase induction motor, torque is proportional to
- (1) slip
 - (2) $\frac{1}{\text{slip}}$
 - (3) $(\text{slip})^2$
 - (4) $\frac{1}{(\text{slip})^2}$
92. A 3.5 kW, 4-pole, 3-phase, 60 Hz induction motor is running at 1440 rpm. The percentage slip of the motor is
- (1) 5
 - (2) 10
 - (3) 15
 - (4) 20
93. When the resistance of the rotor circuit of a 3-phase induction motor is doubled, the maximum torque developed by the machine
- (1) gets doubled
 - (2) increases
 - (3) decreases
 - (4) remains the same
94. Smooth variation of speed in a 3-phase induction motor can be achieved by
- (1) pole changing
 - (2) cascading
 - (3) injecting e.m.f. in the rotor circuit
 - (4) reversing the phase sequence
95. Which one of the following starters do you recommend for a 20 kW, 400 volts, 3-phase, 50 Hz star connected squirrel cage induction motor ?
- (1) Star-delta starter
 - (2) Rotor resistance starter
 - (3) Auto-transformer starter
 - (4) Direct on-line starter
96. When the rotor copper loss in a 3-phase induction motor is 600 watts and slip is 3%, the rotor power input is
- (1) 18 kW
 - (2) 200 kW
 - (3) 20 kW
 - (4) 25 kW
97. Which of the following is *not* determined by circle diagram of 3-phase induction motor ?
- (1) Output
 - (2) Efficiency
 - (3) Power factor
 - (4) Frequency
98. The shaded pole induction motor is used for
- (1) low starting torque
 - (2) medium starting torque
 - (3) high starting torque
 - (4) very high starting torque
99. The motor used for the compressors is
- (1) universal motor
 - (2) shaded pole motor
 - (3) d.c. series motor
 - (4) capacitor-start-capacitor-run motor
100. In a 3-phase induction motor, the torque T is related to the supply voltage V as
- (1) $T \propto V$
 - (2) $T \propto V^2$
 - (3) $T \propto \sqrt{V}$
 - (4) $T \propto \frac{1}{V}$

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101. A 3-phase induction motor connected in star draws 5 Amps. When connected in delta, it will draw a current of
- (1) 5 Amps
 - (2) $5\sqrt{3}$ Amps
 - (3) 15 Amps
 - (4) $\frac{5}{\sqrt{3}}$ Amps
102. When the resistance of the rotor circuit of 3-phase induction motor is doubled, the maximum torque developed by the machine
- (1) gets doubled
 - (2) increases
 - (3) decreases
 - (4) remains the same
103. In a single-phase induction motor running at a slip of 4% with reference to forward field, the slip with reference to backward field is
- (1) zero
 - (2) 0.96
 - (3) 1.96
 - (4) 2.00
104. In 3-phase induction motor, for rotor standstill resistance R_2 , the equivalent load resistance at slip 'S' is
- (1) $\frac{R_2}{S}$
 - (2) SR_2
 - (3) $\left(\frac{1-S}{S}\right)R_2$
 - (4) $(1-S)R_2$
105. The following method is used for speed control of 3-phase squirrel cage induction motor :
- (1) Ward-Leonard method
 - (2) Slip recovery method
 - (3) Pole changing method
 - (4) Voltage injection in rotor circuit
106. Which of the following generating stations has minimum running cost ?
- (1) Thermal power station
 - (2) Nuclear power station
 - (3) Hydro power station
 - (4) Diesel power station
107. The function of moderator in nuclear reactions is
- (1) to accelerate the reaction
 - (2) to absorb excessive neutrons
 - (3) to control the reaction
 - (4) to liberate excessive neutrons
108. Heavy water is
- (1) H_2O
 - (2) D_2O
 - (3) W_2O
 - (4) B_2O
109. The hydraulic turbines used at water heads 400 metres and above is
- (1) Pelton wheel
 - (2) Kaplan turbine
 - (3) Francis turbine
 - (4) Kaplan and Francis turbine

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110. Water hammer is developed in
- (1) alternator
 - (2) surge tank
 - (3) turbine
 - (4) penstock
111. Which plant can never have 100% load factor ?
- (1) Base load plant
 - (2) Hydroelectric plant
 - (3) Peak load plant
 - (4) Nuclear power plant
112. Which power plant *cannot* have single unit of 100 MW capacity ?
- (1) Diesel engine power plant
 - (2) Thermal power plant
 - (3) Hydroelectric power plant
 - (4) Nuclear power plant
113. Which of the following is a fissile material ?
- (1) U-238
 - (2) Th-232
 - (3) U-234
 - (4) Pu-239
114. The rotor used in alternator for hydroelectric station is
- (1) salient pole rotor
 - (2) round rotor with a.c. excitation
 - (3) cylindrical rotor
 - (4) non-salient pole rotor
115. A positive pressure develops in the penstock if the alternator load is suddenly
- (1) decreased
 - (2) increased
 - (3) made fluctuating
 - (4) short circuited
116. For maximum efficiency in the transmission of bulk a.c. power, the p.f. of the load should be
- (1) slightly less than unity lagging
 - (2) slightly less than unity leading
 - (3) unity
 - (4) considerably less than unity
117. As the height of the transmission tower is increased, the line capacitance and line inductance respectively
- (1) decreases, remains unaltered
 - (2) decreases, decreases
 - (3) increases, decreases
 - (4) increases, remains unaltered
118. If the span of a transmission line is increased by 10%, the sag of line increases by about
- (1) 10%
 - (2) 15%
 - (3) 21%
 - (4) 30%
119. Corona discharge on transmission lines may be avoided by
- (1) increasing effective conductor radius
 - (2) increasing the operating voltage
 - (3) decreasing the spacing between the conductors
 - (4) None of the above
120. For the same power transmission, if the transmitted voltage increases by a factor 'n', the size of the conductor gets multiplied by factor
- (1) n^2
 - (2) $\frac{1}{n^2}$
 - (3) n
 - (4) $\frac{1}{n}$

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121. A d.c. shunt generator generates 200 volts rotating in the clockwise direction. For the same initial conditions, if it is rotated at rated speed in anticlockwise direction, the voltage produced equals
- (1) zero volts
 - (2) 200 volts
 - (3) - 200 volts
 - (4) None of these
122. Critical field resistance of a d.c. generator is proportional to
- (1) speed
 - (2) independent of speed
 - (3) $\frac{1}{\text{speed}}$
 - (4) $\frac{1}{(\text{speed})^2}$
123. In a d.c. shunt motor, if the terminal voltage is reduced to half, torque remaining the same, the
- (1) speed will become half and the armature current will also become half
 - (2) speed will become half and the armature current remains the same
 - (3) speed will become half while the armature current doubles
 - (4) speed as well as armature current will double
124. The mechanical power developed by a motor is maximum when the back e.m.f. equals
- (1) the applied voltage
 - (2) half the applied voltage
 - (3) twice the applied voltage
 - (4) square root of the applied voltage
125. A cumulative compound d.c. motor runs at 1500 rpm on full load. If its series field circuit is short circuited, its speed
- (1) becomes zero
 - (2) remains unchanged
 - (3) increases
 - (4) decreases
126. The ratio of iron loss to copper loss under full load conditions, in a power transformer is _____ the corresponding ratio in a distribution transformer.
- (1) less than
 - (2) equal to
 - (3) more than
 - (4) less or more than
127. If a transformer rated at 400 volts, 50 Hz is applied with 200 volts, 25 Hz, the magnetizing current
- (1) gets doubled
 - (2) becomes half
 - (3) remains same
 - (4) increases abnormally
128. The iron loss in a transformer operating at a constant flux and variable frequency can be expressed in the form
- (1) Af^2
 - (2) $Af + Bf^2$
 - (3) Af
 - (4) $Af - Bf^2$

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129. A 220 volts, 100 watt bulb is connected in series with the primary of a 4 KVA, 220/110 volts, 50 Hz transformer. On disconnecting the load on the secondary side, the brightness of the bulb will
- (1) increase
 - (2) decrease
 - (3) remain unaltered
 - (4) decrease to a very low value
130. Zero regulation in a transformer results when power factor of the load is
- (1) zero
 - (2) unity
 - (3) $\frac{X_{eq}}{Z_{eq}}$ leading
 - (4) $\frac{X_{eq}}{Z_{eq}}$ lagging
131. The tertiary winding in a 3-phase transformer is connected in
- (1) star
 - (2) double star
 - (3) delta
 - (4) zig-zag
132. A 4 KVA, 400/200 volts, single-phase transformer has its L.V. winding resistance of 0.03 p.u. This resistance when referred to H.V. side is
- (1) 0.03 p.u.
 - (2) 0.015 p.u.
 - (3) 0.06 p.u.
 - (4) 0.12 p.u.
133. The efficiency of a transformer at full load 0.8 power factor lagging is 95%. Its efficiency at full load 0.8 power factor leading will be
- (1) 80%
 - (2) 90%
 - (3) 95%
 - (4) 100%
134. In Scott connection, if the transformation ratio of main transformer is K, then the teaser transformer has transformation ratio of
- (1) $\frac{2}{\sqrt{3}} K$
 - (2) $\frac{3}{2} \sqrt{K}$
 - (3) $\frac{K}{\sqrt{3}}$
 - (4) $\frac{K}{2}$
135. The function of breather in a transformer is
- (1) to provide cooling to the winding
 - (2) to extract moisture from the air
 - (3) to provide insulation to the winding
 - (4) All of these
136. The regulation of an alternator by the synchronous impedance method as compared to that obtained by Ampere turn method is
- (1) low
 - (2) high
 - (3) same
 - (4) sometimes low and sometimes high

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137. A synchronous machine is working on an infinite busbar supplying power at unity power factor to the bus. If the excitation is increased
- (1) the power factor becomes lagging
 - (2) the power factor becomes leading
 - (3) the power supplied increases
 - (4) the power factor remains unaltered
138. The power developed by a cylindrical rotor synchronous machine is maximum when the load angle is
- (1) 90°
 - (2) 0°
 - (3) 45°
 - (4) 60°
139. When the excitation of a salient pole synchronous motor working on no load is reduced to zero,
- (1) it comes to rest
 - (2) it continues to run at synchronous speed
 - (3) it runs at a speed slightly less than synchronous speed
 - (4) it runs at a speed higher than synchronous speed
140. In thermal power stations, the number of poles used in alternators are usually
- (1) 12
 - (2) 24
 - (3) 48
 - (4) None of these
141. For zero power factor leading, the effect of armature reaction on the main flux is
- (1) magnetizing only
 - (2) demagnetizing only
 - (3) cross magnetizing only
 - (4) None of these
142. Hunting in synchronous motors occurs due to
- (1) changes in excitation
 - (2) increase in supply to the motor
 - (3) increase in supply frequency
 - (4) sudden load variations
143. Two alternators A and B are sharing an inductive load equally. If the excitation of alternator A is increased
- (1) alternator B will deliver more current and alternator A will deliver less current
 - (2) alternator B will deliver less current and alternator A will deliver more current
 - (3) both will continue to share load equally
 - (4) both will deliver more current
144. 50 Hz is generated by a 10-pole alternator rotating at a speed of
- (1) 31.415 rad/sec
 - (2) 62.83 rad/sec
 - (3) 50 rad/sec
 - (4) 100 rad/sec

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145. The pitch factor of a 6-pole, 3-phase alternator having 54 slots and coil span of 6 slots is
- (1) 0.66
 - (2) 0.707
 - (3) 0.866
 - (4) 0.955
146. In an alternator, the distribution factor K_d is given by
- (1) $K_d = \frac{\sin\left(\frac{n\alpha}{2}\right)}{n \sin\left(\frac{\alpha}{2}\right)}$
 - (2) $K_d = \frac{n \sin\left(\frac{\alpha}{2}\right)}{\sin\left(\frac{n\alpha}{2}\right)}$
 - (3) $K_d = \frac{\sin\left(\frac{n\alpha}{2}\right)}{\sin\left(\frac{\alpha}{2}\right)}$
 - (4) $K_d = \frac{\sin\left(\frac{\alpha}{2}\right)}{\sin\left(\frac{n\alpha}{2}\right)}$
147. The e.m.f. generated in an alternator due to n^{th} harmonic is
- (1) n times the fundamental e.m.f.
 - (2) equal to the fundamental e.m.f.
 - (3) less than the fundamental e.m.f.
 - (4) zero
148. If the terminal voltage of an alternator is required to decrease with increase of load, the power factor of the load should be
- (1) zero lagging
 - (2) zero leading
 - (3) unity
 - (4) more than unity
149. A synchronous motor is operating on no load at unity power factor. If the field current is increased, the power factor will become
- (1) leading and the armature current will decrease
 - (2) lagging and the armature current will increase
 - (3) lagging and the armature current will decrease
 - (4) leading and the armature current will increase
150. In salient pole machines, the air gap length under the poles is not kept constant so as to
- (1) obtain a solenoidal distribution of the main field flux
 - (2) obtain a sinusoidal distribution of the armature m.m.f.
 - (3) minimize the effect of armature m.m.f. on the main field flux
 - (4) obtain better cooling