

ELECTRICAL ENGINEERING

Max. Marks – 100

Roll No. (in figures) _____

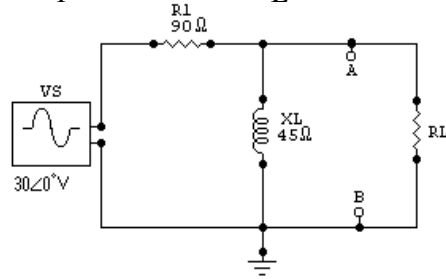
Roll No. (in words) _____

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1. Ampere second could be the unit of
(a) Power. (b) Conductance.
(c) Energy. (d) Charge. []
2. Which of the following theorems are applicable for both linear and non-linear circuits?
(a) Superposition Theorem. (b) Thevenin's Theorem.
(c) Norton's Theorem. (d) None of these. []
3. Superposition theorem is not applicable for
(a) Voltage Calculations. (b) Bilateral Elements.
(c) Power Calculations. (d) Passive elements. []
4. In nodal analysis, if there are N nodes in the circuit, then how many equations will be written to solve the network?
(a) N-1. (b) N+1.
(c) N. (d) N-2. []
5. The temperature coefficient of resistance of an insulator is
(a) Positive and independent of temperature.
(b) Negative and independent of temperature.
(c) Negative and dependent of temperature.
(d) Positive and dependent of temperature. []
6. If two currents are in the same direction at any instant of time in a given branch of a circuit, the net current at that instant
(a) Is Zero.
(b) Is Sum of the two currents.
(c) Is difference between two currents.
(d) Cannot be determined. []

7. Determine V_{TH} when R_1 is 180Ω and X_L is 90Ω .



- (a) $135\angle 63.4^\circ$ V. (b) $13.5\angle 63.4^\circ$ V
 (c) $12.2\angle 0^\circ$ V (d) $122\angle 0^\circ$ V [].

8. For the system $2 / (s + 1)$, the approximate time taken for a step response to reach 98 % of the final value is:

- (a) 1 s. (b) 2 s.
 (c) 4 s. (d) 8 s. [].

9. A cascade of three Linear Time Invariant system is casual and unstable. From this, we conclude that:

- (a) Each system in the cascade is individually casual and unstable.
 (b) At least one system is unstable and at least one system is casual.
 (c) At least one system is casual and all systems are unstable.
 (d) The majority are unstable and the majority are casual. [].

10. Following is true:

- (a) A finite signal is always bounded.
 (b) A bounded signal always possesses finite energy.
 (c) A bounded signal is always zero outside the interval $[- t_0 , t_0]$ for some t_0 .
 (d) A bounded signal is always finite. [].

11. The Laplace transform of a function $f(t)$ is $F(s) = (5s^2 + 23s + 6) / (s^2 + 2s + 2)$ as $t \rightarrow \infty$, $f(t)$ Approaches:

- (a) 3. (b) 5.
 (c) $17/2$. (d) ∞ . [].

12. The RMS value of the resultant current in a wire which carries a DC current of 10 A and a sinusoidal alternating current of peak value 20 is

- (a) 14.1. (b) 17.3.
 (c) 22.4 (d) 30.0. [].

13. The fourier series for the function $f(x) = \sin^2 x$ is:

- (a) $\sin x + \sin 2x$. (b) $1 - \cos 2x$.
 (c) $\sin 2x + \cos 2x$. (d) $0.5 - 0.5 \cos 2x$. [].

14. The period of the signal $x(t) = 8 \sin(0.8\pi t + \pi/4)$ is:
 (a) 0.4π s. (b) 0.8π s.
 (c) 1.25 s. (d) 2.5 s. [].
15. Skewing in the slots of an induction motor is provided to reduce:
 (a) Iron loss. (b) Noise.
 (c) Harmonics. (d) Temperature rise. [].
16. Sometimes a reactor is connected in series with a transformer to:
 (a) Improve regulation. (b) Control fault current.
 (c) Improve efficiency. (d) Improve power factor. [].
17. Which loss occurs in the yoke of a DC machine?
 (a) Iron loss. (b) Copper loss.
 (c) Heat loss. (d) No loss. [].
18. In case of transformers, with increasing frequency:
 (a) Copper losses reduce but efficiency increases.
 (b) Copper losses increase but efficiency decreases.
 (c) Both copper losses and efficiency increase.
 (d) Copper losses remain unaffected while efficiency increases. [].
19. In case a synchronous motor starts but fails to develop full torque, the probable cause could be:
 (a) Low excited voltage. (b) Reverse field winding.
 (c) Open or short circuit. (d) Any of the above. [].
20. Distributed winding and short chording employed in AC machines will result in:
 (a) Increase in EMF and reduction in harmonics.
 (b) Reduction in EMF and increase in harmonics.
 (c) Increase in both EMF and harmonics.
 (d) Reduction in both EMF and harmonics. [].
21. The DC motor, which can provide zero speed regulation at full load without any controller is:
 (a) Series. (b) Shunt.
 (c) Cumulative Compound. (d) Differential Compound. [].
22. What is maximum efficiency (in %) at unity p.f. load?
 (a) 95.1. (b) 96.2.
 (c) 96.4. (d) 98.1. [].
23. A DC series motor driving an electric train faces a constant power load. It is running at rated speed and rated voltage. If the speed has to be brought down to 0.25 p.u. the supply voltage has to be approximately brought down to:
 (a) 0.75 p.u. (b) 0.5 p.u.
 (c) 0.25 p.u. (d) 0.125 p.u. [].

24. The core flux of a practical transformer with a resistive load:
 (a) Is strictly constant with load changes.
 (b) Increases linearly with load.
 (c) Increases as the square root of the load.
 (d) Decreases with increased load. [].
25. For a fixed value of complex power flow in a transmission line having a sending end voltage V , the real loss will be proportional to:
 (a) V . (b) V^2 .
 (c) V^{-2} . (d) V^{-1} .
 [].
26. The concept of an electrically short, medium and long line is primarily based on the:
 (a) Nominal voltage of the line.
 (b) Physical length of the line.
 (c) Wavelength of the line.
 (d) Power transmitted over the line. [].
27. Keeping in view the cost and overall effectiveness, the following circuit breaker is best suited for Capacitor bank switching:
 (a) Vacuum. (b) Air Blast.
 (c) SF_6 . (d) Oil. [].
28. The Gauss Seidel load flow method has following disadvantages. Which is the incorrect statement:
 (a) Unreliable Convergence.
 (b) Slow Convergence.
 (c) Choice of slack bus affects convergence.
 (d) A good initial guess for voltages is essential for convergence. [].
29. Bundled conductors are mainly used in high voltage overhead transmission lines to:
 (a) Reduces transmission line losses.
 (b) Increases mechanical strength of the line.
 (c) Reduces Corona.
 (d) Reduces Sag. [].
30. Equal area criteria gives the information regarding
 (a) Stability region. (b) Absolute Stability.
 (c) Relative Stability. (d) Swing Curves. [].
31. The transfer of power between two stations is maximum when the phase angle displacement between the voltages of the two stations is:
 (a) Zero. (b) 90° .

(c) 120° . (d) 180° . [].

32. Which of the following statement about SF_6 gas is incorrect?

(a) It is non-toxic gas. (b) It is non-inflammable.
(c) It has density 5 times that of air at $20^\circ C$. (d) It has dark yellow color. [].

33. Sphere gaps are used for

(a) Measurement of high dc voltages. (b) Measurement of high ac voltages.
(c) Measurement of impulse voltages. (d) All of the above. [].

34. For the equation, $s^3 - 4s^2 + s + 6 = 0$ the number of roots in the left half of s – plane will be:

(a) Zero. (b) One.
(c) Two. (d) Three. [].

35. The Transfer function of the system is used to determine:

(a) The output for a given input. (b) The type of the system.
(c) The input for a given output. (d) The steady state gain. [].

36. Control Systems are normally designed with damping factor:

(a) Less than unity. (b) More than unity.
(c) Zero. (d) Unity. [].

37. The ON-OFF controller is a ___ system:

(a) Linear. (b) Non linear.
(c) Discontinuous. (d) Digital. [].

38. Control Systems are normally designed with damping factor:

(a) Less than unity. (b) More than unity.
(c) Zero. (d) Unity. [].

39. The Nyquist plot of loop transfer function $G(s)H(s)$ of a closed loop control system passes through the

Point $(-1, j0)$ in the $G(s)H(s)$ plane. The phase margin of the system is:

(a) 0° . (b) 45° .
(c) 90° . (d) 180° . []

40. Consider the function $F(s) = 5 / (s^2 + 3s + 2)$, where $F(s)$ is the Laplace Transform of the function $f(t)$. The initial value of $f(t)$ is equal to:

(a) 5. (b) $5/2$.
(c) $5/3$. (d) 0. [].

41. The Q-meter works on the principle of:

(a) Mutual Inductance. (b) Self Inductance.
(c) Series Resonance. (d) Parallel Resonance. [].

42. Moving Iron instruments can be used on:

- (a) AC and DC both.
- (b) AC only.
- (c) DC only.
- (d) None of the above. []

43. A galvanometer can be used for measuring current and voltage of a circuit by:

- (a) Shunt only.
- (b) Connecting high value of resistance in series only.
- (c) Shunt for measuring current and high resistance in series for voltage.
- (d) Without shunt and series resistance. []

44. The energy meter used for measuring energy of a dc circuit is:

- (a) Ampere hour meter.
- (b) Induction type.
- (c) Electrostatic type.
- (d) Dynamometer type. []

45. The energy consumption of MI instrument as compared to MC instrument is:

- (a) Same.
- (b) More.
- (c) Less.
- (d) Very small. []

46. The complete set of only those Logic Gates designated as Universal Gates is:

- (a) NOT, OR and AND Gates.
- (b) XNOR, NOR and NAND Gates.
- (c) NOR and NAND Gates.
- (d) XOR, NOR and NAND Gates. []

47. The simplified form of the Boolean Expression $Y =$ can be written as:

- (a) .
- (b) .
- (c) .
- (d) . []

48. An SCR is considered to be a semi-controlled device because:

- (a) It can be turned OFF but not ON with a gate pulse.
- (b) It conducts only during one half cycle of an alternating current wave.
- (c) It can be turned ON but not OFF with a gate pulse.
- (d) It can be turned ON only during one half cycle of an alternating voltage wave. []

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

- (a) 0.78.
- (b) 0.827.
- (c) 0.866.
- (d) 0.9. []

50. The conduction loss versus device current characteristics of a power MOSFET is best approximated by:

- (a) A Parabola.
- (b) A Straight Line.
- (c) A Rectangular Hyperbola.
- (d) An Exponentially Decaying Function. []

Rough Sheet