Maximum : 100 marks

Time : 1 hour and 15 minutes

1. Compute the kVA load for maximum efficiency of a 5500/220V, 50 kVA, 50 Hz transformer with full load Cu loss 1.2 kW and a core loss of 1 KW :

   (A) 45.64 kVA (B) 35.33 kVA

   (C) 48.67 kVA (D) 43.35 kVA

2. In a transformer on no load the input voltage :

   (A) is in phase with the magnetizing current

   (B) leads the magnetizing current by 90°

   (C) lags the magnetizing current by 45°

   (D) lags the magnetizing current by 90°

3. If the source voltage and frequency are doubled for a transformer, the eddy current loss in the core will become :

   (A) half (B) remains the same

   (C) doubles (D) 4 times

4. In a level compounded generator, the terminal voltage at half full load is :

   (A) same as full load voltage (B) greater than no load voltage

   (C) same as no load voltage (D) less than no load voltage

5. A 4 pole generator with 16 coils has a 2 layer lap winding. The pole pitch is :

   (A) 32 (B) 16

   (C) 8 (D) 4

6. The back emf generated by a 220V dc machine with armature resistance 0.5 ohm when driven as a motor 210V. What is the generated emf if the machine is driven as a generator?

   (A) 230V (B) 220V

   (C) 210V (D) 240V

7. For a dc shunt motor by flux control, we get speeds :

   (A) above normal speed only (B) below normal speed only

   (C) above and below normal speed only (D) none of the above

8. Swin Burne's test is not suitable for :

(A) shunt motor
(B) series motor
(C) shunt generator
(D) compound generator

9. Armature reaction of a synchronous generator at rated voltage zpf lag is :

(A) Magnetizing
(B) Cross magnetizing
(C) Demagnetizing
(D) Both demagnetizing and cross magnetizing

10. The rotor of a 3 phase 4 pole induction motor rotates at 1000 rpm when 50 Hz supply is connected across stator terminals. Calculate the frequency of rotor induced emf :

(A) 32.33 Hz
(B) 25.67 Hz
(C) 45.5 Hz
(D) 16.67 Hz

11. Class AB operation is often used in power amplifiers in order to :

(A) get maximum efficiency
(B) remove even harmonics
(C) overcome cross over distortion
(D) reduce collector dissipation

12. The MOSFET switch in its ON state may be considered equivalent to :

(A) resistor
(B) inductor
(C) diode
(D) capacitor

13. A relaxation oscillator is one which :

(A) has 2 stable states
(B) produces non sinusoidal outputs
(C) relaxes indefinitely
(D) oscillates continuously

14. In a single stage CB amplifier, a smaller load resistance will produce :

(A) low voltage gain
(B) high current gain
(C) better frequency response
(D) high voltage gain

15. A twisted ring counter consists of 6 flipflops, it will have :

(A) 6 states
(B) 12 states
(C) 64 states
(D) 128 states

16. A memory in which the contents get erased, when power failure occurs :

(A) RAM
(B) EAROM
(C) PROM
(D) ROM

17. Race around condition occurs in J-K Flip Flop when :

(A) both inputs are zero
(B) the inputs are complementary
(C) both inputs are one
(D) none of the above

18. A demultiplexer can be used to realize a :

(A) counter
(B) shift register
(C) display system
(D) combinational circuits

19. The logic swing of a gate is about 0.8V. This gate belongs to logic family :

(A) TTL
(B) ECL
(C) N-MOS
(D) CMOS

20. For a feedback control system of type 2, the steady state error for a ramp input is :

(A) infinite
(B) constant
(C) zero
(D) indeterminate

21. In force current analogy, Capacitance is analogous to :

(A) velocity
(B) displacement
(C) mass
(D) momentum

22. Which of the following quantity is the same for mechanical translational system and mechanical rotational system?

(A) force
(B) mass
(C) moment of inertia
(D) viscous friction coefficient

23. The number of roots of $s^3 + 5s^2 + 7s + 3 = 0$ in the right half of s-plane is :

(A) zero
(B) one
(C) two
(D) three

24. Regenerative feedback means the output is feedback with :

(A) positive sign
(B) negative sign
(C) step input
(D) oscillation

25. An increase in damping factor :

(A) increases peak time
(B) is independent of peak time
(C) decreases peak time
(D) results constant peak time

26. A compensating network is added to :

(A) keep the locus of the roots constant as a system parameter is varied

(B) alter the locus of the roots as a system parameter is varied

(C) alter the locus without changing the position of poles and zero

(D) not alter the position of poles and zeros

27. The characteristic equation of an armature controlled DC motor is of :

(A) 1st order (B) second order

(C) zero order (D) 3rd order

28. The breakaway points of the root locus occurs at :

(A) imaginary axis

(B) real axis

(C) multiple roots of the characteristic equation

(D) zeros

29. If the damping factor of a system is 1, the system is :

(A) under damped (B) over damped

(C) critically damped (D) unstable

30. An energy meter whose constant is 700 revolutions / kWHr makes 5 revolutions in 15 seconds. Calculate the load in kW :

(A) 11.51 kW (B) 1.71 kW

(C) 1.21 kW (D) 1.91 kW

31. The ratio error of a current transformer is due to :

(A) exciting current (B) stray magnetic field

(C) corona effect (D) leakage flux

32. Which method is most suitable for the measurement of resistance of an ammeter shunt?

(A) Wheatstone bridge (B) Kelvin's double bridge

(C) Maxwell's bridge (D) Wein's bridge

33. A (0-1) A ammeter has an internal resistance of 10 ohm. What value of shunt resistance is to be added to measure a current of 5 A :

(A) 2 ohm (B) 0.2 ohm

(C) 0.5 ohm (D) 5 ohm

34. For a single phase induction type energy meter, to obtain true value reading, the shunt magnet flux must lag the applied voltage by :

(A) 180 degree
(B) 0 degree
(C) 45 degree
(D) 90 degree

35. The hysteresis error in the instrument causes :

(A) change in same reading when input is first increased and then decreased
(B) slow response for increasing and decreasing input
(C) vibration is produced for increasing values of input
(D) overshoot during initial values in the scale

36. While measuring power in a 3 phase circuit by 2 wattmeter method, the wattmeter readings will be equal and opposite when :

(A) pf = 0.8
(B) load is balanced
(C) pf = 0.5
(D) load is purely capacitive

37. Thermocouples are :

(A) active transducers
(B) passive transducers
(C) both active and passive
(D) neither active nor passive

38. In spring controlled MI instruments. The scale is :

(A) uniform
(B) cramped at lower end and scattered at the upper end
(C) cramped at higher end and scattered at the lower end
(D) cramped at both lower end and the upper end

39. The controlling torque in a meggar is provided by :

(A) springs
(B) eddy currents
(C) weights added to moving system
(D) does not need any controlling torque arrangement

40. Swamping resistance is used to compensate the error due to :

(A) temperature
(B) humidity
(C) pressure
(D) stray magnetic field

41. Multiple trace can be accomplished in a CRO with :

(A) Horizontal deflection system
(B) Compensation adjustment
(C) Dual beam CRT
(D) Vertical deflection system

42. In an electronic ohm meter, the OP-AMP is used as a :

(A) summer
(B) differentiator
(C) integrater
(D) buffer amplifier

43. In order to reduce the loading effect of the circuit under test, the input impedance of an electronic meter should be :

(A) low
(B) high
(C) medium
(D) constant

44. Electronic volt meters are more accurate for high resistance circuits as compared to ordinary voltmeter because of its :

(A) high volt/ohm rating
(B) high ohm/volt rating
(C) high resolution
(D) high output impedance

45. If the duty cycle of a pulse waveform clamped around zero is 0.5. What is its crest factor?

(A) 2.22
(B) 1.118
(C) 3.1
(D) 1.9

46. A digital power factor meter converts pf into frequency and is counted. If the peak stepped down voltage is 2V, CT ratio 1:40 and rectifier gain is 1. What would be the frequency for 0.85 pf?

(A) 21.65 Hz
(B) 43.33 Hz
(C) 51.44 Hz
(D) 30.5 Hz

47. The voltage sensitivity of a multi meter is 20mV. Its internal resistance is 40 ohm. Then its current sensitivity is :

(A) 2 milli ampere
(B) 5 micro ampere
(C) 500 micro ampere
(D) 0.8 A

48. A digital phase meter with ZCD is fed with 2 sinusoidal voltages of the same amplitude and frequency but with a phase displacement. If the time delay with them is 0.15 msec and their time periods are 1.5 msec, what is the measured phase difference :

(A) 36°.36'
(B) 45°
(C) 85° 46'
(D) 180°

49. A differential amplifier inputs are 5 mV and 3 mV. The output is 300 mV. What is the amplifier gain :

(A) 70 (B) 67

(C) 150 (D) 300

50. If the bandwidth of an oscilloscope is 12 MHz, what is the fastest rise time a sine wave can have in order to be accurately reproduced by the instrument?

(A) 42 msec (B) 19 msec

(C) 49 msec (D) 29 msec

51. 2 identical coils of 200 turns each, lie in a parallel plane and produced a flux of 400 mWb. If a current of 8 A flows through one coil, find the mutual inductance :

(A) 10 H (B) 2 H

(C) 8 H (D) 6 H

52. A coil of insulated wire of resistance 8 ohm and inductance 0.03 H are connected across 240 V 50 Hz supply. Calculate the active power drawn by the coil :

(A) 5 kW (B) 3.01 kW

(C) 6.83 kW (D) 1.03 kW

53. Peak factor of a sinusoidal wave is :

(A) 1.11 (B) 1.414

(C) 0.707 (D) 0.637

54. The magnetic hysteresis is primarily due to :

(A) permeability (B) flux density

(C) retentivity (D) coercivity

55. Load in each branch of a delta connected balanced 3 phase, 400 V, 50 Hz circuit consists of an inductance of 31.8 mH series with a resistance of 10 ohm. Calculate total power consumed by the ckt :

(A) 48 kW (B) 52 kW

(C) 24.01 kW (D) 34.5 kW

56. A 20 kV is applied across a capacitor with capacitance is 0.0004 micro farad. The capacitor is formed by 2 parallel metal plates each of area 200 cm^2 and separated by a dielectric 4 mm thick. Find the electric flux density :

(A) 4×10^{-4} C/m^2 (B) 2×10^{-4} C/m^2

(C) 6×10^{-4} C/m^2 (D) 8×10^{-4} C/m^2

57. If the inductance of a series circuit is increased, its resonance frequency :

(A) increases
(B) decreases
(C) remains the same
(D) is determined by the resistance

58. In a balanced delta connected 3 phase system, line currents lags the phase currents by :

(A) 60°
(B) 30°
(C) 90°
(D) 120°

59. If there are n nodes in a circuit, then the number of equations needed to solve the network using nodal analysis is :

(A) $n+1$
(B) n
(C) $n-1$
(D) $n-2$

60. The power dissipation in each of 4 parallel branch of a circuit is 1 W. Total power dissipation is :

(A) 1 W
(B) 2 W
(C) 8 W
(D) 4 W

61. If the length of a given conductor is doubled and it's cross section is halved, its resistance becomes :

(A) 2 times
(B) 3 times
(C) halved
(D) 4 times

62. A 60 MW power station has an annual peak load of 50 MW. The annual load factor is 0.45. Find the average load :

(A) 27 MW
(B) 24.75 MW
(C) 25 MW
(D) 22.5 MW

63. Absorption of neutrons in a nuclear reactor is done by :

(A) Moderator
(B) Control rods
(C) Reflector
(D) Coolant

64. In a hydroelectric power plant, sudden rise of pressure in the penstock pipe is managed with :

(A) surge tank
(B) turbine
(C) spillway
(D) draft tube