

# Electrical Engineering Questions with Answers 2017

**TSPSC-AEE- 2017 Questions with Answers**  
**(ELECTRICAL ENGINEERING)**

01. A generating station has a maximum demand of 30 MW, a load factor of 60% and a plant capacity factor of 50%. The reserve capacity of the plant is

- (a) 5 MW                      (b) 4 MW  
(c) 6 MW                      (d) 10 MW

**01. Ans: (c)**

02. A 100 km long transmission line is loaded at 110 kV. If the loss of the line is 15 MW and the load is 150 MVA, the resistance of the line is

- (a) 8.06 ohms per phase  
(b) 0.806 ohms per phase  
(c) 0.0806 ohms per phase  
(d) 80.6 ohms per phase

**02. Ans: (a)**

03. When the load on a transmission line is equal to the surge impedance loading

- (a) The receiving end voltage is less than the sending end voltage  
(b) The sending end voltage is less than the receiving end voltage  
(c) The receiving end voltage is more than the sending end voltage  
(d) The receiving end voltage equal to the sending end voltage

**03. Ans: (d)**

04. The inductance of single phase two wire power transmission line per km gets doubled when the

- (a) Distance between wires is doubled  
(b) Distance between the wires is increased four fold  
(c) Distance between the wires is increased as square of the original distance  
(d) Radius of the wire is doubled

**04. Ans: (c)**

05. The dielectric strength of impregnated papers is about

- (a) 20 kV/mm                      (b) 30 kV/mm  
(c) 15 kV/mm                      (d) 5 kV/mm

**05. Ans: (b)**

06. HVDC transmission is preferred to EHV AC because

- (a) HVDC terminal equipments are inexpensive  
(b) VAR compensation is not required in HVDC systems  
(c) System stability can be improved  
(d) Harmonic problem is avoided

**06. Ans: (c)**



07. Zero-sequence current is used for relaying purpose only in the case of
- (a) Phase over current relay
  - (b) Phase impedance relay
  - (c) Ground over current relay
  - (d) Ground impedance relay

**07. Ans: (d)**

08. A 10 kVA, 400 V/200 V single phase transformer with 10% impedance draws a steady short-circuit line current of
- (a) 250A
  - (b) 50 A
  - (c) 150 A
  - (d) 350 A

**08. Ans: (a)**

09. In a 3-phase extra-high voltage cable, a metallic screen around each core insulation is provided to
- (a) Facilitate heat dissipation
  - (b) Give mechanical strength
  - (c) Obtain longitudinal electric stress
  - (d) Obtain radial electric stress

**09. Ans: (b)**

10. The severity of line to ground and three phase faults at the terminals of an unloaded synchronous generator is to be same. If the terminal voltage is 1.0 pu,  $Z_1=Z_2=j0.1$  p.u. and  $Z_0=j0.05$  p.u. for the alternator, then the

required inductive reactance for neutral grounding is

- (a) 0.05 p.u.
- (b) 0.0166 p.u.
- (c) 0.1 p.u.
- (d) 0.15 p.u.

**10. Ans: (b)**

11. The critical clearing time of a fault in power system is related to

- (a) Reactive power limit
- (b) Steady state stability limit
- (c) Short-circuit current limit
- (d) Transient stability limit

**11. Ans: (d)**

12. If the inertia constant H of a machine of 200 MVA is 2 p.u., its value corresponding to 400 MVA will be

- (a) 4 p.u.
- (b) 2 p.u.
- (c) 1.0 p.u.
- (d) 0.5 p.u.

**12. Ans: (c)**

13. In case of a 3-phase short-circuit fault in a system, the power fed into the system is

- (a) Mostly reactive
- (b) Reactive only
- (c) Mostly active
- (d) Active and Reactive both equal

**13. Ans: (a)**



14. The maximum demand of a consumer is 2 kW and his daily energy consumption is 20 units. His load factor is

- (a) 10% (b) 42%  
(c) 60% (d) 41.6%

**14. Ans: (d)**

15. In order to quench the are quickly and also optimize the dimensions generally

- (a) Air blast C.B. is preferred  
(b) Oil C.B. is preferred  
(c) SF<sub>6</sub> C.B. is preferred  
(d) Minimum oil C.B. is preferred

**15. Ans: (c)**

16. If a voltage-controlled bus is treated as load bus, then which one of the following limits would be violated?

- (a) Active power (b) Reactive power  
(c) Voltage (d) Phase angle

**16. Ans: (b)**

17. A suspension type insulator has three units with self-capacitance C and ground capacitance of 0.2 C having a string efficiency of

- (a) 80% (b) 82%  
(c) 78% (d) 76%

**17. Ans: (c)**

18. The X/R ratio for 220 kV line as compared to 400 kV line is

- (a) Equal (b) Greater  
(c) Smaller (d) Not equal

**18. Ans: (b)**

19. Large size steam plants and nuclear plants are suitable for

- (a) Intermediate loads  
(b) Base loads  
(c) Both base and peak loads  
(d) Peak loads

**19. Ans: (b)**

20. Transmission of power by a.c. cables is impossible beyond

- (a) 500 km (b) 300 km  
(c) 250 km (d) 45 km

**20. Ans: (d)**

21. The corona loss in a 50 Hz system is 0.25 kW/ph/km. At a frequency of 60 Hz, the corona loss would be

- (a) 0.30 kW/ph/km (b) 0.36 kW/ph/km  
(c) 0.28 kW/ph/km (d) 0.21 kW/ph/km

**21. Ans: (c)**

22. Which of the two generalized constants of a transmission line are equal?



- (a) B & C (B) A & B  
(c) A & D (D) B & D

**22. Ans: (c)**

23. A 100 km transmission line is designed for a nominal voltage of 132 kV and consists of one conductor per phase. The line reactance is 0.726 ohm/km. The static transmission capacity of the line, in MW, would be

- (a) 240 (b) 132  
(c) 416 (d) 720

**23. Ans: (a)**

24. Poles are real and negative and equal then the system is \_\_\_\_\_ damped system

- (a) Undamped  
(b) Underdamped  
(c) Critically damped  
(d) Overdamped

**24. Ans: (c)**

25. Order of the open loop transfer function is \_\_\_\_\_ to order of closed loop transfer function

- (a) not equal (b) equal  
(c) less than (d) greater than

**25. Ans: (b)**

26. Approximation transfer function of

$$\frac{10}{(S+1)(S+2)} \text{ is}$$

- (a)  $10/S+1$  (b)  $10/S+2$   
(c)  $5/S+1$  (d)  $5/S+1$

**26. Ans: (c)**

27. The gain margin of a system is 0 dB. It represents a

- (a) Stable system  
(b) Unstable system  
(c) Marginally stable system  
(d) Conditionally stable system

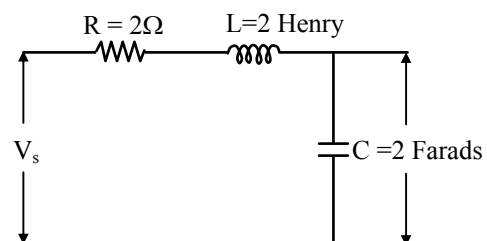
**27. Ans: (c)**

28. Find out damping ratio of second order under-damped impulse response is  $e(t) = 1.8e^{-8t} \sin 6t$

- (a) 0.707 (b) 0  
(c) 0.8 (d) 1

**28. Ans: (c)**

29. For the circuit shown, find out the type of the damped system





- (a) Under-damped system
- (b) Overdamped system
- (c) Undamped system
- (d) Critically damped system

**29. Ans: (d)**

30. Find the steady state error  $e_{ss}$  for  
 $r(t) = (t - 5t^2) u(t)$

- (a) Infinity
- (b) Zero
- (c) 5
- (d) 1

**30. Ans: (a)**

31. Which of the following is located on root locus when  $G(s) = \frac{K(S+2)}{S(S+4)}$ ?

- (a)  $S = -2$
- (b)  $S = -4$
- (c)  $S = -\infty$
- (d)  $S = -j2.2$

**31. Ans: (a,b & c)**

32. Find out break in point / break away point of Unity feedback Transfer Function

$$G(s) = \frac{K(S+4)}{S(S+2)}$$

- (a)  $S = -1.1$  and  $S = -3.5$
- (b)  $S = 0.9$  and  $S = -1.8$
- (c)  $S = -1.1$  and  $S = -6.8$
- (d)  $S = -6.8$  and  $S = -1.8$

**32. Ans: (c)**

33. Which of the following is correct

$$G(s) = \frac{(S+1)}{S(S+2)} \text{ for the polar plot?}$$

- (a) One clockwise direction
- (b) Two clockwise direction
- (c) One anti-clockwise direction
- (d) Two anti-clockwise direction

**33. Ans: (a)**

34. The critical point lies within the nyquist plot then the system is

- (a) Marginally stable
- (b) Unstable
- (c) Stable
- (d) Undetermined

**34. Ans: (b)**

35. Which of the following is lead compensator?

- (a)  $\frac{(S+1)}{(S+10)}$
- (b)  $\frac{(S+10)}{(S+8)}$
- (c)  $\frac{(S+12)}{(S+10)}$
- (d)  $\frac{(S+4)}{(S+2)}$

**35. Ans: (a)**

36. Find out maximum frequency of the transfer

$$\text{function } G(s) = \frac{(S+1)}{(S+2)}$$

- (a) 1 rad/sec
- (b) 2rad/sec
- (c) 0.5 rad/sec
- (d)  $\sqrt{2}$  rad/sec

**36. Ans: (d)**



37. In lag compensator the damping ratio, gain and steady state error ( $e_{ss}$ ) are
- (a) Decreases, Decreases and Increases
  - (b) Decreases, Increases and Increases
  - (c) Increases, Increases and Decreases
  - (d) Increases, Decreases and Decreases

**37. Ans: (d)**

38. Find the K value for unity feedback transfer

function  $G(s) = \frac{k}{S(S+1)}$  when  $e_{ss} = 80\%$

- (a) 1
- (b) 5
- (c) 8
- (d) 2

**38. Ans: (a)**

39. Horizontally mounted moving iron instruments use

- (a) Eddy current damping
- (b) Electromagnetic damping
- (c) Fluid friction damping
- (d) Air friction damping

**39. Ans: (d)**

40. Light load adjustments for induction type energy meters are usually done at

- (a) 10% of full load current
- (b) 5% of full load current
- (c) 50% of full load current
- (d) 1% of full load current

**40. Ans: (b)**

41. Standardization of potentiometers is done in order that, they become

- (a) Accurate
- (b) Precise
- (c) Accurate and direct reading
- (d) Accurate and precise

**41. Ans: (c)**

42. Maxwell's Inductance-Capacitance bridge is used for measurement of inductance of

- (a) Low Q coils
- (b) Medium Q coils
- (c) High Q coils
- (d) Low and medium Q coils

**42. Ans: (b)**

43. If the distance of screen from a CRT to center of deflection plates is 15 cm, the length of deflection plates is 2 cm, the distance between the plates is 1 cm and accelerating voltage is 500 V, deflection sensitivity is

- (a) 33.2 V/cm
- (b) 0.03 cm/V
- (c) 66.4 V/cm
- (d) 0.015 cm/V

**43. Ans: (b)**

44. Gearing, backlash, friction between moving parts and scale accuracies are generally known as



- (a) Instrument errors
- (b) Interference errors
- (c) Calibration errors
- (d) Interaction errors

**44. Ans: (a)**

45. In a single phase induction energy meter, in order to obtain true value of energy, the shunt magnetic flux should lag behind the applied voltage by

- (a)  $90^\circ$
- (b)  $0^\circ$
- (c)  $45^\circ$
- (d)  $60^\circ$

**45. Ans: (a)**

46. Thermocouple instruments can be used for a frequency range upto

- (a) 100Hz
- (b) 5000 Hz
- (c) 1 MHz
- (d) 50 MHz and above

**46. Ans: (d)**

47. Loading effect is principally caused by instruments

- (a) High resistance
- (b) Low sensitivity
- (c) High sensitivity
- (d) High range

**47. Ans: (b)**

48. Wagner's earth devices are used in AC bridge circuits for

- (a) Eliminating the effect of earth capacitances
- (b) Eliminating the effect of intercomponent capacitances
- (c) Eliminating the effect of stray electrostatic fields
- (d) Shielding the bridge elements

**48. Ans: (a)**

49. Torque/weight ratio of an instrument indicates

- (a) Selectivity
- (b) Accuracy
- (c) Fidelity
- (d) Sensitivity

**49. Ans: (d)**

50. Which of the following factors limit the deflection of the pointer of a PMMC instrument of about  $90^\circ$ ?

1. Its damping mechanism
2. Linearity of magnetic field in which the coil moves
3. Control spring arrangement
4. Shape of pole shoe for the horse shoe magnet

Select the correct answer using the code given below:

- (a) Only 1 and 3
- (b) Only 2 and 4
- (c) Only 2 and 3
- (d) Only 1 and 4

**50. Ans: (c)**





51. A 10V range voltmeter is rated for 50 $\mu$ A full-scale current. The total resistance of voltmeter is

- (a) 200k $\Omega$                       (b) 100k $\Omega$
- (c) 50 k $\Omega$                       (d) 400 k $\Omega$

**51. Ans: (a)**

52. Which one of the following frequency meter is suitable for measuring radio frequency?

- (a) Vibrating reed frequency meter
- (b) Weston frequency meter
- (c) Electrical resonance frequency meter
- (d) Heterodyne frequency meter

**52. Ans: (d)**

53. Integrating principle in the digital measurement is the conversion of

- (a) Voltage to time
- (b) Voltage to frequency
- (c) Voltage to current
- (d) Current to voltage

**53. Ans: (b)**

54. If MN/MX is low the 8086 operates in - \_\_\_\_\_ mode.

- (a) Minimum                      (b) Maximum
- (c) Minimum & Maximum
- (d) Medium

**54. Ans: (b)**

55. \_\_\_\_\_ signal is generated by combining RD and WR signals with IO/M.

- (a) Control                      (b) System
- (c) Register                      (d) Memory

**55. Ans: (a)**

56. The 8086 fetches instruction one after another from \_\_\_\_\_ of memory.

- (a) Code segment                      (b) IP
- (c) ES                      (d) SS

**56. Ans: (a)**

57. In 8086 the overflow flag is set when \_\_\_\_\_.

- (a) The sum is more than 16 bits
- (b) Signed numbers go out of their range after an arithmetic operation
- (c) Carry and sign flags are set
- (d) Subtraction

**57. Ans: (b)**

58. A \_\_\_\_\_ Instruction at the end of interrupt service program takes the execution back to the interrupted program.

- (a) Forward                      (b) Return
- (c) Data                      (d) Line

**58. Ans: (b)**



59. Which microprocessor accepts the program written for 8086 without any changes?

- (a) 8085 (b) 8088  
(c) 80186 (d) 80188

**59. Ans: (b)**

60. In an R-C phase shift oscillator, the minimum number of R-C networks to be connected in cascade will be

- (a) One (b) Two  
(c) Three (d) Four

**60. Ans: (c)**

61. The multivibrator circuit which processes one stable state and one quasi stable is

- (a) Astable  
(b) Monostable  
(c) Bistable  
(d) Schmitt trigger circuit

**61. Ans: (b)**

62. Introducing a resistor in the emitter of a common amplifier stabilizes the DC operating point against variations in

- (a) Only the temperature  
(b) Only the  $\beta$  of the transistor  
(c) Both temperature and  $\beta$   
(d) Neither temperature nor  $\beta$

**62. Ans: (c)**

63. Which of the following notations have two repetitions of zero ?

- (P) 1's complement with radix of number being 2  
(Q) 7's complement with radix of number being 8.  
(R) 9's complement with radix of number being 10.  
(S) 10's complement with radix of number being 10

Select the correct answer using the codes given below:

- (a) P, Q and S (b) P and R  
(c) Q, R and S (d) P, Q and R

**63. Ans: (d)**

64. Which of the following circuits come under the class of sequential logic circuits ?

- P. Full adder  
Q. Full subtractor  
R. Half adder  
S. JK flip  
T. Counter

Select the correct answer from the codes given below:

- (a) P and Q (b) Q and R  
(c) R and S (d) S and T

**64. Ans: (d)**



65. Which signal of 8085 microprocessor is used to insert wait states ?

- (a) Ready (b) ALE  
(c) HOLD (d) INTR

**65. Ans: (a)**

66. In an 8085 microprocessor, the contents of accumulator, after the following instructions are executed will become

XRA A

MVI B F0H

SUB B

- (a) 01 H (b) 0F H (c) F0 H (d) 10 H

**66. Ans: (d)**

67. The frequency stability of the oscillator output is maximum in \_\_\_\_.

- (a) Crystal oscillator  
(b) Phase shift oscillator  
(c) LC oscillator  
(d) Wien bridge oscillator

**67. Ans: (a)**

68. In an npn transistor, \_\_\_\_\_ are the minority carriers.

- (a) Free electrons (b) Acceptor ions  
(c) Donor ions (d) Holes

**68. Ans: (d)**

69. A single-phase one-pulse diode rectifier is feeding an RL load with freewheeling diode

across the load. For conduction angle  $\beta$ , the main diode and freewheeling diode would respectively, conduct for

- (a)  $\pi$ ,  $\pi - \beta$  (b)  $\pi$ ,  $\beta - \pi$   
(c)  $\beta$ ,  $\pi$  (d)  $\beta - \pi$ ,  $\pi$

**69. Ans: (b)**

70. A single-phase full-bridge diode rectifier delivers a load current of 10A, which is ripple free. Average and rms values of diode currents are respectively

- (a) 10A, 7.07A (b) 5A, 10A  
(c) 5A, 7.07A (d) 7.07A, 5A

**70. Ans: (c)**

71. In a thyristor, holding current is

- (a) More than latching current  $I_L$   
(b) Less than  $I_L$   
(c) Equal to  $I_L$   
(d) Very small

**71. Ans: (b)**

72. Turn-on time of an SCR in series with RL circuit can be reduced by

- (a) Increasing circuit resistance R  
(b) Decreasing R  
(c) Increasing circuit inductance L  
(d) Decreasing L

**72. Ans: (d)**



73. For an UJT employed for the triggering of an SCR, stand-off ratio  $\eta = 0.64$  and dc source voltage  $V_{BB}$  is 20V. The UJT would trigger when the emitter voltage is
- (a) 12.8V                      (b) 13.1V  
(c) 10V                        (d) 5V

**73. Ans: (b)**

74. In a single-phase full converter, for continuous conduction, each pair of SCRs conduct for
- (a)  $\pi - \alpha$                       (b)  $\pi$   
(c)  $\alpha$                             (d)  $\pi + \alpha$

**74. Ans: (b)**

75. In a 3-phase half-wave rectifier, if per phase input is 200 V, then the average output voltage is
- (a) 233.91 V                      (b) 116.95V  
(c) 202.56 V                      (d) 101.28V

**75. Ans: (a)**

76. In a single-phase full converter, the number of SCRs conducting during overlap is
- (a) 1                      (b) 2                      (c) 3                      (d) 4

**76. Ans: (d)**

77. The four-quadrant dual operation requires
- (a) Two full converters in series

- (b) Two full converters connected back to back  
(c) Two full converters connected in parallel.  
(d) Two semiconverters connected back to back.

**77. Ans: (b)**

78. In dc choppers per unit ripple is maximum when duty cycle is
- (a) 0.2                      (b) 0.5  
(c) 0.7                      (d) 0.9

**78. Ans: (b)**

79. A dc chopper is fed from 100V dc. Its load voltage consists of rectangular pulse of duration 1 msec in an overall cycle time of 3 msec, the average output voltage and ripple factor for this chopper are respectively.
- (a) 25V, 1                      (b) 50V, 1  
(c)  $33.33V \sqrt{2}$                       (d)  $33.33V, 1$

**79. Ans: (c)**

80. In single pulse modulation of PWM inverters, third harmonic can be eliminated if pulse width is equal to
- (a)  $30^\circ$                       (b)  $60^\circ$   
(c)  $120^\circ$                       (d)  $150^\circ$

**80. Ans: (c)**



81. In a single phase voltage controller with RL load, ac output power can be controlled if
- (a) Firing angle  $\alpha > \phi$  (load phase angle) and conduction angle  $\gamma = \pi$
  - (b)  $\alpha > \phi$  and  $\gamma < \pi$
  - (c)  $\alpha < \phi$  and  $\gamma = \pi$
  - (d)  $\alpha < \phi$  and  $\gamma > \pi$

**81. Ans: (b)**

82. A cycloconverter is a
- (a) frequency change r(fc) from higher to lower frequency with one-stage conversion
  - (b) fe from higher to lower frequency with two-stage conversion
  - (c) fc from lower to higher frequency with one-stage conversion
  - (d) Either (a) or (c)

**82. Ans: (d)**

83. The function of snubber circuit connected across an SCR is to
- (a) Suppress  $\frac{dv}{dt}$
  - (b) Increase  $\frac{dv}{dt}$
  - (c) Decrease  $\frac{dv}{dt}$
  - (d) Keep transient overvoltage at a constant value

**83. Ans: (a)**

84. As compared to power MOSFET, a BJT has
- (a) Lower switching losses but higher conduction losses
  - (b) Higher switching losses and higher conduction losses
  - (c) Higher switching losses but lower conduction losses
  - (d) Lower switching losses and lower conduction losses.

**84. Ans: (c)**

85. Which of the following is also called as voltage commutation?
- (a) CLASS A
  - (b) CLASS B
  - (c) CLASS C
  - (d) CLASS D

**85. Ans: (d)**

86. Surge current rating of an SCR specifies the maximum
- (a) Repetitive current with sine wave
  - (b) Non-repetitive current with sine wave
  - (c) Non-repetitive current with rectangular wave
  - (d) Repetitive current with rectangular wave

**86. Ans: (b)**

87. An unsaturated dc shunt motor runs at its rated speed when rated voltage is applied to it. If the supply voltage to the motor is reduced by 25%, the speed of the motor



- (a) Increases by 25%
- (b) Remains the same
- (c) Decreases by 25%
- (d) Decrease only slightly by an amount less than 25%

**87. Ans: (b)**

88. In v/f control method,

- (a) The maximum torque decreases
- (b) The motor speed increases
- (c) The maximum torque is constant
- (d) The maximum torque increases

**88. Ans: (c)**

89. A dc series motor is controlled by chopper.

$V = 600 \text{ V}$ ,  $R_a + R_f = 0.1 \Omega$ ,  $K_m = 4 \times 10^{-3} \text{ N-m/A}^2$ ,  $I_a = 300 \text{ A}$ , duty cycle = 0.6. Power input to the motor is

- (a) 98 W
- (b) 108 kW
- (c) 88 kW
- (d) 100 kW

**89. Ans: (b)**

90. In static rotor resistance control method, the effective external resistance is

- (a)  $R^2 (1 - \alpha)$
- (b)  $\sqrt{R} (1 - \alpha)$
- (c)  $R (1 - \alpha)$
- (d)  $R (1 - \alpha)^2$

**90. Ans: (c)**

91. A three phase slip ring induction motor with chopper controlled resistance has its torque proportional to

- (a) Rotor current
- (b) Stator resistance
- (c) Square of rotor current
- (d) Square root of rotor current

**91. Ans: (c)**

92. In static Kramer drive, motor turns ratio is 0.6, the firing angle is  $120^\circ$ . The motor slip is

- (a) 0.633
- (b) 0.533
- (c) 0.833
- (d) 0.733

**92. Ans: (c)**

93. A DC chopper is used for regenerative braking of a separately excited DC motor. The DC supply voltage is 400V. The armature current during regenerative braking is kept constant at 300 A with negligible ripple. For a duty cycle of 60% the power return to the DC supply is

- (a) 78 kW
- (b) 58 kW
- (c) 38 kW
- (d) 48 kW

**93. Ans: (d)**

94. The power factor will be maximum in case of



- (a) Electric are heating
- (b) Resistance heating
- (c) Induction heating
- (d) Dielectric heating

**94. Ans: (b)**

95. In which of the following welding methods, the molten metal is poured for joining the metals ?

- (a) Gas welding
- (b) Thermit welding
- (c) TIG welding
- (d) Arc welding

**95. Ans: (b)**

96. Which of the following vapour/gas will give yellow colour in a filament lamp?

- (a) Helium
- (b) Mercury
- (c) Magnesium
- (d) Sodium

**96. Ans: (d)**

97. For continuously running rolling mills with intermittent loading, the most suitable DC drive is

- (a) DC series motor
- (b) DC shunt motor
- (c) DC differentially compound motor
- (d) DC cumulatively compound motor

**97. Ans: (d)**

98. The average speed of a train is independent of

- (a) Duration of steps
- (b) Acceleration and braking retardation
- (c) Distance between stops
- (d) Running time

**98. Ans: (a)**

99. Nichrome wires can be safely used for heating upto

- (a) 1200 °C
- (b) 1400 °C
- (c) 1500 °C
- (d) 2000 °C

**99. Ans: (a)**

100.  $V$  being the voltage impressed on a dielectric, dielectric loss is proportional to

- (a)  $V$
- (b)  $V^2$
- (c)  $1/V$
- (d)  $V^{-2}$

**100. Ans: (b)**

101. The coefficient of adhesion is

- (a) Zero in traction systems
- (b) Low in case of AC traction high in DC traction
- (c) High in AC traction low in case of DC traction
- (d) Same on AC and DC traction systems

**101. Ans: (c)**





102. In HPSV lamps, traces of neon gas
- (a) Helps in stabilizing the arc
  - (b) Changes the colour of light
  - (c) Prevents the vaporization of filament
  - (d) Assists during starting to develop enough heat to vaporize sodium

**102. Ans: (d)**

103. Which of the following lamp light output is comparable with that of day light?
- (a) Fluorescent lamp
  - (b) Sodium vapour lamp
  - (c) Mercury vapour lamp
  - (d) Halogen lamp

**103. Ans: ( )**

104. Bearings used to support axles of traction coaches are
- (a) Ball bearings
  - (b) Bush bearings
  - (c) Roller bearings
  - (d) Journal bearings

**104. Ans: (c)**

105. Change in the frequency of supply does not affect the
- (a) Dielectric heating
  - (b) Electrical resistance heating
  - (c) Induction heating
  - (d) Microwave heating

**105. Ans: (b)**

106. The flicker effect of fluorescent lamps is more pronounced at
- (a) Lower frequencies
  - (b) Higher frequencies
  - (c) Lower voltage
  - (d) Higher voltages

**106. Ans: (a)**

107. In an electric press, mica is used
- (a) As an insulator
  - (b) As a device for power factor improvement
  - (c) For dielectric heating
  - (d) For induction heating

**107. Ans: (a)**

108. Gray iron is usually welded by
- (a) Gas welding
  - (b) TIG welding
  - (c) MIG welding
  - (d) Arc welding

**108. Ans: (a)**

109. Three resistances each of  $R$  ohms are connected to form a triangle. The resistance between any two terminals will be
- (a)  $R\Omega$
  - (b)  $3R/2\Omega$
  - (c)  $3R\Omega$
  - (d)  $2R/3\Omega$

**109. Ans: (d)**





110. If the number of branches in a network is 'B', the number of nodes is 'N' and the number of dependent loops is 'L', then the number of independent node equations will be

- (a)  $N+L-1$  (b)  $B-1$   
(c)  $B-N$  (d)  $N-1$

**110. Ans: (d)**

111. Which of the following theorems can be applied to any network linear or non-linear, active or passive, time variant or time invariant?

- (a) Thevenin Theorem  
(b) Norton Theorem  
(c) Telligen Theorem  
(d) Superposition Theorem

**111. Ans: (c)**

112. A passive 2-port network is in a steady state, compared to its input, the steady output can never offer

- (a) Higher voltage (b) Lower impedance  
(c) Greater power (d) Better regulation

**112. Ans: (c)**

113. Change in the circuit voltage will affect

- (a) Resonant frequency (b) Q factor  
(c) Current (d) Bandwidth

**113. Ans: (c)**

114. In a pure inductive circuit, if the supply frequency is reduced to half, the current will be

- (a) Reduced to one fourth  
(b) Reduced to half  
(c) Doubled  
(d) Four times at high

**114. Ans: (c)**

115. A  $200\ \mu\text{H}$  coil has a Q of 250 at resonance frequency of 800 kHz. The effective resistance of coil is

- (a)  $8\ \Omega$  (b)  $4\ \Omega$   
(c)  $2\ \Omega$  (d)  $1\ \Omega$

**115. Ans: (b)**

116. Fourier series does not exist for the functions  $x^2+y^2=4$  because

- (a) function is single valued  
(b) function is not a single valued  
(c) function is not continuous  
(d) function is continuous

**116. Ans: (b)**

117. The power delivered to a 3-phase load can be measured by the use of two wattmeters only when the

- (a) load is unbalanced  
(b) load is balanced



- (c) three phase load is connected to the source through three wires
- (d) three phase load is connected to the source through four wires

**117. Ans: (c)**

118. Measurement of power and power factor of a 3-phase system by two wattmeter method can be obtained in case of

1. Balanced load and balanced source
2. Balanced source with 3-phase 3-wire unbalanced load
3. Unbalanced source with 3-phase 3-wire balanced load
4. Balanced source with 3-phase 4-wire unbalanced load
5. unbalanced and unbalanced source

- (a) 1 only                      (b) 2, 3 and 5
- (c) 1, 2, 3, 4 and 5        (d) 1, 2, 3 and 5

**118. Ans: (d)**

119. The time constant of an RC circuit is defined as the time taken by the voltage across the capacitor to become \_\_\_\_\_ of its final value

- (a) 63.2%                      (b) 36.8%
- (c) 50%                        (d) 100%

**119. Ans: (a)**

120. A 200 V, 50 Hz inductive circuit takes current of 10 amp, lagging  $30^\circ$ . The inductive reactance of the circuit is

- (a)  $20 \Omega$                       (b)  $16 \Omega$
- (c)  $17.32 \Omega$                   (d)  $10 \Omega$

**120. Ans: (d)**

121. The surface integral of the electrical field intensity is the

- (a) net flux eliminating from the surfaces
- (b) Electrical charge
- (c) Charge density
- (d) Flux density

**121. Ans: (a)**

122. Which of the following is a vector quantity?

- (a) Magnetic potential
- (b) Susceptibility
- (c) Magnetic flux intensity
- (d) Magnetic flux density

**122. Ans: (d)**

123. Which law is synonymous to the occurrence of diamagnetism?

- (a) Ampere's law
- (b) Maxwell's law
- (c) Coloumb's law
- (d) Lenz's law

**123. Ans: (d)**



124. A 220 V DC machine has an armature resistance of  $1\ \Omega$ . If the full load current is 20A, the difference in the induced voltages when the machine is running as a motor and as a generator is

- (a) 20 V (b) Zero  
(c) 40 V (d) 50 V

**124. Ans: (c)**

125. Under which of the following conditions is a DC motor provided with compensating winding used?

1. Wide range of speed control above normal
2. Wide range of steady load variation with no speed control
3. Wide range of rapid variation in load.

Select the correct answer using the codes given below:

- (a) 1, 2 and 3 (b) 2 and 3  
(c) 1 and 2 (d) 1 and 3

**125. Ans: (a)**

126. Match List-I and List-II and select the correct answer from the codes:

**List-I**

- A. Voltage drop test  
B. Hopkinson's test  
C. Swinburne's test

D. Retardation test

**List-II**

1. Efficiency
2. Separation of iron and friction losses
3. Open and short circuited armature coils
4. Temperature rise

**Codes**

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

**126. Ans: (c)**

127. In a DC shunt generator working on load, the brushes are moved forward in the direction of rotation, as a result of this, commutation will

- (a) Improve but terminal voltage will fall  
(b) Worsen and terminal voltage will fall  
(c) Improve and terminal voltage will rise  
(d) worsen and terminal voltage will rise

**127. Ans: (a)**



128. What are the slot wedges in a DC machine made of?

- (a) Mild steel                      (b) Silicon steel
- (c) Fibre                              (d) Cast iron

**128. Ans: (c)**

129. A transformer has a percentage resistance of 2% and percentage reactance of 4%. What are its regulations at power factor 0.8 lagging and 0.8 leading respectively?

- (a) 4% and -0.8%
- (b) 3.2% and -1.6%
- (c) 1.6% and -3.2%
- (d) 4.8% and -0.6%

**129. Ans: (a)**

130. In a transformer, zero voltage regulation at full load is

- (a) Not possible
- (b) Possible at unity power factor load
- (c) Possible at leading power factor load
- (d) Possible at lagging power factor load

**130. Ans: (c)**

131. In a transformer, low voltage winding is placed near the core in case of concentric windings so as to

1. Reduce the leakage flux
2. Reduce the insulation requirement

3. Reduce the risk of voltage shock in case of insulation breakdown

4. Reduce the core loss

From these, the correct answer is

- (a) 1, 2, 3                      (b) 2, 3, 4
- (c) 1, 2, 3, 4                (d) 2, 3

**131. Ans: (d)**

132. For a constant load current, transformer maximum efficiency occurs at

- (a) any power factor
- (b) zero power factor leading
- (c) zero power factor lagging
- (d) unity power factor

**132. Ans: (d)**

133. The hysteresis and eddy current losses of a single phase transformer working on 200 V, 50 Hz supply are  $P_h$  and  $P_e$  respectively.

The percentage decrease in these when operated on a 160 V, 40 Hz supply are

- (a) 32, 36                      (b) 20, 36
- (c) 25, 50                      (d) 40, 80

**133. Ans: (b)**

134. Potier reactance of an alternator is almost the same as

- (a) Field winding reactance
- (b) Total armature reactance



(c) Leakage reactance of field winding

(d) Armature leakage reactance

**134. Ans: (d)**

135. A synchronous motor operates at 0.8 pf lagging. If the field current of the motor is continuously increased

1. The power factor decreases upto a certain value of field current and thereafter it increases.
2. The armature current increases upto a certain value of field current and thereafter it decreases.
3. The power factor increases upto a certain value of field current and thereafter it decrease
4. The armature current decreases upto a certain value of field current and thereafter it, increases.

From these, the correct answer is

- (a) 1, 2                      (b) 3, 4  
(c) 1, 3                      (d) 2, 4

**135. Ans: (b)**

136. In wound rotor alternator, reactive power is maximum at a load angle of

- (a)  $90^\circ$                       (b)  $180^\circ$   
(c)  $0^\circ$                       (d)  $45^\circ$

**136. Ans: (c)**

137. Skew of rotor bar eliminates

1. The effect of space harmonics
2. The entire effect of crawling
3. Magnetic noise
4. Vibration due to unequal force developed on rotor

**137. Ans: (d)**

138. It is desirable to eliminate 5<sup>th</sup> harmonic voltage from the phase voltage of an alternator. The coils should be short pitched by, an electrical angle of

- (a)  $30^\circ$                       (b)  $36^\circ$   
(c)  $72^\circ$                       (d)  $18^\circ$

**138. Ans: (b)**

139. The speed of a 3-phase induction motor is controlled by controlling its supply frequency. If the speed of the machine is reduced by reducing the frequency by 50% of the rated frequency; to keep the flux in the machine constant, the motor voltage compared to rated voltage must be

- (a) increased by 25%  
(b) increased by 50%  
(c) decreased by 50%  
(d) decreased by 25%

**139. Ans: (c)**



140. Consider the following statements:

Star delta starter is used in 3-phase induction motor because it

1. Prevents heating of the motor winding
2. Ensures permissible minimum starting current
3. Is regulated by electricity authority
4. Ensures smooth run up to full load

Of these statements

- (a) 1, 2 and 3 are correct
- (b) 2, 3 and 4 are correct
- (c) 1, 3 and 4 are correct
- (d) 1 and 2 are correct

**140. Ans: (d)**

141. The power output of 3-phase induction motor is 15 kW and the corresponding slip is 4%. The rotor ohmic loss will be

- (a) 600 W
- (b) 625 W
- (c) 650 W
- (d) 700 W

**141. Ans: (b)**

142. The starting torque of a 3-phase induction motor varies as

- (a)  $V^2$
- (b)  $V$
- (c)  $V^{1/2}$
- (d)  $1/V$

**142. Ans: (a)**

143. Consider the following statements:

In a 3-phase induction motor connected to a 3-phase supply; if one of the lines suddenly gets disconnected, then the

1. Motor will come to a standstill
2. Motor will continue to run at the same speed with line current unchanged
3. Motor will continue to run at a slightly speed with increase in the line current
4. Rotor current will have both of  $sf$  and  $(2-s)f$  component frequencies where  $s$  is the slip and  $f$  is the supply frequency

Of these statements:

- (a) 1 and 4 are correct
- (b) 1 and 2 are correct
- (c) 3 and 4 are correct
- (d) 2 and 3 are correct

**143. Ans: (c)**

144. For successful parallel operation of two single phase transformer, the essential condition is that their

- (a) Percentage impedances should be equal
- (b) Turns ratio should be exactly equal
- (c) Polarities must be properly connected
- (d) kVA ratings should be equal

**144. Ans: (c)**

145. For eliminating  $n^{\text{th}}$  harmonic from the emf generated in the phase of 3-phase alternator, the chording angle should be



- (a)  $n \times \text{full pitch}$       (b)  $\frac{1}{n} \times \text{full pitch}$   
(c)  $\frac{2}{n} \times \text{full pitch}$       (d)  $\frac{3}{n} \times \text{full pitch}$

**145. Ans: (b)**

146. Consider the following statements:

1. A grid connected induction generator always supplies leading reactive power to the bus
2. An overexcited synchronous motor draws current at a lagging power factor
3. An underexcited synchronous generator connected to an infinite bus works at a leading power factor
4. The torque angle of a synchronous machine is the angle between the excitation voltage and the gap voltage

Of these statements

- (a) 1 and 2 are correct  
(b) 3 and 4 are correct  
(c) 1, 3 and 4 are correct  
(d) 1, 2, 3 and 4 are correct

**146. Ans: (c)**

147. The approximate value of efficiency of a three phase induction motor running at a slip 's' is given by

- (a)  $\frac{1}{1+s}$       (b)  $\frac{s}{1+s}$

- (c)  $(1-s)$       (d)  $\frac{s}{1-s}$

**147. Ans: (c)**

148. For C coils and P poles, the distance between the coils connected by an equalizer ring is

- (a)  $\frac{C}{P}$       (b)  $\frac{C}{2}$   
(c)  $\frac{2C}{P}$       (d)  $\frac{C}{2P}$

**148. Ans: (c)**

149. If the discharge is  $1 \text{ m}^3/\text{s}$  and head of the water is 1 m, then the power generated by the alternator in one hour (assume 100% efficiency of generator and turbine) will be

- (a) 10 kW      (b)  $\frac{73}{75}$  kW  
(c)  $\frac{746}{75}$  kW      (d) 100 kW

**149. Ans: (c)**

150. Which one of the following is employed as a moderator by CANDU type of slow thermal nuclear reactors?

- (a) Water      (b) Heavy water  
(c) Graphite      (d) Beryllium

**150. Ans: (b)**