**1.** An 8-pole alternator runs at 750 r.p.m. and supplies power to a 6-pole induction motor which has a full-load slip of 3%. The full-load speed of the motor is

(A) 1050 r.p.m.

(B) 970 r.p.m.

(C) 960 r.p.m.

(D) 1250 r.p.m.

**2.** The input to a 3-phase induction motor is 50 kW. The stator losses amount 800 W. The rotor copper loss is (slip = 3%)

(A) 49.2 kW

(B) 4.92 kW

(C) 1.476 kW

(D) 7.28 kW

**3.** The reactance of the rotor circuit of a 3-phase induction motor is maximum at

(A) no-load

(B) full-load

(C) half full-load

(D) starting.

**4.** The magnetizing current drawn by a 3-phase induction motor is about…….. of full–load stator current.

(A) 5%

(B) 10 to 15 %

(C) 15 to 20 %

(D) 30 to 50 %.

**5.** In a squirrel cage rotor, the bars are not placed parallel to the shaft but are skewed to have

(A) greater mechanical strength

(B) less rotor losses

(C) uniform torque

(D) no harmonics

**6.** Turbo-alternators have rotors of

(A) small diameter and long axial length

(B) large diameter and long axial length

(C) large diameter and small axial length

(D) same diameter and axial length.

**7.** In an alternator, the effect of armature reaction is minimum at power factor of

(A) 0.866 lagging

(B) 0.866 leading

(C) 0 lagging

(D) Unity.

**8.** The voltage regulation of an alternator for a p.f. 0.8 lagging is ……..… that at unity p.f.

(A) greater than

(B) smaller (with positive sign) than

(C) same as

(D) smaller (with negative sign) than

**9.** A 3-phase, 16-pole alternator has a star–connected winding with 144 slots and 10 conductors per slot. The flux per pole is 30 mWb sinusoidally distributed and the speed is 375 r.p.m. The frequency of generated e.mf. is

(A) 25 Hz

(B) 50 Hz

(C) 60 Hz

(D) 200 Hz

**10.** A 3-phase, 16-pole alternator has a star-connected winding with 144 slots and 10 conductors per slot. The flux per pole is 30 mWb sinusoidally distributed and the speed is 375 rpm. The line emf is

(A) 1120 V

(B) 3750 V

(C) 1875 V

(D) 2770 V

**11.** The speed of a synchronous motor can be changed by varying

(A) mechanical load

(B) field excitation

(C) supply frequency

(D) voltage magnitude

**12.** Negative voltage regulation of transmission line means (subscript R for receiving end and subscript S for sending end)

(A) $V_R = V_S$

(B) $V_R < V_S$

(C) $V_R > V_S$

(D) $V_R = \sqrt{V_S}$

**13.** The insulating material most commonly used for power cable is

(A) PVC

(B) Paper

(C) Rubber

(D) Wood

**14.** A 200 kVA transformer has an iron loss of 1 kW and full load copper loss of 2 kW. Its load kVA corresponding to maximum efficiency is

(A) 70.6

(B) 100

(C) 141.4

(D) 200

**15.** During short circuit test, the iron loss of a transformer is negligible because

(A) the entire input is only sufficient to meet copper loss only

(B) flux produced is a small fraction of normal flux

(C) iron core becomes fully saturated

(D) supply frequency is held constant.

**16.** A 1000 kVA transformer has a reactance of 5%. Its reactance at 2000 kVA base is

(A) 5 %

(B) 2.5 %

(C) 20 %

(D) 10 %

**17.** For the interruption of high voltage and low current, the circuit breaker (CB) preferred is

(A) vacuum CB

(B) air blast CB

(C) bulk oil CB

(D) minimum oil CB

**18.** Stepped distance protection scheme is used for the protection of

(A) alternators

(B) transformers

(C) bus bars

(D) transmission line

**19.** A single phase induction motor employs …. rotor.

(A) squirrel cage
(B) wound
(C) either squirrel cage or wound
(D) combination of wound and squirrel cage

**20.** The main winding and starting winding of a single-phase induction motor are connected across the supply as in

(A) series
(B) parallel
(C) series–parallel
(D) any combination

**21.** For inrush current issue, harmonic restraint is used with

(A) distance relay
(B) Buchholz relay
(C) overcurrent relay
(D) differential relay

**22.** $SF_6$ circuit breaker has excellent insulating strength because of its

(A) high reaction with air
(B) high electron affinity
(C) turbulence in the medium
(D) low reaction with nitrogen

**23.** The average output voltage(Vdc) of the full wave diode bridge rectifier is

(A) $V_m/2$
(B) $2V_m/\pi$
(C) $3V_m/\pi$
(D) $4V_m/\pi$

**24.** A half controlled single phase bridge rectifier is supplying an R–L load. It is operated at a firing angle ($\alpha$) and load current is continuous. The fraction of cycle that the free wheeling diode conducts is

(A) 1/2
(B) $(1-\frac{\alpha}{\pi})$
(C) $\frac{\alpha}{2\pi}$
(D) $\frac{\alpha}{\pi}$

**25.** An IGBT has three terminals called

(A) Collector, Emitter and Base

(B) Drain, Source and Base

(C) Drain, Source and Gate

(D) Collector, Emitter and Gate

**26.** The typical ratio of latching current to holding current in a 20A thyristor is

(A) 5.0

(B) 2.0

(C) 1.0

(D) 0.5

**27.** A single phase full-wave half controlled bridge converter feeds an inductive load. The two SCRs in the converter are connected to a common DC bus. The converter has to have a free wheeling diode

(A) because the converter inherently does not provide for free wheeling.

(B) because the converter does not provide for free wheeling for high values of trigger–angles.

(C) or else the free wheeling action of the converter will cause shorting of the AC supply.

(D) or else if a gate pulse to one of the SCRs is missed, it will subsequently cause a high load current in the other SCR.

**28.** A single phase fully controlled thyristor bridge ac-dc converter is operating at a firing angle of 25°, and an overlap angle 10° with constant dc output current of 20A. The fundamental power factor ( displacement factor) at input ac mains is

(A) 0.78

(B) 0.827

(C) 0.866

(D) 0.9

**29.** In thyristor, holding current is

(A) more than the latching current

(B) less than the latching current

(C) equal to latching current

(D) none of the above

**30.** During forward blocking state, a thyristor is associated with

(A) large current and low voltage

(B) low current and large voltage

(C) medium current and large voltage

(D) None of the above

**31.** Once SCR starts conducting a forward current, its gate losses control over

(A) anode circuit voltage only

(B) anode circuit current only

(C) anode circuit voltage and current

(D) none of the above

**32.** The function of Snubber circuit connected across the SCR is to

(A) Suppress $dv/dt$

(B) Increase $dv/dt$

(C) Decrease $dv/dt$

(D) Decrease $di/dt$

**33.** A UJT exhibits negative resistance region

(A) Before the break point

(B) Between peak and valley point

(C) After the valley point

(D) Both before the break point and after the valley point

**34.** For dynamic equalizing circuit used for series connected SCRs, the choice of $C$ is based on

(A) Reverse recovery characteristics

(B) Turn-on characteristics

(C) Turn-off characteristics

(D) Rise time characteristics

**35.** A resistor connected across the gate and cathode of an SCR in a circuit increases its

(A) $dv/dt$ rating

(B) Holding current

(C) Noise Immunity

(D) Turn-off time

**36.** Which of the following will not cause permanent damage of an SCR ?

(A) High current

(B) High rate of rise of current

(C) High temperature rise

(D) High rate of rise of voltage

**37.** An SCR has an anode supply of sine voltage 200V rms, 50 Hz applied through a 100Ω resistor and fired at an angle of 60°. Assuming no voltage drop , the rms value of the output voltage is

(A) 89.7 V

(B) 126.7 V

(C) 166.7 V

(D) 288.28 V

**38.** In a 3-phase semi-converter, for firing angle less than or equal to 60°, each thyristor and diode conduct, respectively for

(A) 60°, 60°

(B) 90°, 30°

(C) 120°, 120°

(D) None of these

**39.** In a 3-phase full converter, if load current is I and ripple free then average thyristor current is

(A) (1/2)I

(B) (1/3)I

(C) (1/4)I

(D) I

**40.** If $N_s$ is the speed of rotating flux and N the speed of the rotor, then the rate at which the flux cuts the rotor conductors in induction motor is directly proportional to

(A) $N_s$

(B) N

(C) $N_s - N$

(D) zero

**41.** For higher efficiency of 3-phase induction motor, the slip should be

(A) large

(B) very large

(C) as low as possible

(D) unity

**42.** If the supply voltage of a 3-phase induction motor is increased two times, then torque is

(A) increased two times

(B) decreased two times

(C) increased four times

(D) decreased four times

**43.** In 3-phase induction motor the number of poles

(A) of rotor and stator are always same.

(B) of wound rotor is more than its stator.

(C) of cage rotor is more than its stator.

(D) of rotor is always 4.

**44.** If the copper loss in a 3-phase induction motor is 1.0 kW and slip is 2%, the air-gap power is

(A) 5 kW

(B) 2 kW

(C) 50 kW

(D) 100 kW

**45.** The number of cycles generated in a 6-pole alternator in one revolution is

(A) 3

(B) 6

(C) 50

(D) none of the above

**46.** When load on an alternator is increased, the terminal voltage increases if the load p.f. is

(A) unity

(B) lagging

(C) leading

(D) zero

**47.** The voltages of two buses (bus – 1 and 2) connected by a line are given as $0.97 \angle -10^0$ and $1.0 \angle 0^0$ pu respectively. The active power will flow from

(A) bus–1 to bus –2

(B) bus–2 to bus–1

(C) no power flow in the line

(D) cannot be decided for the case

**48.** A thyrite type lightning arrestor

(A) blocks the surge voltage appearing in a line

(B) absorbs the surge voltage appearing in a line

(C) offers a low resistance path to the surge appearing in line

(D) returns the surge back to the source

**49.** Transmission lines should be transposed to

(A) reduce copper loss

(B) reduce skin effect

(C) prevent interference with neighbouring telephone lines

(D) prevent short-circuit between any two lines

**50.** When a line-to-ground fault occurs, the current in a faulted phase is 100 A. The zero sequence current in that phase will be

(A) zero

(B) 33.3 A

(C) 66.6 A

(D) 100 A

**51.** Protection scheme used for detection of loss of excitation of a very large generating unit feeding power into a grid employs

(A) undervoltage relay

(B) offset mho relay

(C) underfrequency relay

(D) percentage differential relay

**52.** A single line to ground fault occurs on a three-phase isolated neutral system with a line to neutral voltage of $V_1$ kV. The potentials on the healthy phases rise to a value equal to

(A) $\sqrt{2}\ V_1$ kV

(B) $\sqrt{3}\ V_1$ kV

(C) $3\ V_1$ kV

(D) $1/\sqrt{3}\ V_1$ kV

**53.** The change of load on a synchronous motor will not result in the change of

(A) armature current

(B) speed

(C) torque angle

(D) power factor

**54.** The full-load slip of a synchronous motor is

(A) 5%

(B) 1%

(C) 2%

(D) zero

**55.** The synchronous reactance of an alternator is due to

(A) leakage flux only

(B) DC field excitation

(C) armature reaction and leakage flux

(D) stator winding

**56.** If span length is doubled with no change in other factors, the sag of the line will become

(A) 0.5 times

(B) 2 times

(C) 8 times

(D) 4 times

**57.** Corona effect can be reduced by

(A) increasing conductor size

(B) decreasing conductor size

(C) decreasing conductor space

(D) none of the above

**58.** The current in a radial distributor without shunt compensation will be maximum at the

(A) source end of the distributor

(B) midpoint of the distributor

(C) endpoint of the distributor

(D) none of the above

**59.** Sheaths are used in cables to

(A) provide proper insulation

(B) prevent moisture entering

(C) provide mechanical strength

(D) none of the above

**60.** A certain cable has an insulation of relative permittivity 2. If the insulation is replaced by one of relative permittivity 4, then capacitance of cable becomes

(A) one - half

(B) 4 times

(C) 2 times

(D) 3 times

**61.** In a 3-phase , four-wire AC system, unbalancing is caused due to the connection of

(A) single-phase loads

(B) 3-phase induction motors

(C) synchronous condenser

(D) 3-phase synchronous motor

**62.** In low oil circuit breaker, the oil performs the function of

(A) insulation only

(B) arc extinction only

(C) both insulation and arc extinction

(D) none of above

**63.** In order to reduce voltage surges due to current chopping and capacitive current breaking, we connect

(A) a resistor across the contacts of CB

(B) an inductor across the contacts of CB

(C) a capacitor across the contacts of CB

(D) none of the above

**64.** Current chopping mainly occurs in

(A) air-blast circuit breaker

(B) oil circuit breaker

(C) $SF_6$ circuit breaker

(D) vacuum circuit breaker

**65.** For the successful working of ground wire, the footing resistance of the tower should be

(A) infinite

(B) very high

(C) low

(D) none of the above

**66.** Differential protection scheme of transformer provides protection against

(A) earth faults only

(B) phase faults only

(C) any internal faults

(D) any external faults

**67.** A single phase transformer has 400 primary and 1000 secondary turns. The net cross sectional area of the core is 60 $cm^2$. If the primary is connected to 500 V, 50 Hz source the peak value of flux density in the core is

(A) 2.4 Wb / $m^2$

(B) 0.94 $Wb / m^2$

(C) 3.8 Wb / $m^2$

(D) 0.25 $Wb / m^2$

**68.** Coupling between the two windings of a transformer can be increased by

(A) increasing the resistance of the two windings

(B) increasing the primary voltage

(C) interleaving the windings on a common core of low reluctance

(D) reducing the insulation of the two windings

**69.** Three units of 1:5 transformers are connected in Delta-Star to supply a 3-phase load from 400 V, 3-phase source. The line voltage on the load side is

(A) 1000 V

(B) 80 V

(C) 3464 V

(D) 803 V

**70.** A transformer is working at its full load and its efficiency is also maximum at that point. Its iron loss is 1000 W. Then, its copper-loss at half of full load will be

(A) 250 W

(B) 300 W

(C) 400 W

(D) 500 W

**71.** For a 1.15 kVA, 460/230 V transformer, no load current is likely to be

(A) 1.25 A

(B) 0.1 A

(C) 0.8 A

(D) 2 A

**72.** At an industrial sub-station with a 4 MW load, a capacitor of 2 MVAR is installed to maintain the load power factor at 0.97 lagging. If the capacitor goes out of service, the load power factor becomes

(A) 0.85 lag

(B) 0.8 lag

(C) 0.9 lag

(D) unity

**73.** Buchholz relay is placed in between the

(A) conservator and the breather

(B) tank and the conservator

(C) h.v. winding and the bushing

(D) l.v. winding and the bushing

**74.** Rotor winding of the synchronous motor is excited by

(A) induction from stator current

(B) AC supply

(C) DC supplied by the exciter

(D) the revolving field

**75.** V-curves of a synchronous motor show the relation between

(A) armature current and field current

(B) applied voltage and field current

(C) applied voltage and armature current

(D) none of the above

**76.** The main advantages of distributing the winding in slots in an alternator armature is to

(A) add mechanical strength to the winding

(B) reduce the amount of copper required

(C) reduce the harmonics in the generated e.m.f

(D) reduce the size of the machine

**77.** In a salient pole synchronous generator connected to an infinite bus bar, maximum power is delivered at a power angle

(A) $\delta = 90°$

(B) $\delta = 45°$

(C) $45° < \delta < 90°$

(D) $\delta = 0°$

**78.** The power factor of an induction motor at light load is low due to

(A) high working component of $I_o$

(B) high magnetizing component of $I_o$

(C) high speed

(D) very low speed

**79.** A 500-V , 50 Hz 1-phase motor takes a full-load current of 40 A at a factor of 0.85 lagging. If a capacitor of 80 $\mu$F is connected across the motor terminals, the overall power factor becomes

(A) 0.52 leading

(B) 0.8 lagging

(C) 0.97 lagging

(D) 0.0 lagging

**80.** Corona effect can be detected by

(A) high temperature of conductors

(B) vibrations in conductors

(C) faint luminous glow of bluish colour

(D) emission of smoke

**81.** If the capacitance between two conductors of a 3-phase line is 6 $\mu$F, the capacitance of each conductor to neutral plane will be

(A) 3 $\mu$F

(B) 12 $\mu$F

(C) 6 $\mu$F

(D) 1.5 $\mu$F

**82.** The principle of operation of a 3 phase induction motor is most similar to that of a

(A) transformer with a shorted secondary

(B) transformer with a open secondary

(C) DC motor with a shorted armature

(D) DC motor with no commutator

**83.** The positive sequence reactance is equal to negative sequence reactance in case of which of the following elements in power system ?

(A) transformer

(B) transmission line

(C) generator

(D) motor

**84.** When sine wave is given as input to Schmitt trigger, then its generates

(A) Sine wave

(B) Saw tooth wave

(C) Triangle wave

(D) Square wave

**85.** The output clock frequency for a frequency division circuit having 11 flip – flops with an input clock frequency of 20.48 MHz is

(A) 10.24 kHz

(B) 5 kHz

(C) 10 kHz

(D) 5.12 kHz

**86.** On a master slave Flip–flop, master is enabled

(A) when gate is low

(B) when gate is high

(C) when gate is either low or high

(D) none of these

**87.** A J-K flip-flop with J = 1 and K = 1 has a 20 kHz clock input. The Q output is

(A) constant and low

(B) constant and high

(C) a square wave with 20 kHz frequency

(D) a square wave with 10 kHz frequency

**88.** Thermal runaway is not possible in FET because as the temperature of FET increases

(A) the mobility decreases

(B) the transconductance increases

(C) the drain current increases

(D) none of these

**89.** Most of the linear ICs are based on two-transistor differential amplifier because of

(A) input voltage dependent linear transfer characteristic

(B) high voltage gain

(C) high input resistance

(D) high CMRR

**90.** The output of logic gate is '1' when all its inputs are at logic '0'.The gate is

(A) NAND /EX–OR

(B) NOR/EX–OR

(C) AND/EX–NOR

(D) NOR/EX–NOR

**91.** If the excitation of a synchronous generator fails, it acts as a/an

(A) synchronous motor

(B) synchronous generator

(C) induction motor

(D) induction generator

**92.** Zero sequence currents can flow from a line into a transformer bank if the windings are in

(A) grounded– star/delta

(B) delta /star

(C) star/ground star

(D) delta /delta

**93.** Capacitor Voltage Transformer (CVT) is used to

(A) improve the power factor of the transmission line

(B) reduce losses in the transmission line

(C) connect instruments on the LT side

(D) reduce the incidence of over voltages on the transmission line

**94.** The line currents in amperes in phase a, b, c respectively are (400 + j100), (75 – j600), (–300 + j500) A, referred to same reference phasor. The negative sequence component of current will be

(A) 25A

(B) 100A

(C) 160A

(D) 149.9A

**95.** The use of high speed circuit breakers

(A) reduces short circuit current

(B) improves system stability

(C) decreases system stability

(D) increases short circuit current

**96.** A Buchholz relay is used for

(A) protection of transformer against internal faults

(B) protection of transformer against external faults

(C) protection of transformer against lightning

(D) protection of transformer from mechanical problem

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

(A) reactive power limit

(B) short-circuit current limit

(C) steady – state stability limit

(D) transient stability limit

**98.** Bulk power transmission over long HVDC lines are preferred , on account of

(A) low cost of HVDC terminals

(B) simple protection

(C) no reactive line loss

(D) asynchronous tie

**99.** Signal flow graph is used to obtain the

(A) stability of the system

(B) transfer function of the system

(C) controllability of the system

(D) observability of the system

**100.** The impulse response of an R-L circuit is a

(A) rising exponential

(B) decaying exponential

(C) step function

(D) parabolic function

**101.** A synchro-transmitter receiver unit is a

(A) two – phase device

(B) 3-phase device

(C) dc device

(D) single-phase device

**102.** For a step input, a system with forward path a transfer function $G(s)=\frac{20}{s^2}$ and the feedback path transfer function H(s) = (s+5), has a steady state output of

(A) 20

(B) 5

(C) 0.2

(D) Zero

**103.** In a linear system, an input of 5sin*wt* produces an output of 10cos*wt*. The output corresponding to 10cos*wt* will be

(A) 5sin*wt*

(B) –5sin*wt*

(C) 20sin*wt*

(D) –20sin*wt*

**104.** Final value theorem is used to find the

(A) steady state value of system output

(B) initial value of system output

(C) transient behavior of the system

(D) None of these

**105.** The characteristic equation of the system is $q(s)=2s^5+s^4+4s^3+2s^2+2s+1$. The system is

(A) stable

(B) marginally stable

(C) unstable

(D) oscillatory

**106.** The Laplace transform of $(t^2-2t)*u(t-1)$ is

(A) $\frac{2}{s^3}e^{-s}-\frac{2}{s^2}e^{-s}$

(B) $\frac{2}{s^3}e^{-2s}-\frac{2}{s^2}e^{-s}$

(C) $\frac{2}{s^3}e^{-2s}-\frac{2}{s}e^{-s}$

(D) None of these

**107.** A phase lag compensation will

(A) improve relative stability

(B) increase the speed of response

(C) increase bandwith

(D) increase overshoot

**108.** For making the unstable system stable

(A) gain of the system should be increased.

(B) gain of the system should be decreased.

(C) the number of zero to the loop transfer functions should be increased.

(D) the number of pole to the loop transfer functions should be increased.

**109.** The type of power amplifier that exhibits crossover distortion in its output is

(A) Class A

(B) Class B

(C) Class AB

(D) Class C

**110.** For a resonant circuit with resonant frequency of 1MHz, Q = 50 and R = 400, find the value of C.

(A) 250 pF

(B) 1000 pF

(C) 1.25 pF

(D) 500 pF

**111.** An SMPS operating at 20 kHz to 100 kHz range uses as the main switching element

(A) Thyristor

(B) MOSFET

(C) Triac

(D) UJT

**112.** Slew rate is expressed in

(A) A/microsec

(B) V/microsec

(C) W/microsec

(D) None of these

**113.** The minimum number of NAND gates require to implement Boolean expression : $A+A\overline{B}+A\overline{B}C$

(A) 1

(B) 2

(C) 4

(D) 0

**114.** The slowest ADC among the following is

(A) flash type

(B) successive approximation type

(C) integrating type

(D) counting type

**115.** Fourier series expansion of an even periodic function contains only

(A) cosine terms and a constant

(B) sine terms and a constant

(C) cosine terms

(D) sine terms

**116.** In dynamometer type wattmeter the moving coil

(A) carries the load current

(B) is the voltage coil

(C) is only responsible for power factor.

(D) is connected to a resistor to adjust the power factor angle

**117.** A balanced three phase load takes 10 kW at a power factor of 0.9 lagging. If one of the wattmeters in two-wattmeter arrangement reads 6398 W, the reading of other wattmeter will be

(A) 6398 W

(B) –6398 W

(C) 3602 W

(D) –3602 W

**118.** In a dynamometer type wattmeter the deflecting torque is proportional to

(A) square of current in the series coil

(B) square of current in the shunt coil

(C) current in the series coil

(D) connected load power

**119.** The area of a hysteresis loop is a measure of

(A) flux

(B) power loss

(C) coercive force

(D) field intensity

**120.** Coercive force in a hysteresis loop corresponds to

(A) magnetic field strength in the reverse direction of magnetisation

(B) magnetic field strength required to wipe out residual flux of the material

(C) magnetic field strength in saturation region of the loop

(D) magnetic field strength required to retain the residual flux in a material

**Space For Rough Work**