# JEEDEC–2017

## Subject : ELECTRICAL ENGINEERING

*Time Allowed* : 2 Hours | *Maximum Marks* : 100

Booklet No. 70300115

## INSTRUCTIONS

Candidates should read the following instructions carefully before answering the questions:

1. This question Paper contains 50 MCQ type objective questions. Each question has four answer options given, viz. A, B, C and D.
2. Only one answer is correct. Correct answer will fetch full marks 2. Incorrect answer or any combination of more than one answer will fetch –½ marks. No answer will fetch 0 marks.
3. Questions must be answered on OMR sheet by darkening the appropriate bubble marked A, B, C, or D.
4. Use only **Black/Blue ball point pen** to mark the answer by complete filling up of the respective bubbles.
5. Mark the answers only in the space provided. Do not make any stray mark on the OMR.
6. Write question booklet number and your roll number carefully in the specified locations of the OMR. Also fill appropriate bubbles.
7. Write your name (in block letter), name of the examination centre and put your full signature in appropriate boxes in the OMR.
8. The OMRs will be processed by electronic means. Hence it is liable to become invalid if there is any mistake in the quesion booklet number or roll number entered or if there is any mistake in filling corresponding bubbles. Also it may become invalid if there is any discrepancy in the name of the candidate, name of the examination centre of signature of the candidate vis-a-vis what is given in the candidate's admit card. The OMR may also become invalid due to folding or putting stray marks on it or any damage to it. The consequence of such invalidation due to incorrect marking or careless handling by the candidate will be sole responsibility of candidate.
9. Rough work must be done on the question paper it self. Additional blank pages are given in the question paper for rough work.
10. Hand over the OMR to the invigilator before leaving the Examination Hall.

**Space for Rough Work**

1. The dimension of capacitance is

(A) $L^{-2}M^{-1}T^{4}I^{2}$ (B) $L^{2}M^{-1}T^{4}I^{2}$

(C) $L^{-2}M^{-1}T^{4}I^{1}$ (D) $L^{2}M^{-1}T^{2}I^{2}$

2. For an ideal DC voltage source, the voltage across the load

(A) will not depend on load (B) will depend on the load

(C) will change with square of the load current (D) decrease with increase in load current

3. The voltage across an inductor with ideally zero resistance in a DC circuit at steady state is

(A) 100 V (B) −100 V

(C) 10 V (D) 0 V

4. A capacitor of value 5000 μF is charged to 1000 V. Then the capacitor is discharged through a resistance of value 100 ohm. After 0.5s current will be

(A) 3·68 A (B) 5·86 A

(C) 1 A (D) 10 A

5. Power dissipated in a resistance is 100 W. The voltage across the resistance is increased by two times. The power dissipation in the resistance will be

(A) 100 W (B) 50 W

(C) 200 W (D) 1000 W

6. What is the force necessary to separate two opposite poles of magnets having contact surface areas of 100 $cm^2$ when the flux density normal to the surface is 1 $wb/m^2$?

(A) 2000 N (B) 3500 N

(C) 3979 N (D) 2980 N

7. An iron ring with a mean circumference of 140 cm and cross-section of 12 $cm^2$ is wound with 500 turns of wire. When the exciting current is 2 A. the flux is found to be 1·2 mwb. The relative permeability of the iron is

(A) 1114 T (B) 1114

(C) 800 (D) 3000

8. A resonating circuit is made by connecting a resistor, inductor and a capacitor in series. The capacitor is ideal with zero series resistance. The voltage across the inductor will be

(A) less than the voltage across capacitor. (B) greater than the voltage across the capacitor.

(C) equal to the voltage across the capacitor. (D) double the voltage across the capacitor.

**9.** In a series R-L circuit, the value of resistance is 10 ohm and the value of the inductance is 10 mH. If the frequency of the ac voltage source applied on this series R-L branch is 50 Hz, then the phase angle of the current phasor with respect to the voltage phasor will be

(A) 17·44° lagging
(B) 90° lagging
(C) 17·44°
(D) 17·44° leading

**10.** In a series R-L-C circuit at resonance draws current of 10 A from a 100 V, 50 Hz supply. What is the power drawn from the supply?

(A) 1000 W
(B) 100 W
(C) 50 W
(D) 0 W

**11.** In a circuit, one lossless inductor is in parallel to a perfect capacitor and the combination is in series with a resistance. A 100 V, 50 Hz source is connected across the combination. What will be the voltage across the parallel combination of L and C when the circuit is in resonance?

(A) 50 V
(B) 100 V
(C) 200 V
(D) 0 V

**12.** For a three phase balanced circuit, the power delivered to the load can be expressed as in conventional symbols

(A) $W = \sqrt{3} V_L I_{ph} \cos\phi$
(B) $W = 3 V_L I_L \cos\phi$
(C) $W = \sqrt{3} V_L I_L \sin\phi$
(D) $W = \sqrt{3} V_L I_L \cos\phi$

**13.** The expression of total power in two wattmeter measurement of power for a three phase balanced load is

(A) $W_1 + W_2$
(B) $W_1 - W_2$
(C) $2(W_1 - W_2)$
(D) $2W_1 - W_2$

**14.** In a balanced three phase load connected to 200 V, 50 Hz three phase supply, the line current is 115.5 A. When the power is measured by two-wattmeter method one of the wattmeter reads 20 kW and the other zero. The power factor of the load is

(A) zero
(B) unity
(C) 0·5
(D) 0·866

**15.** A circuit is shown in the Fig. Q 15. Find the current flowing in 12 Ohm resistance.

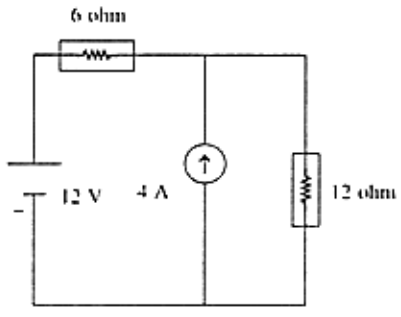


Fig. Q 15

(A) 2 A
(B) 1 A
(C) 4 A
(D) 0 A

16. Three resistances of 12 ohm each are connected in Delta. What is the equivalent resistance in each branch if the Delta network is converted into a star network?

(A) 4 Ohm
(B) 8 Ohm
(C) 16 Ohm
(D) 10 Ohm

17. A current of 300 μA produces a Full Scale Division in an instrument whose coil resistance is 75 Ohm. Calculate the values of the shunt resistors if the instrument is to measure currents of 5A.

(A) 0·0008 Ohm
(B) 0·0045 Ohm
(C) 0·0040 Ohm
(D) 0·0065 Ohm

18. Output terminals of a measuring CT must not be

(A) open circuited
(B) short circuited
(C) connected to very low resistance
(D) connected in parallel to an ammeter

19. The CE amplifier has

(A) only current gain
(B) only voltage gain
(C) both current gain and voltage gain
(D) no voltage or current gain

20. The number of diodes requires in a single phase bridge rectifier

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

21. The thyristor cannot be turned off

(A) applying reverse voltage
(B) decreasing the current below the holding current
(C) by making gate current zero
(D) using none of the above schemes mentioned in (A), (B) and (C)

22. The oscillator which will produce square wave oscillating output

(A) Wien bridge oscillator
(B) Phase shift oscillator
(C) Colpitts oscillator
(D) Astable multivibrators

23. The resistivity of a semiconductor materials has

(A) positive temperature coefficient
(B) negative temperature coefficient
(C) zero temperature coefficient
(D) No dependency on doping

24. The current of an a.c. circuit is $i = 10\sin\left(\omega t - \frac{\pi}{6}\right)$ Amps. What will be the reading if this current is measured by a moving coil ammeter?

(A) 14·14 A
(B) 10 A
(C) 7·07 A
(D) 0 A

**25.** An ammeter gives full scale deflection when it measures 1 mA. The coil resistance of 100 Ω. How can this instrument be converted to read up to 1·0 A?

(A) 0·1Ω is connected in parallel to the ammeter coil

(B) 0·1Ω is connected in series to the ammeter coil

(C) 100·1 Ω is connected in parallel to the ammeter coil

(D) 100·1 Ω is connected in series to the ammeter coil

**26.** In two wattmeter method of measurement of three-phase power of balanced load, if both the wattmeters indicate the same reading then the power factor of the load is

(A) 0·5 lagging

(B) less than 0·5 lagging

(C) unity

(D) greater than 0·5 lagging

**27.** In moving iron instrument, the relation between deflecting torque ($T_d$) and the current ($I$) to be measured is

(A) $T_d \propto I$

(B) $T_d \propto I^2$

(C) $T_d \propto I^{3/2}$

(D) $T \propto \sqrt{I}$

**28.** In dynamometer wattmeter the compensating coil

(A) has equal number of turns of voltage coil and is connected in series with current coil.

(B) has equal number of turns of current coil and is connected in series with voltage coil.

(C) has equal number of turns of current coil and is connected in series with current coil.

(D) has equal number of turns of voltage coil and is connected in series with voltage coil.

**29.** For a burden of 15 VA and secondary rated current of 5 A of a current transformer, the load impedance is

(A) infinity

(B) zero

(C) 0·333 Ω

(D) 0·6 Ω

**30.** The number of teeth in a d.c. machine is 37. The number of slots in the machine is

(A) 37

(B) 36

(C) 38

(D) 19

**31.** A 900 rpm, 6-pole d.c. generator has simplex lap winding consisting of 300 conductors on the armature. If the flux per pole is 50 mwb then the emf induced between the brushes is

(A) 337·5 V

(B) 2250 V

(C) 225 V

(D) 675 V

**32.** The external characteristic of d.c. generator is the relation between

(A) induced emf and load current

(B) terminal voltage and load current

(C) induced emf and field current

(D) terminal voltage and field current

33. If a d.c. series motor is started without load, the motor will

(A) run slowly
(B) run at normal speed
(C) pick-up high speed
(D) refuse to start at all

34. The back emf of a d.c. shunt motor at starting is

(A) zero
(B) equal to the supply voltage
(C) infinity
(D) about 50% of the supply voltage

35. Swinburne's test of d.c. machine determines

(A) speed regulation
(B) voltage regulation
(C) efficiency
(D) constant loss

36. The yoke of a transformer is made of

(A) solid steel bar
(B) solid copper bar
(C) copper stampings
(D) iron stamping

37. In a transformer, if $f$ is the supply frequency in Hz, $\Phi_m$ is the maximum mutual flux in weber than per turn voltage of the transformer in volts is

(A) $f\Phi_m$ volts
(B) $\sqrt{2}\pi f\Phi_m$ volts
(C) $\pi f\Phi_m$ volts
(D) $\frac{\pi}{\sqrt{2}}f\Phi_m$ volts

38. The high-voltage and low-voltage winding resistances of a distribution transformer of 100 kVA, 1100/220 volts, 50 Hz are 0·1 Ω and 0·004 Ω respectively. Find the equivalent resistance referred to high-voltage side and low-voltage side.

(A) 0·2 Ω and 0.10016 Ω
(B) 2·504 Ω and 0.10016 Ω
(C) 0·2 Ω and 0.008 Ω
(D) 2·504 Ω and 0.008 Ω

39. The short-circuit test of a transformer gives

(A) equivalent resistance and equivalent reactance.
(B) equivalent reactance and magnetizing reactance.
(C) core loss resistance and equivalent resistance.
(D) core loss resistance and magnetizing reactance.

40. The most common connection of a 3-ϕ distribution transformer is

(A) star/delta
(B) delta/delta
(C) star/star
(D) delta/star

**41.** For a particular power factor, the maximum efficiency of a transformer occurs when

(A) total loss = variable loss
(B) constant loss = total loss
(C) hysteresis loss = eddy current loss
(D) constant loss = variable loss

**42.** The full load slip of a 3-$\phi$, 4-pole, 50 Hz induction motor running at 1455 rpm at full load is

(A) 3·09%
(B) 3%
(C) 97%
(D) 0·333%

**43.** In a 3-$\phi$ squirrel cage induction motor, the rotor conductors are

(A) short circuited via external resistance
(B) short circuited via end rings
(C) open circuited via high impedance
(D) open circuited via slip rings

**44.** During starting of 3-$\phi$ squirrel cage induction motor, the machine may refuse to start at all. This phenomenon is called

(A) crawling
(B) stalling
(C) cogging
(D) single phasing

**45.** The coil pitch factor for a full pitched winding of a synchronous machine is

(A) 1·0
(B) 0·5
(C) 0·6
(D) 0·8

**46.** The armature reaction in synchronous machine is the effect of

(A) armature current on main flux.
(B) armature current on field flux.
(C) field current on main flux.
(D) field current on armature flux.

**47.** The synchronous motor is ideally suited for

(A) electric tram cars
(B) large elevators
(C) large compressors
(D) large cranes

**48.** The overall efficiency of a thermal power plant is in the range of

(A) 20-35%
(B) 70-80%
(C) 50-60%
(D) 85-95%

**49.** In power generating station, 'Load factor' is defined as

(A) $\frac{\text{maximum demand}}{\text{connected load}}$
(B) $\frac{\text{average demand}}{\text{installed capacity}}$
(C) $\frac{\text{maximum demand}}{\text{installed capacity}}$
(D) $\frac{\text{average demand}}{\text{maximum demand}}$

**50.** For same power transmission, same power loss and same maximum voltage between conductor and earth, the ratio of copper requirement for a.c., 3-$\phi$, 3-wire system with power factor cos $\phi$ to d.c., 2-wire system is

(A) $\frac{0.5}{\cos^2\phi}$
(B) $\frac{1.5}{\cos^2\phi}$
(C) 1·0
(D) $2\cos^2\phi$