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1. Zero voltage regulation in a transformer occurs at :
(A) zero p.f. lead (B) unity p.f. (C) leading p.f. (D) lagging p.f.
2. A parallel plate capacitor has $15 \mu\text{F}$ capacitance. If the linear dimensions of the plate are doubled and the distance between the plates are also doubled, then new value of capacitance would be :
(A) $15 \mu\text{F}$ (B) $30 \mu\text{F}$ (C) $60 \mu\text{F}$ (D) $7.5 \mu\text{F}$
3. Resistance of a 230 V 100 W bulb is R_1 and that of a 230 V 75 W is R_2 . Then,
(A) $R_1 = R_2$ (B) $R_1 > R_2$ (C) $R_1 < R_2$ (D) $R_1 = 2R_2$
4. The current in a series RL circuit with $R = 10 \Omega$ and $L = 0.05 \text{ H}$ is suddenly connected to a DC voltage source of 200 V. The current in the series circuit, just after the switch is closed is equal to :
(A) 20 A (B) 10.75 A (C) 4000 A (D) zero
5. A $\frac{230}{115}$ V transformer has its LV side resistance of 0.06 p.u. The resistance referred to HV side is :
(A) 0.24 p.u. (B) 0.06 p.u. (C) 0.03 p.u. (D) 0.015 p.u.
6. Laplace transform of the function $t^3 e^{-at}$ is :
(A) $\frac{a}{(s+a)^3}$ (B) $\frac{6}{(s+a)^4}$ (C) $\frac{3}{(s+a)^3}$ (D) $\frac{4}{(s+a)^4}$
7. The effect of addition of zero to the open loop transfer function is :
(A) pulling the root locus to the right and to slow down the settling of response
(B) pulling the root locus to the left and to slow down the settling of response
(C) pulling the root locus to the left and to speed up the settling of response
(D) pulling the root locus to the right and to speed up the settling of response
8. Polar plot of a sinusoidal transfer function is a plot of :
(A) magnitude and phase angle (B) magnitude versus frequency
(C) phase angle versus frequency (D) none of the above

9. Gain margin is the :
- magnitude of $|G(j\omega)|$ at the frequency at which the phase angle is -90°
 - magnitude of $|G(j\omega)|$ at the frequency at which the phase angle is -180°
 - reciprocal of the magnitude of $|G(j\omega)|$ at the frequency at which the phase angle is -90°
 - reciprocal of the magnitude of $|G(j\omega)|$ at the frequency at which the phase angle is -180°
10. A bipolar transistor is specified to have forward current gain in the range of 8 to 40. The load resistance is 11Ω . The dc supply voltage $V_{cc} = 200 \text{ V}$ and input voltage to the base circuit is 10 V . If $V_{CEsat} = 1.0 \text{ V}$ and $V_{BEsat} = 1.5 \text{ V}$, what is the collector saturation current ?
- 144.4 A
 - 18.09 A
 - 0.045 A
 - 17.27 A
11. The current rating of a relay is 5 A and it is set at 150%. C.T. ratio is $\frac{400}{5}$. Fault current is 6000 A . PSM is :
- 75
 - 15
 - 10
 - 20
12. A 11 kV 100 MVA alternator is grounded through a resistance of 4Ω . The C.T.s have a ratio of $\frac{500}{5}$. The relay is set to operate when there is an out of balance current of 2 A . What percentage of the generator winding will be protected by the percentage differential protection scheme ?
- 93.7
 - 6.3
 - 54.6
 - 84.5
13. A generating station has a connected load of 500 MW and a maximum demand of 300 MW . The units generated being 600×10^6 per annum. The load factor is :
- 60%
 - 13.7%
 - 40%
 - 22.83%
14. A 132 kV , 200 km long transmission line has a reactance of $0.2 \Omega/\text{phase}/\text{km}$. What is its reactance/phase in p.u. on 100 MVA base ?
- 0.2
 - 0.23
 - 0.6
 - 0.174
15. Which of the following is not true for a fault limiting reactor ?
- they limit the short circuit current to a safe value
 - they protect the circuit breakers which have inadequate rating
 - they improve the voltage regulation
 - they avoid the fault from spreading

16. Positive sequence impedance of a transformer is :
- (A) 2 times greater than negative sequence impedance
 (B) equal to negative sequence impedance
 (C) half of negative sequence impedance
 (D) none of the above
17. Two parallel alternators each rated 11 kV 50 MVA and each having a subtransient reactance of 15% are connected to a bus bar. What is the fault level for a fault on one of the feeders near the bus bar ?
- (A) 666.67 MVA (B) 333.33 MVA (C) 1333.5 MVA (D) 100 MVA
18. The positive sequence and zero sequence impedance of a generator are X_1 and X_0 respectively and its neutral is grounded through a reactance X_n . A single line to ground fault is more severe than a three phase fault at its terminals when ?
- (A) $X_n = X_1 - X_0$ (B) $X_n = 3(X_1 - X_0)$
 (C) $X_n > 1/3(X_1 - X_0)$ (D) $X_n < 1/3(X_1 - X_0)$
19. A schedule speed of 45 km/h is required between two stops 1.5 km apart. If the stop is 20 s duration, what is the actual time of run for the train ?
- (A) 120 s (B) 60 s (C) 100 s (D) 80 s
20. What is the supply voltage of electric traction in Kerala ?
- (A) 11 kV AC (B) 110 kV AC (C) 1000 V DC (D) 25 kV AC
21. What is the decimal number for 10101 ?
- (A) 21 (B) 22 (C) 28 (D) 91
22. Which gate is known as inverter gate ?
- (A) AND (B) OR (C) NOT (D) NAND
23. Which of the following is a binary storage device ?
- (A) diode (B) flipflop (C) BJT (D) SCR
24. The address of a memory location of Intel 8085 microprocessor is :
- (A) 8 bit (B) 16 bit (C) 32 bit (D) 64 bit
25. A voltage of V is applied across an RLC series circuit. A voltmeter is connected across L and C. What will be the reading of voltmeter at resonance ?
- (A) zero (B) V (C) $2V$ (D) $0.5V$

26. The mechanical power developed by a shunt motor will be maximum when the ratio of back e.m.f. to applied voltage is :
 (A) 4 (B) 2 (C) 1 (D) 0.5
27. The e.m.f. induced in the armature of a shunt generator is 240 V. The armature resistance is 0.8Ω . If the armature current is 10 A, the terminal voltage will be :
 (A) 248 V (B) 240 V (C) 232 V (D) 160 V
28. The speed of a DC shunt motor can be increased by :
 (A) Increasing the resistance in the field circuit
 (B) Reducing the resistance in the field circuit
 (C) Reducing the armature resistance
 (D) None of the above
29. At full load, the copper loss and iron loss in a 100 kVA transformer is each equal to 3 kW. What is the efficiency at a load of 60 kVA, 0.8 power factor ?
 (A) 88.88% (B) 90.9% (C) 80.6% (D) 92.16%
30. An 8 pole DC generator has 500 armature conductors and has a useful flux/pole of 0.065 Wb. What will be the e.m.f. generated if it is lap connected and runs at 1000 r.p.m. ?
 (A) 541.67 V (B) 2166.67 V (C) 135.41 V (D) 270.83 V
31. An over excited synchronous motor will take current at :
 (A) lagging p.f. (B) leading p.f.
 (C) unity p.f. (D) none of the above
32. The V curves of a synchronous motor show relationship between :
 (A) armature current and supply voltage
 (B) field current and p.f.
 (C) armature current and back e.m.f.
 (D) dc field current and ac armature current
33. If in a 3 phase 3.5 MVA, 4160 V star connected alternator, a field current of 200 A produces full load current on short circuit and 4750 V on open circuit, its synchronous impedance is :
 (A) 9.77Ω (B) 23.75Ω (C) 5.64Ω (D) 13.7Ω
34. What is the r.m.s. value of the induced e.m.f. per phase of a 10 pole, 3 phase, 50 Hz alternator with 2 slots per pole per phase and 4 conductors per slot in two layers ? The coil span is 150° . Flux per pole is 0.12 Wb.
 (A) 560 V (B) 995 V (C) 1000 V (D) 835 V

35. Which of the following devices convert fixed DC to variable DC ?
 (A) cyclo converter (B) phase controlled rectifier
 (C) chopper (D) voltage source inverter
36. If V_c is the peak value of carrier signal and V_r is that of reference signal, modulation index of a sinusoidal PWM is :
 (A) V_r/V_c (B) V_c/V_r (C) $(V_c/V_r)^2$ (D) $(V_r/V_c)^2$
37. Which of the following possess bidirectional current capability ?
 (A) BJT (B) Triac (C) MOSFET (D) SCR
38. What is the approximate value of an alternating current producing 4 times the heat produced per second by a steady current of 2 A in a resistor ?
 (A) 2.6 A (B) 5.6 A (C) 8 A (D) 4 A
39. A current of 2.2 A flows through a coil when connected to 220 V DC. When 220 V 50 Hz AC is applied to the same coil, current is 1 A. What is inductance of coil ?
 (A) 6.24 H (B) 62.4 mH (C) 0.624 H (D) 0.624 mH
40. A 50 Hz AC current of peak value 1 A flows through the primary coil of a transformer. If the mutual inductance between primary and secondary is 1.5 H, the mean value of induced voltage is :
 (A) 300 V (B) 225 V (C) 150 V (D) 75 V
41. The r.m.s. value of the e.m.f. given by $E = 8 \sin \omega t + 6 \sin 2\omega t$ volt is :
 (A) $7\sqrt{2}$ V (B) $5\sqrt{2}$ V (C) 7 V (D) 10 V
42. A 22 cm long solenoid having total number of turns 1000, consists of a core of cross sectional area 4 cm^2 . Half portion of the core consists of air and other half is made of iron of relative permeability 500. The self inductance of the solenoid is :
 (A) 0.64 mH (B) 0.057 H (C) 0.57 H (D) 57.0 H
43. Which of the following is a solution to Ferranti effect ?
 (A) shunt capacitor (B) shunt reactor
 (C) series capacitor (D) none of the above
44. FACTS device is used for :
 (A) enhancing controllability (B) varying network impedance
 (C) increasing power transfer (D) all of the above

45. P_{\max} is the maximum power that can be transferred through a transmission line. What is the maximum power transfer if a series capacitor with a degree of compensation $k = \frac{1}{3}$ is connected in the line ?
- (A) $1.5 P_{\max}$ (B) $3 P_{\max}$ (C) $\frac{2}{3} P_{\max}$ (D) $\frac{1}{3} P_{\max}$
46. STATCOM is a :
- (A) variable impedance type shunt compensator
 (B) variable impedance type series compensator
 (C) switched converter type shunt compensator
 (D) switched converter type series compensator
47. A static synchronous series compensator injects :
- (A) a current in quadrature with the system voltage
 (B) a voltage in quadrature with the line current
 (C) a current in phase with the line current
 (D) a voltage in phase with the system voltage
48. The operation of a TCSC is prohibited for firing angles in the resonance region, since it offers to the network :
- (A) a low impedance (B) a high current
 (C) a low voltage (D) a high impedance
49. Which of the following scheme is used for coupling ac systems of different frequencies ?
- (A) FACTS device (B) cycloconverter
 (C) back to back dc link (D) none of the above
50. Under normal conditions, an HVDC link operates with :
- (A) CC control at rectifier station and CEA control at inverter station
 (B) CIA control at rectifier station and CC control at inverter station
 (C) both at CC control
 (D) both at minimum delay angle control
 (CC-constant current; CEA-constant extinction angle; CIA-constant ignition angle)
51. What is the penalty factor of a plant if its incremental loss is 0.2 ?
- (A) 5 (B) 0.8 (C) 0.2 (D) 1.25

52. What is the new steady state frequency, if a 10 MW load increase occurs in an area with frequency 50 Hz, governor regulation $R=0.1$ p.u. and frequency dependent component of load change $D=0.8$ p.u. on 100 MVA base ?
 (A) 49.889 Hz (B) 49.537 Hz (C) 49.074 Hz (D) 48.554 Hz
53. A circuit breaker is connected to a 132 kV bus bar. What is the maximum value of restriking voltage across the contacts of the circuit breaker ?
 (A) 216 kV (B) 108 kV (C) 373.35 kV (D) 264 kV
54. Current chopping occurs during :
 (A) disconnection of capacitor
 (B) lightning
 (C) disconnection of transformer on no load
 (D) short circuit fault
55. A 400 kV surge travels on an overhead line of surge impedance 400Ω towards its junction with a cable which has a surge impedance of 40Ω . What is the transmitted voltage ?
 (A) 36.36 kV (B) 72.73 kV (C) -327.27 kV (D) 400 kV
56. Which of the following is an example of high frequency electric heating ?
 (A) salt bath furnace (B) induction furnace
 (C) electric arc furnace (D) resistance welding
57. An illumination on the working plane of 32 lux is required in a room $80 \text{ m} \times 15 \text{ m}$. Assuming a utilization factor of 0.5, lamp efficacy of 14 lumen/watt and candle power depreciation of 0.2, estimate the number of 200 W lamps required.
 (A) 192 (B) 100 (C) 80 (D) 36
58. The specified parameters for a slack bus in load flow analysis are :
 (A) real power and reactive power
 (B) real power and voltage magnitude
 (C) voltage magnitude and phase angle
 (D) reactive power and voltage magnitude
59. Which of the following is true for a suburban electric traction service ?
 (A) coasting period is longer
 (B) free running period is longer
 (C) coasting and free running periods are smaller
 (D) none of the above is true