APSPDCL-2012 QUESTION PAPER

1. In two wattmeter method of 3-phase power measurements, when the power factor is 0.5

(A) the readings of the two wattmeters are equal and positive

(B) the readings of the two wattmeters are equal and opposite

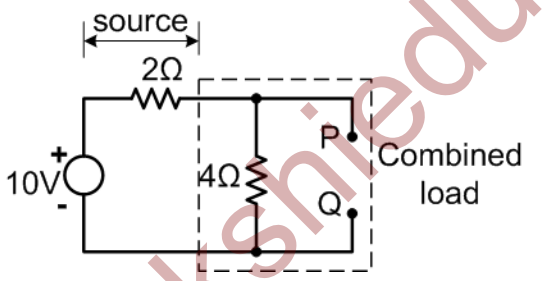
(C) the total power is measured by only 1 wattmeter

(D) the readings of the 2 wattmeters are not equal and positive

2. The readings of the wattmeter connected to measure the reactive power in a 3-phase circuit is given by zero when the line voltage is 400 Volts and the line current is 15 Amps. Then the power factor of the circuit is:

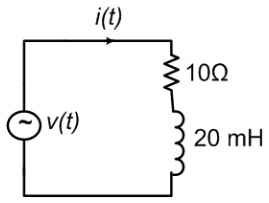
(A) 0 (B) 0.6 (C) 0.8 (D) unity

3. The resistance which should be connected between terminals P and Q for maximum transfer of power from source to the combined load is



(A) 0 Ω (B) 2 Ω (C) 4 Ω (D) infinity ohms

4. In the given circuit given below the current is i(t) = 4sin(500t) Amps. The applied voltage v(t) in volts is



a. 40sin(500t) b. 56.56sin(500t+45^o) c. 40cos(500t) d. 56.56cos(500t+45^o)

5. In a two port network open circuit impedance parameters express

a. V_1,V_2 in terms of I_1,I_2 b. I_1,I_2 in terms of V_1,V_2

c. V_1,I_1 in terms of V_2,I_2 d. V_1,I_2 in terms of V_2,I_1

6. When two 2-port networks are connected in parallel it is convenient to use

a. O.C impedance parameters b. S.C admittance parameters

c. transmission parameters d. inverse hybrid parameters

7. On increasing the Q-factor of a coil

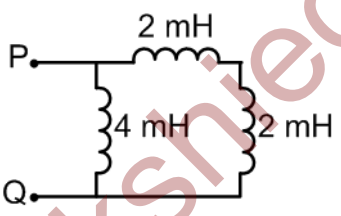
a. its power factor increases b. its power factor decreases

c. its power factor remains unaltered d. its power may increase or decrease

8. The value of current at resonance in a series RLC circuit is affected by the value of

a. R b. L c. R, L and C d. C

9. The equivalent inductance of the below given circuit at the terminals P-Q is



a. 4 H b. 2 H c. 6 H d. 8 H

10. A capacitor C at time $t=0^+$ with initial charge Q_0 acts as

a. S.C b. O.C c. current source d. voltage source

11. An electrical network with 8 independent nodes will have

a. 4 nodal equations b. 8 nodal equations c. 7 nodal equations d. 9 nodal equations

12. Impedance $Z_1 = 20\angle 50^o\ \Omega$ and $Z_2 = 10\angle 30^o$. Then $\frac{Z_1}{Z_2}$ is

a. $2\angle 80^o\ \Omega$ b. $2\angle 50^o\ \Omega$ c. $2\angle 30^o\ \Omega$ d. $2\angle 20^o\ \Omega$

13. Transformers used in conjunction with measuring instruments for measurement of high voltage and high current are called

a. transformer meters b. power transformer

c. pulse transformers d. instrument transformer

14. Swamping resistance is used in moving coil instruments to reduce error due to

a. thermal EMF b. temperature

(C) power taken by instrument c. galvanometer sensitivity

15. It is required to measure pf of an electrical load. No power factor meter is available. The following combination is used to determine pf

a. a wattmeter b. a voltmeter and ammeter

c. a voltmeter , ammeter and wattmeter d. a KWH meter

16. The dielectric loss of a capacitor can be measured by

a. Wein bridge b. Owen bridge c. Schering bridge d. Maxwell bridge

17. One of the following is an active transducer

a. Strain guage b. Selsyn c. Photo voltaic cells d. Photo emissive cell

18. The breakaway point of the root from the real axis for a closed loop system with loop gain

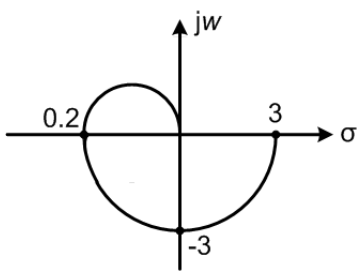
$$G(s)H(s) = \frac{K(S+10)}{(S+2)(s+5)}$$

a. between -10 and -∞ b. at - ∞ c. between -2 and origin d. between -2 and -5

19. A system has 12 poles and 2 zeros. Its high frequency asymptote in its magnitude polt will have a slope of

a. -60dB/dec b. -120dB/dec c. -200dB/dec d. -240dB/dec

20. The Nyquist plot of a transfer function is shown in the figure. The gain margin is



a. 5 b. 8 c. 10 d. 15

21. If the gain of the open loop system is doubled the gain margin

a. gets 1/4th b. gets halved c. gets doubled d. is not affected

22. The maximum phase shift that can be obtained by using a lead compensator with transfer function $G(s) = \frac{4(1+0.15\,s)}{(1+0.05\,s)}$ is equal to

a. 15^o b. 30^o c. 45^o d. 60^o

23. In monostable multivibrator using 555 timer, the time delay is 100 msec, timing resistor is 100 kΩ, the value of timing capacitor is

a. 9 mF b. 0.9μF c. 9F d. 1.8μF

24. The ideal operational amplifier has

a. $R_i = \infty$, $R_0 = \infty$ b. $R_i = 0$, $R_O = \infty$ c. $R_i = \infty$, $R_O = 0$ d. $R_i = 0$, $R_o = 0$

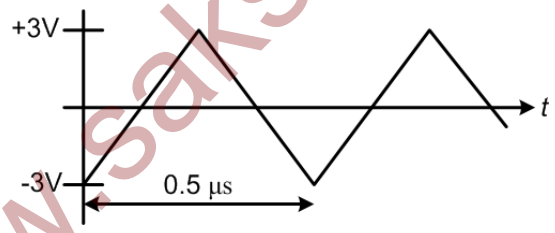
25. In the LM741, LM stands for

a. Motorola b. RCA c. Texas instruments d. National semiconductor

26. ADC preferred for digital panel meters and multimeters

a. Flash ADC b. Servo ADC c. Successive approximation ADC d. Dual-slope ADC

27. The output of an op-amp voltage follower is a triangular wave as shown in fig. for a square wave input of frequency 2MHz and 8V peak amplitude. The slew rate of the op amp is



a. 6 μs b. 8 V/μs c. 14 V/μs d. 14 μs

28. Match the following with parts in list-I with machines in list-II

list-I	list-II
p. damper bars	1.dc machine
q. rotor bars	2.synchronous machine
r. commutator	3.induction machine

a. p-1 q-2 r-3 b. p-3 q-1 r-2

c. p-2 q-3 r-1 d. p-3 q-2 r-1

29. The following is the apparent disadvantage of auto transformer as compared to two-winding transformer

a. power rating is greater b. efficiency is low

c. conductive isolation is not present d. voltage regulation is low

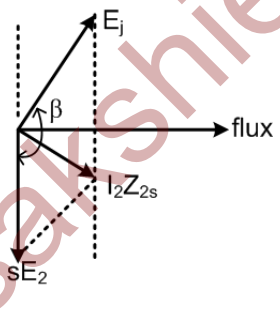
30. A 230/2300 V, Y/Δ 3-phase transformer is rated at 230 KVA its rated secondary current/phase is

a. 33.33 A b. 133.33 A c. 66.66 A d. 30.33 A

31. A 3-phase induction motor is run in counter colckwise direction as motor with reverse phase sequence of supply. The range of slip variation for this mode is

a. $0 < s < 1$ b. $2 < s < 1$ c. $0 < s < -1$ d. $3 < s < 2$

32. The following is phasor diagram of rotor variables of 3-phase induction motor with E_j as injected EMF. This provides



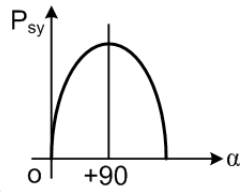
a. sub synchronous speed without pf improvement

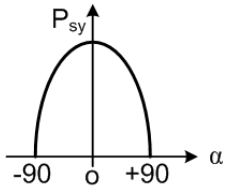
b. super synchronous speed without pf improvement

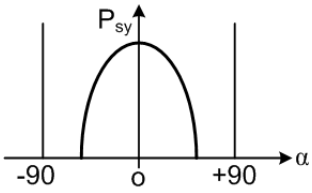
c. sub synchronous speed with pf improvement

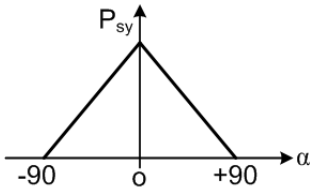
d. super synchronous speed with pf improvement

33. The variation of synchronising power for variation of power angle for a salient pole machine will be

a. 

b. 

c. 

d. 

34. If the supply frequency and voltage apply to a synchronous motor are both reduced to fractions *Kf*, *K*V the motor becomes

a. *K* times of P_{max} at '*f* ' b. $\frac{1}{K}$ times of P_{max} at '*f* '

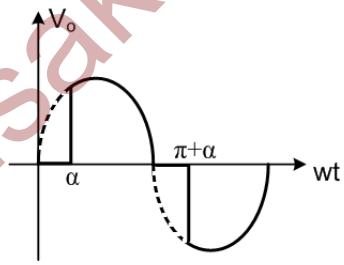
c. K^2 times of P_{max} at '*f* ' d. $\frac{1}{K^2}$ times of P_{max} at '*f* '

35. For a salient pole synchronous machine, when the speed becomes super synchronous, during hunting, the damper bars develop

a. synchronous motor torque b. DC motor torque

c. induction motor torque d. induction generator torque

36. The output waveform given below can be obtained from



a. controlled rectifier b. AC chopper

c. DC chopper d. DIAC -TRIAC face controlled circuit

37. The candle power of a lamp placed normal to a working plane is 30 C.P. Find the distance if the illumination is 15 lux;

a. 2 m b. 0.5 m c. 1.414 m d. 0.707 m

38. The luminous intensity of a lamp is 750 C.P then the flux is given out is

a. $\frac{750}{\pi}$ lumen b. 750π lumen c. $\frac{750}{2\pi}$ lumen d. 1500π lumen

39. Furnaces used for electric crematorium are of type

a. resistance heating b. induction heating c. dielectric heating d. arc heating

40. For the same rating the amount of radiant heat produced is least in

a. florescent lamp b. filament lamp c. sodium vapour lamp d. mercury vapour lamp

41. In electric traction , the friction at the track is proportional to

(A) $\frac{1}{\text{speed}}$ (B) $\frac{1}{(\text{speed})^2}$ (C) speed (D) speed^2

42. Polar form of (1-a^2+a) is

(A) $1.732\angle 150^o$ (B) $2\angle -60^o$ (C) $1.732\angle -150^o$ (D) $2\angle 60^o$

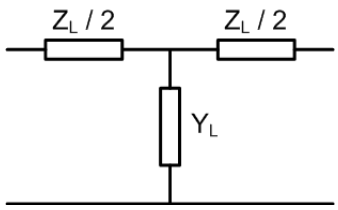
43. The number of strands on 3-layer cable is

(A) 24 (B) 7 (C) 37 (D) 19

44. Given maximum power transmitter through a line P_{max}, the with 60% of series capacitor compensation the maximum power transfer becomes

A. $\frac{P_{max}}{0.4}$ B. $0.4\ P_{max}$ C. $\frac{P_{max}}{0.6}$ (D) $0.6\ P_{max}$

45. In A, B, C, D parameters, $Z_L/2$ in the T- equivalent shown can be represented as



(A) $(A-1)C$ (B) $(A-1)B$ (C) $(A-1)/C$ (D) $B/(A-1)$

46. An industrial consumer has a load of 1500 kw at 0.8 pf lag. for 12 hrs and 1000 kw at Upf for 12 hrs during a day. The daily load factor of the consumer is

(A) 0.666 (B) 0.833 (C) 0.8 (D) 1.25

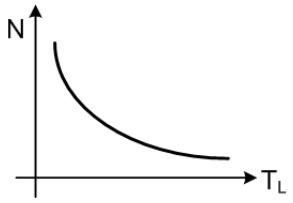
47. In a power system with negligible resistance , the fault current at a point is 8.0pu. the series reactance to be connected at the fault point to reduce the short ckt current to 5.0pu is

(A) 3.0 pu (B) 0.25 pu (C) 0.075 pu (D) 0.125 pu

48. Merz-price protection is most suitable for

(A) transformers (B) generators (C) transmission lines (D) load

49. The load torque versus speed characteristic of an industrial load is given below



The motor suitable for the above load is

(A) DC shunt motor (B) 3-phase induction motor (C) DC series motor (D) capacitor motor

50. Between 2 supports , due to sag , the conductor takes the shape of

(A) parabola (B) hyperbola (C) catenary (D) semi circle

51. In suspension type insulator , the potential drop is maximum across

(A) top disc (B) centre disc (C) lowest disc (D) depends on number of discs of the string

52. The chances of occurrence of corona is maximum during

a. dry weather b. humid weather c. winter d. hot summer

53. Equal area criterion can be applied to

a. multi machine system

b. to any system with any number of loads and generators

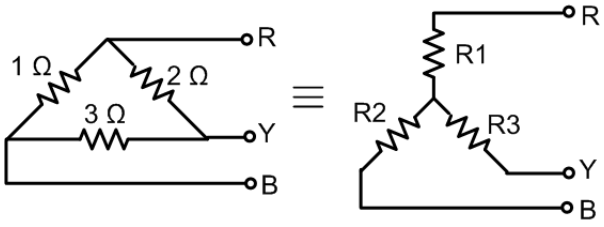
c. single machine connected to infinite bus system

d. system with induction machines

54. An ideal current source has zero

a. internal conductance b. internal resistance c. voltage on no load d. ripple

55. 3-resistances of 1Ω ,2Ω and 3Ω are connected in delta. These resistances of are to be replaced by star connection as shown in the fig below, maintaining the same terminal conditions



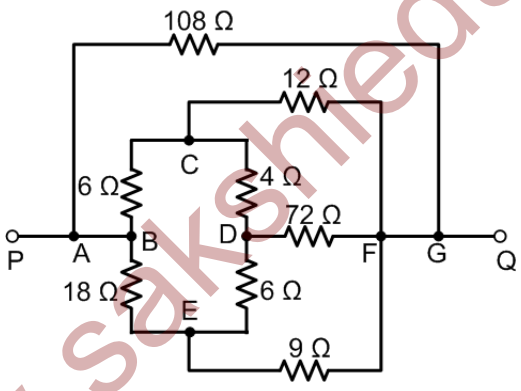
The value of highest resistance in start will be

a. 1/4Ω b.1/3Ω c. 1/2Ω d.1Ω

56. Superposition theorem requires as many circuitss to be solved as there are

a. sources b. nodes c. source+node d. source+nodes+meshes

57.



The ckt shown above can be easily solved by

a. series parallel n/w b. start mesh theorem c. thevenins theoerm d. reciprocity theorem

58. At half power frequencies, the current in the RLC series ckt is

a. 1/2 × current at resonance b. $1/\sqrt{2}$ × current at resonance

c. 1/4 × current at resonance d. $1/\sqrt{3}$ × current at resonance

58. In RLC ckts , the current at resonance is

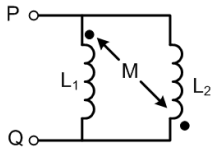
a. maximum in parallel resonance and minimum in series resonance

b. maximum in series resonance and minimum in parallel resonance

c. maximum in both series and parallel resonance

d. minimum in both series and parallel resonance

60. The equivalent inductance of the circuit between terminals P and Q is equal to



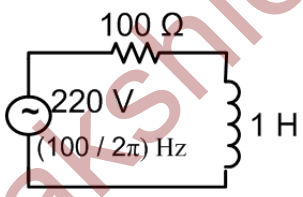
(A) $\frac{L_1 + L_2 + 2M}{L_1L_2 - M^2}$

(B) $\frac{L_1 + L_2 - 2M}{L_1L_2 - M^2}$

(C) $\frac{L_1 + L_2 + 2M}{L_1L_2 + M^2}$

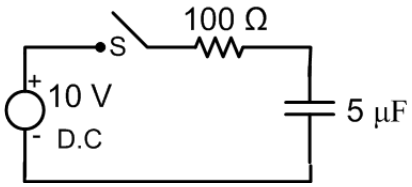
(D) $\frac{L_1 + L_2 - 2M}{L_1L_2 + M^2}$

61. In the given circuit below, the voltage across the inductor is



(A) $\frac{220}{\sqrt{2}}$ V (B) $220\sqrt{2}$ V (C) 220 V (D) 110 V

62. In the given RC circuit, the current reaches its maximum value



(A) after 50 μ.sec of turning on the switch S

(B) after 100 μ.sec of turning on the switch S

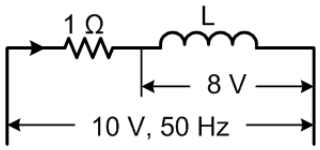
(C) after 1000 μ.sec of turning on the switch S

(D) immediately after turning on the switch S

63. The time constant of a series RL circuit is given by

(A) L^2R (B) LR^2 (C) LR (D) $\frac{L}{R}$

64. For the circuit given below, the current through 1ohm resistor will be



(A) 2 amps (B) 4 amps (C) 6 amps (D) 8 amps

65. Admittance is the reciprocal of

(A) impedance (B) inductance (C) suseptance (D) reactance

66. The power expression in 3-phase circut in terms of line voltage V_L the line current I_L and power factor of the load is $\sqrt{3}\, V_L I_L \cos\phi$ where ϕ is the angle between

(A) line voltage and line current (B) line voltage and phase current

(C) phase voltage and line current (D) phase voltage and phase current

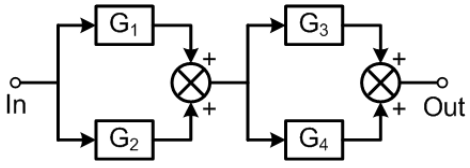
67. The open loop transfer function of a unity feedback control system is given by

$$G(s) = \frac{K}{s(s+1)}$$

If the gain K is increased to infinity then the damping ratio will tend to become

(A) $1/\sqrt{2}$ (B) 1 (C) 0 (D) infinity

68. The overall gain for the block diagram shown below is given by



(A) $G_1G_2G_3G_4$ (B) $G_1+G_2+G_3+G_4$

(C) $G_1G_2+G_3G_4$ (D) $(G_1+G_2)(G_3+G_4)$

69. Which of the following systems does have the tendency to oscillate?

(A) closed loop system (B) open loop system (C) either (A) or (B) (D) both (A) and (B)

70. The feedback system with characteristic equation $s^4+2Ks^3+s^2+5s+5=0$

a. unstable for all values of K b. stable for all values of K

c. stable for positive values of K d. stable for zero value of K

71. For making an unstable system as stable system

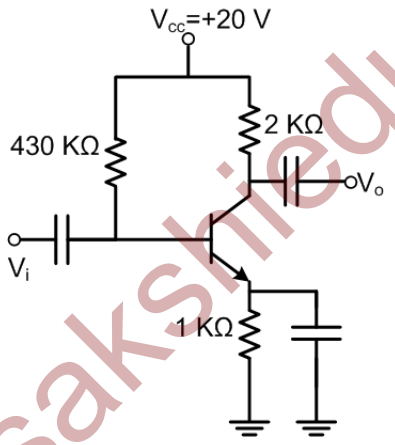
a. gain of the system should be decreased

b. gain of the system should be increased

c. the number of zeros of the loop transfer function should be increased

d. the number of poles of the loop transfer function should be increased

72. For the BJT shown in figure $V_{BE} = 0.7$ V, $\beta = 100$. Find I_B



a. 36.35 µA b. 19.3 mA c. 38.6 mA d. 57 µA

73. The value of transconductance at a bias voltage of 0 V for the JEFET which is having I_{DSS} = 0.9 mA and V_P = -3V is

(A) 6 mV (B) 6 mS (C) 27 S (D) 3 mS

74. The efficiency of a class B amplifier for a supply voltage Vcc = 24 V with peak to peak output of 6 V is

(A) 4% (B) 48% (C) 19.6% (D) 39.2%

75. The ripple voltage of a FWR with a 100 µF filter capacitor connected to a load of 50 mA is

(A) 2.4 V (B) 1.2 V (C) 4.4 V (D) 6.6 V

76. The timing resistor is 10 kΩ and timing capacitor is 200 pF for a 565 PLL. The free running frequency is

(A) 500 KHz (B) 350 KHz (C) 250 KHz (D) 150 KHz

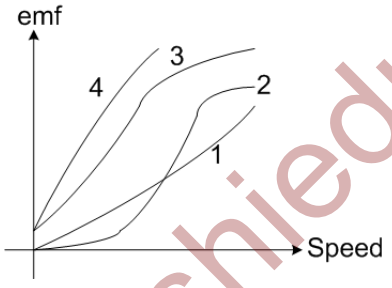
77. A DC motor is driving a load that requires constant output power. The PU value of torque with its field current reduced to half would be (consider rated quantities as 1.0 PU)

a. 0.5 pu b. 1.0 pu c. 2 pu d. 1.5 pu

78. A 2 -pole wave wound DC generator has 120 conductors in each parallel path of its armature. If it is driven at 1200 rpm and excited to have 0.02wb/pole, the induced emf would be

a. 48V b. 96V c. 24V d. 124V

79. The variation of open circuit emf of a separate excited generator when I_f =constant and variable speed would be



a. 1 b. 2 c. 3 d. 4

80. A 220V/12-0-12 V transformer has an emf/turn of 1V .The number of turns on secondary would be

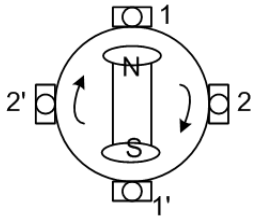
a.12 with centre tapped b. 220 with centre tapped

c. 24 with no centre tapped d. 24 with centre tapped

81. An ideal transformer has N_1=100 turns N_2=200 turns with a mutual flux of $\phi_m(t) = -0.05(t^2-2t)$. The induced emf of secondary in volts is

a. -5(t-1) b. -10(t-1) c.-5(t^2-1) d. -20(t-1)

82. Four conductors in a stationary armature (alternator) are shown as 1, 1', 2, 2' for given direction of rotation of router the direction of induced emf (at the instant shown) in the conductors respectively.



Conductor	1	1'	2	2'
a.	⊕	⊙	O	O
b.	O	O	⊕	⊙
c.	⊕	⊙	⊕	⊙
d.	⊙	⊕	⊙	⊕

83. A synchronous machine has X_s=1pu and operates at V=1pu when its emf is 1.5pu with load angle 0^O_e, current has (0+j0.5), the mode of operation is

a. generator with lagging pf b. generator with leading pf

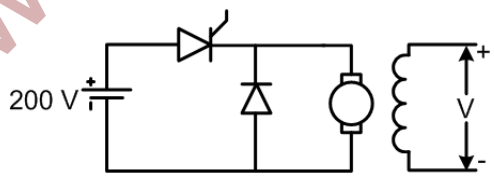
c. motor with lagging pf d. motor with leading pf

84. A 3- phase, 16 pole, 108 slot alternator will have the following phase grouping in each phase with 60^o phase spread

a. 2,2,2,2 coils in basic unit of 4 poles b. 3,2,2,2 coils in basic unit of 4 poles

c. 3,2,2,2 coils in basic unit of 16 poles d. 2,2,2,2 coils in basic unit of 8 poles

85. For the power circuit given below, SCR is operated at 1KHz with T_{ON} of 0.5msec

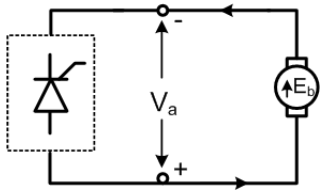


motor ratings: 200V(dc), 1000 rpm, 10A

Neglecting armature resistance the speed of motor at given duty cycle (Tm = constant)

a. 1000rpm b. 500rpm c. 1500rpm d. 750rpm

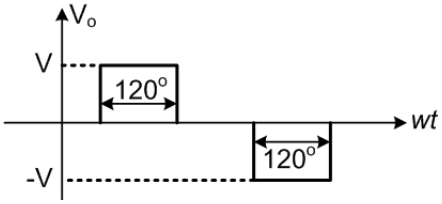
86. A converter is feeding a dc machine as shown below:



The mode of operation of machine is

a. motoring b. regenerating c. plugging d. rheostatic braking

87. The output of a single phase inverted bridge is as given below:



In the above output voltage

a. 5^{th} and 7^{th} harmonics will be absent b. 3^{rd}, 5^{th} and 7^{th} harmonics will be absent

c. 3^{rd}, 9^{th}, 15^{th} harmonics will be absent d. 3^{rd} and 7^{th} harmonics will be absent

88. A 4-pole turbo generator rated 500MVA, 22KV has it angular acceleration 437.8ele.degrees/sec^2 ; It is equivalent to

a. 1500 rpm/sec b. 36.48 rpm/sec c. 145.92rpm/sec d. 72.97 rpm/sec

89. A 50 Hz generator having H=6MJ/MVA is connected to synchronous motor having H=4MJ/MVA through a n/w of reactances. The generator is delivering power of 1.0pu to the motor which reduces to 0.6pu when fault occurs. the angular acceleration in ele.degrees/sec^2 is

a. 360 b.180 c. 1500 d.1800

90. Synchronizing power co-efficient can be written as

a. $P_\alpha \cos \delta_O$ b. $P_{max} \cos \delta_O$ c. $P_e \cos \delta_O$ d. $P_\alpha \sin \delta_O$

91. The relay most likely to operate during power swings is

a. reactance relay b. impedance relay c. Mho relay d. Bucholtz's relay

92. An OCB is rated 1500 A, 200 MVA, 33 kV. Its making in kA is

a. 51.51 b. 35 c.89.25 d.154.54

93. The rating of lightning arrester used for 220 kV, 3 phase system is

a. 220 kV, 10 kA b.220 kV, 5 kA c.198 kV, 10 kA d. 198 kV, 2 kA

94. A generation system has maximum demand of 30 MW, a load factor of 0.6 and plant capacity factor 0.48; The reverse capacity of the plant is

a. 37.5 MW b.7.5 MW c.19.5 MW d.12 MW

95. A transformer of 10MVA, 33KV has reactance 0.1pu. On 20MVA, 11kV the new pu value is

a.0.45 b.1.8 c.1.2 d.0.6

96. In which type of fault, zero sequence currents are absent?

a. L-L b. L-G c. L-L-G d. L-L-L-G

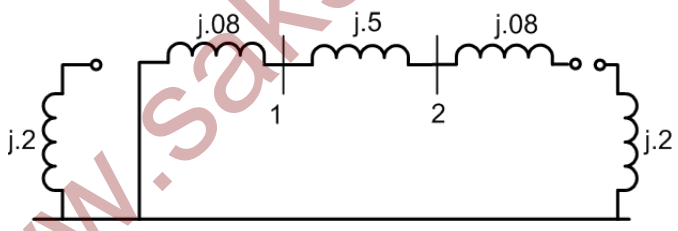
97. In a single machine connected to infinite bus bar system alternator voltage is 1.5pu and its reactance is 1.0pu are connected through a line reactance of 0.3pu. the maximum steady state power transfer is

a. 1.154pu b. 5.0pu c. 1.5pu d. 0.76pu

98. Value of acceleration factor used in Gauss-seidal method in load flow studies is

a. 1.59 b. 1.66 c. 1.0 d. 1.6

99. The Z-bus of the following system of impedance is



a. $\begin{bmatrix} j0.08 & j0.5 \\ j0.5 & j0.58 \end{bmatrix}$ b. $\begin{bmatrix} j0.08 & j0.08 \\ j0.08 & j0.58 \end{bmatrix}$ c. $\begin{bmatrix} j0.08 & -j0.5 \\ -j0.5 & j0.58 \end{bmatrix}$ d. $\begin{bmatrix} j0.08 & -j0.08 \\ -j0.08 & j0.58 \end{bmatrix}$

100. An over current relay having a current setting of 125% is connected to a supply circuit through a current transformer of ratio 400/5. The pick-up value will be

a. 6.25A b. 500A c. 100A d. 80A