

Test paper for the post of Junior Engineer (Electrical)

Name and Address of the Candidate	Max. Marks	Marks Obtained
	100	

Instructions:

1. Attempt all the question. Question paper is divided into sections A & B.
2. All Questions carry 1 marks each.
3. There are no negative marks.
4. Total duration 60 minutes.
5. Please indicate the most appropriate answer by writing either *a, b, c or d* against the given question

Section – A

Q1. Steam power plant works on

- (a) Carnot cycle
- (b) Rankine cycle
- (c) Otto cycle
- (d) None of the above

Q2. To improve the power factor in distribution system, which of the following options is normally used:

- (a) Capacitor in series with load
- (b) Capacitor in shunt with load
- (c) Reactor across the load
- (d) Reactor in series with load

Q3. Normally, corona loss occurs in

- (a) Distribution systems
- (b) Transmission Systems
- (c) Transformer
- (d) Machine

Q4. A generator having rated capacity of 100MW produces 600MWh while operating only 10 hrs. in a day .The Maximum demand during the day is 80 MW. The load factor is:

- (a) 0.8
- (b) 0.6

- (c) 0.25
- (d) None of above

Q5. The distribution system is normally operated radially because

- (a) Distribution system is very large
- (b) Protection requirement is reduced
- (c) It Provides more safety
- (d) None of the above

Q6. Governor in a generator is used for :

- (a) Load frequency control
- (b) MVAR- voltage control
- (c) Increasing efficiency of generator
- (d) All of the above

Q7. A Synchronous machine with large air gap has _____

- (a) A higher value of stability limit
- (b) A higher synchronizing power
- (c) A small value of regulation
- (d) All options are correct

Q8. In India, the highest operating voltage level of transmission line is

- (a) 400kV
- (b) 765kV
- (c) 500kV
- (d) 1100kV

Q9. The rating of the batteries is given by

- (a) kWh (b) kV Ah (c) Ampere- hour (d) kW

Q10. Power factor of which devices is better?

- (a) Transformer
- (b) Incandescent Bulb
- (c) 1- Phase induction motor
- (d) 3- phase induction motor

Q11. Ceiling fan used in the houses is

- (a) Single – reluctant motor
- (b) Single- phase induction motor
- (c) Single – phase synchronous motor
- (d) 3- phase induction motor

Q12. Reactors are used in long transmission line to

- (a) Improve the power factor of line
- (b) To increase the voltage
- (c) To reduce the Ferranti effect
- (d) To reduce the corona loss

Q13. In a 5-A,3- pin plug, the pins are

- (a) One for phase ,one for neutral an one for ground
- (b) Two for phases, one for neutral
- (c) Two for phases , one for ground
- (d) One for phase, two for neutral

Q14. A transformer transforms

- (a) Frequency
- (b) Power
- (c) Voltage and Current
- (d) All of the above

Q15. Lighting arrestor is used to protect the

- (a) Transmission line
- (b) Transformer
- (c) Substation equipment
- (d) Working personnel

Q16. To decide the conductor size of feeders, following law is used

- (a) Kirchhoff' current law
- (b) Kirchhoff' voltage law
- (c) Maxwell's law
- (d) Kelvins law

Q17. Which one is not a ACSR conductor name'

- (a) Rabbit
- (b) Dog
- (c) Panther
- (d) Lion

Q18. Thermal power plants in India run at

- (a) 3000rpm
- (b) 3600rpm
- (c) 1500rpm
- (d) 750rpm

Q19. Voltage cannot be changed instantaneously across

- (a) Resistors
- (b) Inductors
- (c) Capacitors
- (d) Mutually coupled circuit

Q20. In an RLC series circuit, the voltage (measured by moving iron voltage meter) across resistance, inductance and capacitance are 4V, 9V, 6V, respectively. The supply voltage will be

- (a) 19V
- (b) 7V
- (c) 5V
- (d) None of the above

Q21. Which of the following is equivalent to 0.5 kWh?

- (a) 1800000 W
- (b) 1800000 J
- (c) 18000000 J
- (d) 36000000 J

Q22. "Erg" is a unit measurement for _____

- (a) Energy
- (b) Power
- (c) Voltage
- (d) Impedance

Q23. Which of the following quantity will remain the same, when a layer of Teflon is inserted between the plates of a charged parallel plate capacitor?

- (a) Capacitance
- (b) Charge
- (c) Energy of the capacitor
- (d) Potential

Q24. Which of the following is NOT a type of capacitor?

- (a) Ceramic
- (b) Electrolytic
- (c) Film
- (d) Wire Wound

Q25. The S.I unit of electric charge is _____

- (a) Henry
- (b) Coulomb
- (c) Tesla
- (d) Weber

Q26. Hysteresis loss occurring in a material does NOT depend on which of the following parameters?

- (a) Hysteresis constant
- (b) Magnetic flux density

- (c) Frequency
- (d) Reluctivity

Q27. Determine the eddy current loss (in W) in a material having eddy current coefficient of 1, thickness of 0.02 m and a volume of 1 cubic metre, which is kept in a magnetic field of maximum flux density of 2T and supplied by a frequency of 50Hz.

- (a) 2
- (b) 3
- (c) 4
- (d) 5

Q28. Determine the peak value (in A) of the current used by a motor rated at 220 V, 30A.

- (a) 21.02
- (b) 30
- (c) 42.4
- (d) 51.9

Q29. What will be the frequency (in Hz) of a sinusoidal wave, when the time period is 20ms?

- (a) 50
- (b) 60
- (c) 40
- (d) 30

Q30. A 3- phase delta connected system is supplied by a line voltage of 200V. The value of phase currents is 30A. What is the total power consumed (in W) by the system, if the current lags the voltage by 30 degrees?

- (a) 16.32
- (b) 14.45
- (c) 15.59
- (d) 16.69

Q31. Determine the reactive power (in kVAR) of a 3- Phase delta connected system having a line voltage of 400 V, line current of 40A and the phase difference between the voltage and current is 45 degrees.

- (a) 14.4
- (b) 15.8
- (c) 18.7
- (d) 19.6

Q32. Which one of the following statement is NOT TRUE about multimeter?

- (a) Multimeter can be used for the measurement of voltage.
- (b) Multimeter can be used for the measurement of power.
- (c) Multimeter can be used for the measurement of resistance.

(d) Multimeter can be used for the measurement of current.

Q33. Determine the apparent power (in W) of a circuit, if the circuit have power factor of 0.8 and the reactive power of the circuit is 60W.

- (a) 80
- (b) 75
- (c) 60
- (d) 55

Q34 A building has 3 floors and each floor has 4 fans of 50 W that operates for 12 hours a day and one air conditioner of 3000 W that operates for 2 hours per day in the month of the June .

Determine the energy consumption (in kWh) of the building in June.

- (a) 512
- (b) 252
- (c) 756
- (d) 504

Q35. In which transformer, the tertiary winding is used

- (a) Star- delta
- (b) Star-star
- (c) Delta-delta
- (d) Delta-star

Q36. Secondary winding of an auto transformer is also called _____

- (a) Compensating winding
- (b) Common Winding
- (c) Tertiary Winding
- (d) Damping Winding

Q37. The field control of a DC shunt motor gives _____

- (a) Constant torque drive
- (b) Constant kW drive
- (c) Constant speed drive
- (d) Variable load speed drive

Q38. Transformer cooling and insulation oil must be of

- (a) Low viscosity
- (b) High Viscosity
- (c) Low BDV
- (d) Low resistivity

Q39. Single phase transformer can be used in parallel only when their voltage are

- (a) Equal
- (b) Unequal
- (c) Zero
- (d) None of these

Q40. The starting torque of a 1- phase motor, the revolving field is produced by the use of

- (a) High
- (b) Moderate
- (c) Low
- (d) Zero'

Q41. The repulsion- start induction –run motor is used because of _____

- (a) Good power factor
- (b) High efficiency
- (c) Minimum cost
- (d) High starting torque

Q42. The rotor of a hysteresis motor is made of

- (a) Aluminium
- (b) Cast iron
- (c) Chrome steel
- (d) Copper

Q43. ACSR stands for

- (a) All Copper Standard Reinforced Conductor
- (b) Aluminium Conductor Steel Reinforced Conductor
- (c) Aluminium Copper Steel Reinforced Conductor
- (d) All Copper Steel Reinforced Conductor

Q44. The insulating material for cables should have

- (a) High dielectric strength
- (b) High mechanical strength
- (c) Low cost
- (d) All options are correct

Q45. The main source of hydro –electric power station is

- (a) Coal
- (b) Generator
- (c) Water
- (d) Nuclear

2. Stator of 3-phase, 50 Hz, 10 HP induction motor is made up of

- a) 3- Φ winding distributed in several slots
- b) 3- Φ winding concentrated at 3 places which are 120° apart
- c) Aluminium bars shorted at both ends
- d) Aluminium bars connected to 3 slip rings

3. Which of the following is a unity power factor load

- a) Ceiling fan
- b) Television set
- c) Heater
- d) Fluorescent tube

4. Current drawn from the supply when two equal resistances connected in series is 10 A. If the same resistances are connected in parallel, the current drawn from the supply is

- a) 20 A
- b) 40 A
- c) 5 A
- d) 15 A

5. Type of motor generally used in ceiling fans is

- a) Split phase induction motor
- b) Capacitor start induction motor
- c) Capacitor run induction motor
- d) DC shunt motor

6. Diodes are generally used to convert

- a) AC to DC
- b) Low frequency AC to high frequency AC
- c) DC to AC
- d) High frequency AC to low frequency AC

7. A 1- Φ , 230 V, 50 Hz, 2 kVA, pf 0.8 lag load is operating for duration of 4 hours. Energy consumption read by the energy meter placed in home is

- a) 2000 units b) 6400 units c) 6.4 units d) 2 units

8. *Approximate* full load efficiency of 3- Φ , 22 kV/ 415 V, 100 kVA transformer is

- a) 97% b) 90% c) 85% d) 87%

9. A 3- Φ , 415 V, Δ -connected induction motor draws 90 A current when started direct-on-line.

In order to reduce its starting current a Y- Δ starter is used. Now, what would be its starting current in star position

- a) 16 A b) 30 A c) 52 A d) 64 A

10. The speed of rotation of a 3- Φ , 50 Hz, 6 pole induction motor is 900 rpm. The slip is

- a) 5% b) 8% c) 4% d) 10%

11. The direction of rotation of 3-phase induction motor can be reversed by

- a) Interchanging two supply lines b) Using star-delta starter
c) Using DOL starter d) Using an autotransformer

12. In fluorescent tube circuit the function of the choke is to

- a) Improve the power factor
b) Suppress high frequency interference
c) Provide a momentary high voltage for establishing the main arc
d) Reduce power consumption

13. Mass, force and distance in SI units, respectively are represented by:

- a. Kg, N, m
- b. Pound, Ounce, ft
- c. N, Kg, m
- d. Ounce, Pound, ft

14. Earthing is generally provided to give protection against

- a) Voltage fluctuation
- b) Overloading
- c) Danger of electric shock
- d) High temperature of the conductor

15. Type of semiconductor power device used in solid state fan regulators is

- a) Triac
- b) SCR
- c) Transistor
- d) UJT

16. Two identical capacitors are connected in series. The equivalent capacitance is found to be 20 F. If these capacitors are connected in parallel, the equivalent capacitance will be

- a) 40 F
- b) 80 F
- c) 10 F
- d) 5 F

17. Approximate full load power factor of 3- Φ , 415 V, 10HP induction machine is

- a) 0.89
- b) 0.7
- c) 0.75
- d) 0.95

18. Type of power plant at Chhabra (Rajasthan) is

- a) Thermal
- b) Hydroelectric
- c) Nuclear
- d) Solar

19. The cross-sectional area of copper wire generally used in a residential system to supply 1- Φ , 230 V, 2 kVA, 0.8 pf load is

- a) 1.5 mm^2 b) 2.5 mm^2 c) 4 mm^2 d) 6 mm^2

20. Total electrical load of IITJ is going to be around 6 MVA. The voltage level of incoming line from Power utility company is

- a) 33 kV b) 415 V c) 220 kV d) 440 kV

21. Which one of following methods should be used to reduce electricity consumption in IITJ campus

- a) Replace 40 W fluorescent lamp by 25 W incandescent bulb
- b) Replace 38 W fluorescent lamp by LED lamp of suitable rating
- c) Replace street lights by high pressure sodium-vapor lamp
- d) Use windmill or Diesel generator to generate power inside the campus

Give the approximate power consumption of the following commonly used household items

Example: Incandescent Bulb: 60 W.

26. Room Airconditioner (1 Ton) :

- a) 15 W b) 150 W c) 1500 W d) 15000 W

27. 1/2 HP water pump:

- a) 40 W b) 400 W c) 4000 W d) 40 kW

For a series R-L circuit connected to an AC 50 Hz source of 10 V (rms), with the inductive reactance and resistance being 8Ω and 6Ω respectively, calculate the following:

28. Current flowing through the circuit (rms).

- a) 1 A b) 0.866 A c) 0.7071 A d) 0.5 A

29. Power factor of the circuit (lagging)

- a) 0.6 b) 0.8 c) 1 d) 1.5

30. Power consumed in the resistance

- a) 6 W b) 1 W c) 7.7 W d) 8.66 W

31. Reactive power delivered by the source

- a) 6 VA b) 7 VA c) 7.251 VA d) 8 VA

32. A commonly used unit for electrical energy consumption is:

- a) kW b) kVA c) kWh d) kW/h

33. Which of the following is not a unit of power

- a) MW b) kW c) HP d) kWh

34. A 50 Hz balanced three-phase, Y- connected supply is connected to a balanced three-phase, 0.8 power factor, Y-connected load. If the rms line to line voltage of the supply is 415 V and the rms value of phase -a load current is 10 A, the three-phase power is :

- a) 3320 W b) 5750 W c) 9960 W d) 3980 W

35. The currents in the three phases of a unbalanced star connected load are $2\sqrt{3}$ A, $2\sqrt{3}$ A and $2\sqrt{3}$ A. The current through the neutral wire is:

- (a) 0 A (b) 2 A (c) $\sqrt{3}$ A (d) $\sqrt{3}/30$ A

36. Moisture content in soil ----- the soil resistance.

- a) increases. b) does not effect. c) decreases. d) None of these

37. On which of the following factors does the soil resistance depends on?

- a) depth of the electrode b) salt content. c) water content. d) all options a,b and c

38. Calculate the current drawn by a 400 V DC motor running at an efficiency of 80% when supplying a load of 15 HP.

- a) 35 A. b) 45 A. c) 40 A. d) 30 A

39. Determine the number of electric bulbs that will be required to light a 15m by 9 m room with illumination of 200 lumen/sq. mtr. If each bulb produces light of 3000 lumens and has coefficient of utilisation and maintenance factor of 0.75 and 0.8 respectively.

- a) 25. b) 30. c) 15. d) 10

40. Determine the area of cross section of the core a 50 Hz power transformer which has 240 V applied to its 100 turn winding . The maximum allowed flux density is 1 T.

- a) 0.015 sq. mtr. b) 0.0108 sq. mtr. c) 0.0216 sq. mtr. d) 0.02 sq.mtr.

41. According to the wiring code of India , what does Green colour signify ?

- a) Live. b) Phase c) Neutral d) Earth

42. For a good earthing, the pit resistance should be

- a) >10 ohms. b) <1 ohms. c) 100 ohms. d) 50 ohms

43. Charging current of a three phase cable _____ with increase in length.

- a) increases. b) remain constant c) decreases. d) None of these

44. What is the most prevalent technology of circuit breaker at voltage above 220 KV?

- a) Air Blast b) Vacuum c) Oil. d) SF6

45. Consider two transformers with rating of 50 MVA 11/66 KV. Transformer 1 has core and copper losses of 40 KW & 200 KW respectively. Transformer 2 has core and copper losses of 50 KW and 160 KW respectively. Which transformer will you recommend for continuous use with load less than 40% of their rating.

- a) Transformer 1. b) Transformer 2. c) Both are suitable. d) Cannot say

46. In a three pin plug, the thicker and longer pin corresponds to what?

- a) Neutral. b) Not required. c) Phase. d) Earth

47. The winding connections for a typical distribution transformer in India is?

- a) HV(Star)- LV(Star) b) HV(Delta)- LV(Star). c) HV(Star)- LV(Delta) d) HV(Delta)- LV(Delta)

48. The main purpose of the capacitor used in household fans is?

- a) to increase efficiency b) for aesthetics c) for starting d) to increase speed

49. Starters are used with induction motors because of

- a) Their starting torque is high b) Their starting current is high

c) They will run at high speed on direct line starting d) They can not run in reverse direction

50. Isolator in a substation are used for

a) isolating the circuit with current b) isolating circuit with fault

c) isolating the circuit without current d) None of the above