

# EE: ELECTRICAL ENGINEERING

(40 Multiple choice questions of 1.25 marks each)

Roll No. \_\_\_\_\_

Discipline: \_\_\_\_\_

## SECTION-1

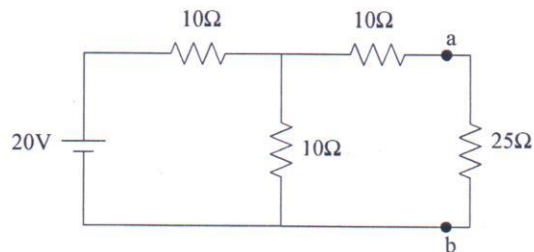
Q1. The graph of an electrical network has  $N$  nodes and  $B$  branches. The number of links  $L$  with respect to the choice of tree is

- (a)  $B-N+1$
- (b)  $B+N$
- (c)  $N-B+1$
- (d)  $N-2B-1$

Q2. A two-port network is defined by the relation  $I_1 = 2V_1 + V_2$ ;  $I_2 = 2V_1 + 3V_2$ , then  $Z_{12}$  is

- (a)  $-2 \Omega$
- (b)  $-1 \Omega$
- (c)  $-3/4 \Omega$
- (d)  $-1/4 \Omega$

Q3. The current in  $25 \Omega$  resistance of the network shown below is given by



- (a) 6.25 A
- (b) 0.25 A
- (c) 2.5 A
- (d) None of these

Q4. In India, as per the latest data, the contribution of renewable energy sources in the installed capacity is about

- (a) 5%
- (b) 10%
- (c) 15%
- (d) 20%

- Q5. Ferranti effect on long overhead transmission line is experienced, when it is
- Lightly loaded
  - On full load at unity power factor
  - On full load at 0.8 power factor load
  - On full load at 0.5 power factor load
- Q6. An overhead 3 phase transmission line delivers 500 kW at 33 kV at 0.8 power factor lagging. The line current is
- 12 A
  - 14 A
  - 11 A
  - 13 A
- Q7. The H constants of two non-coherent machines in a system on same MVA base are given as  $H_1=4.25$  MJ/MVA and  $H_2=3.75$  MJ/MVA, the equivalent H of the two machines will be
- 8 MJ/MVA
  - 1.992 MJ/MVA
  - 4 MJ/MVA
  - 3.532 MJ/MVA
- Q8. Equal area criterion method is used to determine the stability of
- Single machine system
  - Two machine system
  - Multi machine system
  - All of the above
- Q9. For critically damped system, the nature of the response of a second order system is
- Oscillatory
  - Damped Oscillatory
  - Exponentially rising
  - None of these
- Q10. For the transfer function  $G(s) = \frac{k}{s(s^2+5s+10)}$ , the number of asymptotes are
- 1
  - 3
  - 2
  - 4
- Q11. For the given characteristics equation  $s^4 + 3s^3 + 4s^2 + 4s + 6 = 0$ , the system is
- Stable
  - Unstable
  - Marginally stable
  - None of these

- Q12. Two wattmeters  $W_1$  and  $W_2$  are used to measure power in a three phase circuit having a phase sequence of RYB. The circuit coil of  $W_1$  is connected in R and that of  $W_2$  is connected in B. If reading of  $W_2$  is zero, the power factor of the circuit is
- (a) 0.5 lead
  - (b) 0.5 lag
  - (c) Zero
  - (d) Unity power factor lead
- Q13. A single-phase energy meter is operating on 200 V, 50 Hz, supply with a load of 15 A at unity power factor for 2 hours. The meter makes 960 revolutions during this period. The meter constant is
- (a) 0.16 rev/kWh
  - (b) 1/160 rev/kWh
  - (c) 256 rev/kWh
  - (d) 160 rev/kWh
- Q14. The burden of a CT is expressed in
- (a) Power rating of the resistor
  - (b) VA rating
  - (c) Current rating of secondary winding
  - (d) Current and voltage rating of secondary winding
- Q15. The maximum value of  $di/dt$  of SCR is
- (a) 3.3 A/ $\mu$ S
  - (b) 3 A/ $\mu$ S
  - (c) 4.3 A/ $\mu$ S
  - (d) 4 A/ $\mu$ S
- Q16. In a thyristor DC chopper the commutation that results in best performance is
- (a) Current commutation
  - (b) Supply commutation
  - (c) Voltage commutation
  - (d) Load commutation
- Q17. The full load copper loss and iron loss of a transformer are 6400 W and 5000 W respectively. The copper loss and iron loss at half load will be, respectively
- (a) 3200 W and 2500 W
  - (b) 1600 W and 2500 W
  - (c) 1600 W and 1250 W
  - (d) 1600 W and 5000 W

- Q18. An independent voltage source in series with an impedance  $Z_s = R_s + j X_s$  delivers a maximum average power to a load impedance  $Z_L$  when
- (a)  $Z_L = R_s + j X_s$
  - (b)  $Z_L = R_s$
  - (c)  $Z_L = jX_s$
  - (d)  $Z_L = R_s - jX_s$
- Q19. A signal of frequency of 10 kHz is sampled at Nyquist rate. The time interval between successive samples is
- (a) 50  $\mu\text{sec}$
  - (b) 100  $\mu\text{sec}$
  - (c) 1000  $\mu\text{sec}$
  - (d) 5  $\mu\text{sec}$
- Q20.  $y(t) = t x(t)$  then the signal is
- (a) Unstable
  - (b) Stable
  - (c) Stable but non-casual
  - (d) Unstable but non-casual
- Q21. The following switching functions are to be implemented using a decoder  $F_1 = \Sigma m (1, 2, 4, 8, 10, 14)$ ;  $F_2 = \Sigma m (2, 4, 5, 6, 7)$ ;  $F_3 = \Sigma m (2, 4, 9, 11)$ , the minimum configuration of the decoder should be
- (a) 2 to 4 line decoder
  - (b) 3 to 8 line decoder
  - (c) 4 to 16 line decoder
  - (d) 5 to 32 line decoder
- Q22. The bit sequence 0 0 1 0 is serially entered into a 4 bit parallel out shift register that is initially clear. The Q outputs after 2 clock pulses will be
- (a) 0 0 1 0
  - (b) 0 0 0 0
  - (c) 1 1 1 1
  - (d) 1 0 0 0
- Q23. An n-channel JFET has  $I_{DSS} = 2 \text{ mA}$  and  $V_P = -4 \text{ V}$ . Its transconductance  $g_m$  (in milli mho) for an applied gate to source voltage  $V_{GS}$  of -2 V is
- (a) 0.25
  - (b) 0.5
  - (c) 0.75
  - (d) 1.0

- Q24. Which type of transformer is most commonly used in power systems?
- (a) Star/Star
  - (b) Delta/Delta
  - (c) Star/Delta
  - (d) Zig zag/Star
- Q25. If no load voltage of a generator is 230 V and the rated voltage is 200 V, then the voltage regulation is nearly
- (a) 5%
  - (b) 10%
  - (c) 20%
  - (d) 15%
- Q26. A 220 V separately excited DC machine has an armature resistance of  $0.4 \Omega$ . If the load current is 18 A, the induced emf when the machine operates as a generator and as a motor respectively are
- (a) 207.2 V, 202.8 V
  - (b) 212.8 V, 227.2 V
  - (c) 227.2 V, 212.8 V
  - (d) 202.8 V, 207.2 V
- Q27. A 10-mA ammeter has a resistance of  $50 \Omega$ . It has to be converted to a 1 A ammeter. The value of shunt resistance is
- (a)  $5 \Omega$
  - (b)  $0.05 \Omega$
  - (c)  $0.5 \Omega$
  - (d)  $50 \Omega$
- Q28. A wattmeter has a range of 1000 W with an error of  $\pm 2\%$  of full scale deflection. If the true power passed through it is 100 W, then the relative error would be
- (a)  $\pm 20\%$
  - (b)  $\pm 5\%$
  - (c)  $\pm 0.5\%$
  - (d)  $\pm 1\%$
- Q29. An electronic voltmeter is more reliable as compared to multi-meter for measuring voltages across low impedance because
- (a) Its sensitivity is high
  - (b) It offers high input impedance
  - (c) It does not alter the measured voltage
  - (d) Its sensitivity and input impedance are high and don't alter the measured value

- Q30. In a 25 kVA, 2000/200V transformer has iron and full load copper losses of 350 W and 400 W respectively. The efficiency of transformer at unity power factor at full load and half load respectively is
- (a) 97.09%, 96.53%
  - (b) 98.09%, 97.63%
  - (c) 96.60%, 95.53%
  - (d) 96.53%, 97.09%
- Q31. Inside a hollow conducting sphere
- (a) Electric field is infinite
  - (b) Electric field is a non-zero constant
  - (c) Electric field is zero
  - (d) None of these
- Q32. When the plate area of a parallel plate capacitor is increased keeping the capacitor voltage constant, the force between the plates
- (a) Increases
  - (b) Decreases
  - (c) Remain constant
  - (d) Becomes zero
- Q33. Unilateral Laplace transform of  $\delta(t+2)$  is
- (a)  $e^{2s}$
  - (b)  $e^{2s}/s$
  - (c) 0
  - (d)  $e^{-2s}$
- Q34. In order to get the original signal from the sampled signal, which of the following filter should be necessarily used?
- (a) Band pass filter
  - (b) Low pass filter
  - (c) High pass filter
  - (d) Band stop filter
- Q35. The rotor of a 4 pole, three phase cage induction motor is replaced by a three phase, 4 pole wound rotor when fed with normal supply, the machine will
- (a) Not run
  - (b) Run of slightly lower than normal speed
  - (c) Run at slightly higher than normal speed
  - (d) Run at very low speed

Q36. Synchronous capacitor is

- (a) An under excited synchronous motor with light load
- (b) An over excited synchronous motor with no load
- (c) An over excited synchronous motor with mechanical load
- (d) None of the above

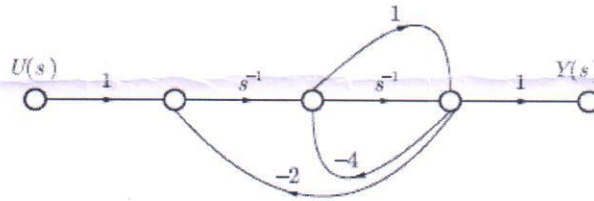
Q37. A two machine system is stable only if

- (a)  $-90^\circ < \delta < 90^\circ$ ,  $dP/d\delta$  is positive
- (b)  $\delta > 90^\circ$ ,  $dP/d\delta$  is negative
- (c)  $-90^\circ < \delta < 90^\circ$ ,  $dP/d\delta$  is negative
- (d)  $0 < \delta < 90^\circ$ ,  $dP/d\delta$  is positive

Q38. Merz price protection is a type of

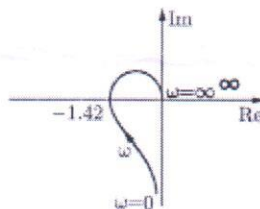
- (a) Distance protection
- (b) Differential protection
- (c) Both a and b
- (d) None of these

Q39. The signal flow graph for a system is given below. The transfer function  $(Y(s))/(U(s))$  for this system is



- (a)  $\frac{s+1}{5s^2+6s+2}$
- (b)  $\frac{s+1}{s^2+6s+2}$
- (c)  $\frac{s+1}{5s^2+4s+2}$
- (d)  $\frac{1}{5s^2+6s+2}$

Q40. The polar plot of an open loop stable system is shown below. The closed loop system is



- (a) Always stable
- (b) Marginally stable
- (c) Unstable with one pole on the RH  $s$ -plane
- (d) Unstable with two poles on the RH  $s$ -plane

EE

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**Answer Key**

Question No	Answer
Q1	A
Q2	D
Q3	B
Q4	D
Q5	A
Q6	C
Q7	B
Q8	B
Q9	C
Q10	B
Q11	B
Q12	A
Q13	D
Q14	B
Q15	B
Q16	C
Q17	D
Q18	D
Q19	A
Q20	A
Q21	C
Q22	D
Q23	B
Q24	C
Q25	D
Q26	C
Q27	C
Q28	A
Q29	D
Q30	A
Q31	C
Q32	A
Q33	C
Q34	B
Q35	D
Q36	B
Q37	A
Q38	B
Q39	A
Q40	D