

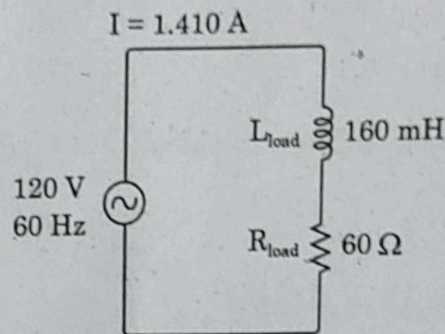
105/2022

Maximum : 100 marks

Time : 1 hour and 15 minutes

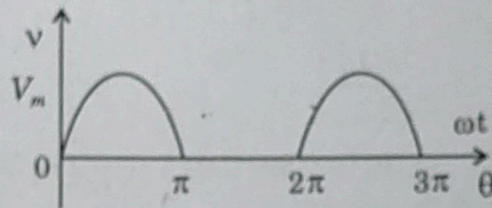
1. Who got ONV Literary Award for the year 2022?
(A) C. Radhakrishnan (B) T. Padmanabhan
(C) M. Mukundan (D) K.R. Meera
2. Which Article of the Indian Constitution relates to GST Council?
(A) Article 239 AA (B) Article 312
(C) Article 280 (D) Article 279 A
3. The book 'Waiting for Mahatma' is written by
(A) R.K. Narayan (B) Ramchandra Guha
(C) Mulk Raj Anand (D) Gopalkrishna Gandhi
4. Where is the World Economic Forum Annual Meeting held?
(A) New York (B) Geneva
(C) Davos (D) Hague
5. Operation Ganga is associated with
(A) Conservation and Rejuvenation of River Ganga
(B) Evacuation of Indians from Ukraine
(C) Campaign for reducing fuel consumption
(D) Evacuation of Indians from Sri Lanka
6. Azad Hind Fauj is organized by :
(A) Chittaranjan Das (B) Sri Aurobindo
(C) Bhagat Singh (D) Subhash Chandra Bose
7. Which day is celebrated as National Voter's Day?
(A) January 25 (B) November 26
(C) January 26 (D) November 25
8. Dostarlimab medicine is related to which disease?
(A) AIDS (B) Asthma
(C) Cancer (D) Alzheimer's

9. Who is known as 'the Tendulkar of Women's Cricket'?
- (A) Ellyse Perry (B) Jhulan Goswami
(C) Sana Mir (D) Mithali Raj
10. Which Country Won the Thomas Cup 2022?
- (A) Indonesia (B) India
(C) Australia (D) Germany
11. A series RLC circuit has $R = 2000$, $L = 50$ mH and $C = 0.60$ F and a peak voltage of 40 V at a frequency of 100 Hz. What is the rms value of the current in the circuit?
- (A) 20 mA (B) 14.14 A
(C) 19.5 mA (D) 14.14 mA
12. For the circuit given, find the reactive power :

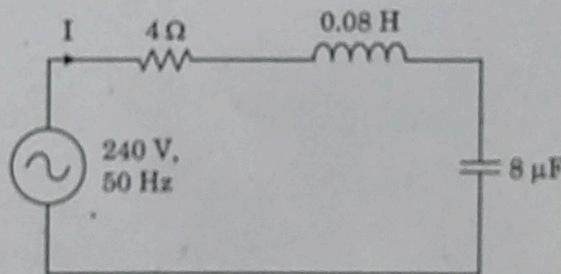


- (A) 119.998 VAR (B) 119.365 VAR
(C) 169.256 VAR (D) 119.998 W
13. A resistor of 10Ω , inductance 0.3 H and capacitance of $100 \mu\text{F}$ are connected across 230 V, 50 Hz mains in series. Calculate the power factor :
- (A) Zero (B) 0.158 lag
(C) 0.158 lead (D) Unity
14. The value of ripple factor for a full wave rectifier is :
- (A) $\sqrt{3}$ (B) 1.21
(C) $\sqrt{2}$ (D) 0.482
15. Controlling torque in indicating instruments is commonly achieved by :
- (A) Fluid friction (B) Eddy currents
(C) Air friction (D) Springs

16. A coil is wound uniformly with 300 turns over a steel ring of relative permeability 900, having a mean circumference of 40 cm and a cross sectional area of 5 cm^2 . If the coil has a resistance of 100Ω and is connected to 250 V dc supply, calculate the field strength :
- (A) 1875 AT/m (B) 750 AT/m
 (C) 1500 AT/m (D) 900 AT/m
17. A coil of 1000 turns is linking a flux of 0.01 Wb . The flux is reversed in an interval of 0.1 sec . Calculate the average e.m.f. induced in the coil :
- (A) 150 V (B) 300 V
 (C) 200 V (D) 220 V
18. A conductor of length 150 cm moves at an angle of 30° to a uniform magnetic field of flux density 2 T with a velocity of 100 m/sec . Calculate the e.m.f. induced in it :
- (A) 75 V (B) 150 V
 (C) 37.5 V (D) 50 V
19. Determine the form factor of the output voltage wave of a half wave rectified :

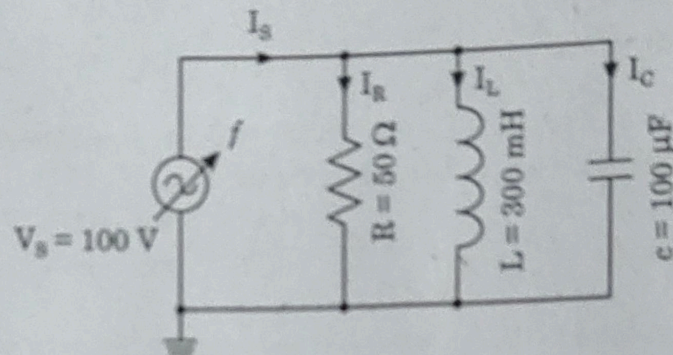


- (A) 1.11 (B) $\sqrt{2}$
 (C) $\sqrt{3}$ (D) 1.57
20. A 240 V , 50 Hz , AC supply is applied a coil of 0.08 H inductance and 4Ω resistance connected in series with a capacitor of $8 \mu\text{F}$. Calculate the Q-factor of the circuit at resonant frequency.

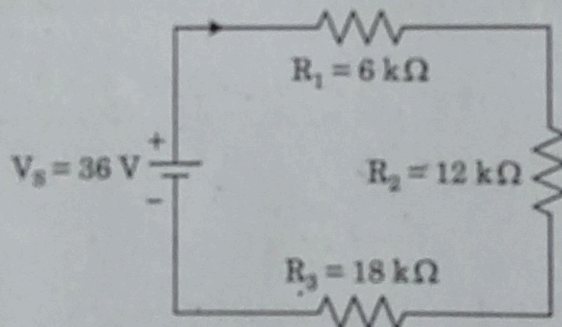


- (A) 25 (B) 50
 (C) 75 (D) 100

21. A parallel resonance network consisting of a resistor of $50\ \Omega$, a capacitor of $100\ \mu\text{F}$ and an inductor of $300\ \text{mH}$ is connected across a sinusoidal supply voltage which has a constant output of $100\ \text{volts}$ at all frequencies. Calculate the resonant frequency.

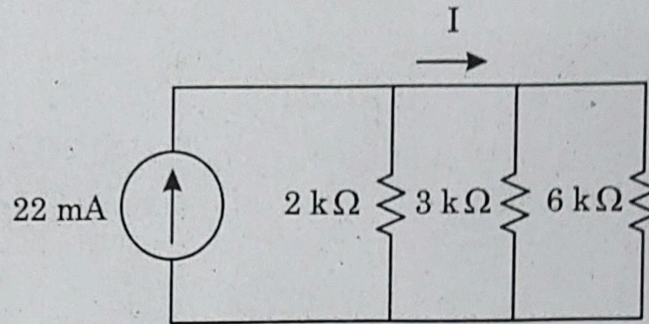


- (A) $50\ \text{Hz}$ (B) $60\ \text{Hz}$
 (C) $10.06\ \text{Hz}$ (D) $29.06\ \text{Hz}$
22. A $12\ \mu\text{F}$ capacitor is connected to a $50\ \text{V}$ battery. How much electrostatic energy is stored in the capacitor?
 (A) $2.5 \times 10^{-8}\ \text{J}$ (B) $1.5 \times 10^{-8}\ \text{J}$
 (C) $1.5 \times 10^{-12}\ \text{J}$ (D) $3.5 \times 10^{-8}\ \text{J}$
23. A $40\ \text{kVA}$, $3300/240\ \text{V}$, $50\ \text{Hz}$, 1-phase transformer has 660 turns on the primary. Determine the number of turns on the secondary.
 (A) 42 (B) 24
 (C) 48 (D) 9075
24. Find the voltage drop across R_1 .



- (A) $18\ \text{V}$ (B) $12\ \text{V}$
 (C) $6\ \text{V}$ (D) $36\ \text{V}$

25. Find the current I in the circuit given



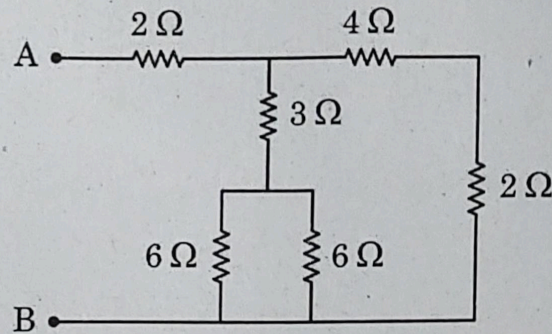
(A) 4 mA

(B) 6 mA

(C) 12 mA

(D) 11 mA

26. Find the equivalent resistance across the terminals A & B of the following electrical network.



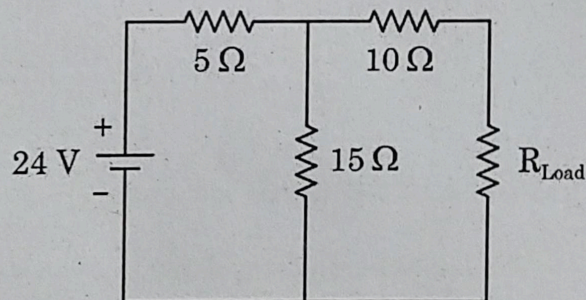
(A) $5\ \Omega$

(B) $23\ \Omega$

(C) $10\ \Omega$

(D) None of these

27. What is Thevenin's voltage for the given circuit with load R_{Load} ?



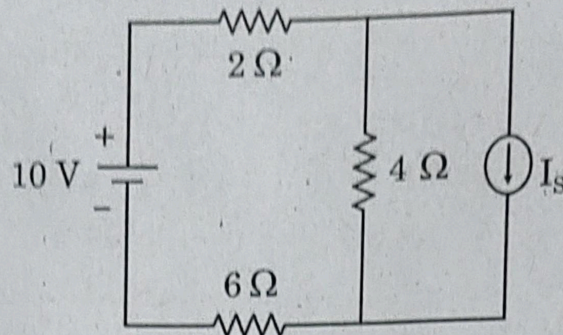
(A) 24 V

(B) 18 V

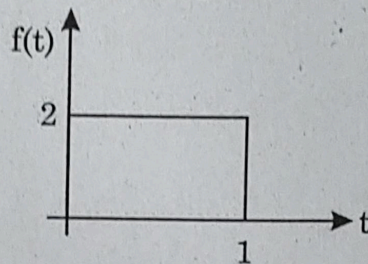
(C) 15 V

(D) 12 V

28. For the given network, find the value of I_s which reduces the voltage across 4Ω resistor to zero. (Hint : Use Superposition theorem)

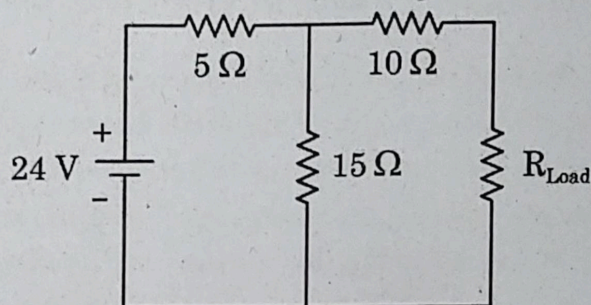


- (A) 2 A
(B) 3.5 A
(C) 1.5 A
(D) 1.25 A
29. The inverse Laplace transform of $H(S) = \frac{S+3}{S^2+2S+1}$ for $t \geq 0$ is
- (A) $3te^{-t} + e^{-t}$
(B) $3e^{-t}$
(C) $2te^{-t} + e^{-t}$
(D) $4te^{-t} + e^{-t}$
30. Laplace transform of the function shown below is given by :



- (A) $\frac{1-e^{-2s}}{s}$
(B) $\frac{1-e^{-s}}{2s}$
(C) $\frac{2(1-e^{-s})}{s}$
(D) $\frac{1-2e^{-2s}}{s}$
31. The function $f(t)$ satisfies the differential equation $\frac{d^2f}{dt^2} + f = 0$ and the auxiliary conditions, $f(0) = 0, \frac{df}{dt}(0) = 4$. The Laplace transform of $f(t)$ is given by
- (A) $\frac{2}{s+1}$
(B) $\frac{4}{s^2+1}$
(C) $\frac{3}{s+1}$
(D) $\frac{2}{s^4+1}$

32. The star equivalent resistance of 3 resistors having each resistance = 5Ω is.
- (A) 1.5Ω (B) 3Ω
 (C) 4.5Ω (D) 1.67Ω
33. Given two mutually coupled coils have a total inductance of 1500 mH, the self-inductance of each coils if the coefficient of coupling is 0.2 is
- (A) 625 mH (B) 550 mH
 (C) 325 mH (D) 255 mH
34. A capacitor, used for power factor correction in a single phase circuit increases which of the following?
- (A) Line Current
 (B) Power Factor
 (C) Both Line Current and Power Factor
 (D) Neither Line Current nor Power Factor
35. What is Norton's resistance for the given circuit with load R_{Load} ?



- (A) 30Ω (B) 13.75Ω
 (C) 11Ω (D) 7.5Ω
36. Which of the following tests must be performed on a transformer to determine its core losses?
- (A) Routine tests (B) SC test only
 (C) OC test only (D) Both OC and SC tests
37. The efficiency of a transformer at full load 0.85 pf lag is 95%. Its efficiency at full load 0.85 pf lead will be
- (A) More than 95% (B) Less than 95%
 (C) 95% (D) 100%

38. Two transformers of identical voltages but of different capacities are operating in parallel. For satisfactory load sharing
- (A) Impedances must be equal
 - (B) Per-unit impedances must be equal
 - (C) Per-unit impedances and X/R ratios must be equal
 - (D) Impedances and X/R ratios must be equal
39. A single-winding single phase motor has
- (A) Low starting torque
 - (B) Zero starting torque
 - (C) High starting torque
 - (D) Starting torque equal to full load torque
40. A single phase stator winding when excited with ac voltage produces
- (A) A single rotating field rotating at synchronous speed
 - (B) Two rotating fields rotating in the same directions but at different speeds
 - (C) Two rotating fields rotating at synchronous speed in opposite directions
 - (D) Two rotating fields rotating in opposite directions but with different speeds
41. What should be observed if a dc shunt motor is started with an open-circuited field?
- (A) The motor does not pick up speed but draws a large current
 - (B) The motor does not pick up speed but draws only a small current
 - (C) The motor picks up fast and acquires full speed while drawing large current
 - (D) The motor picks up fast and acquires full speed while drawing small current
42. A DC generator will have maximum efficiency when
- (A) Eddy current losses = Stray losses
 - (B) Hysteresis losses = Eddy current losses
 - (C) Copper loss = 0
 - (D) Variable Losses \cong Constant Losses
43. The speed of a DC shunt motor can be increased by
- (A) Increasing the resistance in the armature circuit
 - (B) Decreasing the resistance in the armature circuit
 - (C) Increasing the resistance in the field circuit
 - (D) Decreasing the resistance in the field circuit

44. DC shunt motors are started with a starter
- (A) To restrict the armature current as the back emf is zero while starting
 - (B) To restrict the field current as the back emf is zero while starting
 - (C) These motors have high starting torque
 - (D) To provide residual magnetism required for startup
45. In a DC machine, which of the following speed control method is least preferred?
- (A) Voltage Control method
 - (B) Field Control method
 - (C) Armature Control method
 - (D) Ward-Leonard System
46. Which of these features can be used to identify a DC series motor?
- (A) A motor with low starting torque
 - (B) A motor with thick field windings
 - (C) A motor which can be started easily without any load
 - (D) A motor with constant speed
47. Which of the following motor is used for a 20 HP hoist motor?
- (A) Single phase induction motors
 - (B) DC shunt motors
 - (C) PMDC motors
 - (D) Wound field DC motors
48. A 3-phase 440 V, 50 Hz induction motor has 3% slip. The frequency of rotor current will be
- (A) 1.5 Hz
 - (B) 50 Hz
 - (C) 25 Hz
 - (D) 5 Hz
49. In a three-phase induction motor, the number of poles in the rotor winding is always
- (A) Zero
 - (B) More than the number of poles in the stator
 - (C) Equal to the number of poles in the stator
 - (D) Less than the number of poles in the stator
50. A three-phase, four-pole, 50 Hz induction motor rotates at a full-load speed of 1470 rpm. The EMF measured between the slip-ring terminals when the rotor is not rotating is 200 V. The rotor windings are star connected and have resistance and stand-still reactance per phase of 0.1Ω and 1.0Ω respectively. Then the rotor current at full load is
- (A) 25 A
 - (B) 11.2 A
 - (C) 15.43 A
 - (D) 22.5 A

51. A 3-phase induction motor is running at 3% slip. If the input to rotor is 1000 W, then mechanical power developed by the motor is
- (A) 970 W (B) 30 W
(C) 500 W (D) 300 W
52. For large range of speed changes, which of the following speed control technique is used in squirrel cage induction motors?
- (A) Cascade Connection (B) Rheostatic Control
(C) Pole changing method (D) Frequency Control
53. Which relay is found in a distribution transformer?
- (A) Polarized Relay (B) Buchholz Relay
(C) High-Voltage Relay (D) Small Signal Relay
54. A vessel with silica gel to prevent the moist air entering into the tank in a transformer is called
- (A) Breather (B) Conservator
(C) Buchholz Relay (D) Vent
55. A single phase 800 V/100 V, 50 Hz transformer has a maximum core flux density of 1.294 T and an effective cross sectional area of 60 cm². Calculate the number of turns on the secondary windings.
- (A) 100 turns (B) 800 turns
(C) 464 turns (D) 58 turns
56. For a uniformly distributed winding of an alternator with a phase spread of β degrees, the distribution factor is _____ (Assume $m = 1$)
- (A) $\frac{\sin \beta}{\beta}$ (B) $\frac{2 \sin\left(\frac{\beta}{2}\right)}{\beta}$
(C) $\frac{\sin\left(\frac{\beta}{2}\right)}{\beta}$ (D) $\frac{\sin\left(\frac{\beta}{2}\right)}{2\beta}$
57. Two identical loss-less series motors connected in series across a dc supply voltage, run at speeds of N_1 and N_2 , then ratio of their output powers will be
- (A) $N_1^2 : N_2^2$ (B) 1 : 1
(C) $N_1 : N_2$ (D) $N_2 : N_1$

58. Slip test is performed to determine
- Slip
 - Positive and negative sequence reactances
 - Sub Transient reactance
 - Direct and quadrature axis reactances
59. Which of the following motors running under the specified conditions will have a leading power factor?
- Double-cage induction motor at load
 - Over excited synchronous motor
 - Under excited synchronous motor
 - Slip ring induction motor at no load
60. A circular iron core has an air-gap cut in it and is excited by passing direct current through a coil wound on it. The magnetic energy stored in the air-gap and the iron core is
- Inverse ratio of their reluctances
 - Equally divided among them
 - In direct ratio of their reluctances
 - Energy resides wholly in the iron core
61. The transfer function of the system described by $\frac{d^2y}{dt^2} + \frac{dy}{dt} = \frac{du}{dt} + 3u$ where u is the input and y is the output is
- | | |
|-----------------------------|-----------------------------|
| (A) $\frac{(s+3)}{(s^2+2)}$ | (B) $\frac{(s+1)}{(s^2+2)}$ |
| (C) $\frac{s}{(s^2+2)}$ | (D) $\frac{3s}{(s^2+2)}$ |
62. Consider the following statements regarding time-domain analysis of a control system :
- Derivative control improves system's transient performance
 - Integral control does not improve system's steady state performance
 - Integral control can convert a second order system into a third order system.
- Of these statements :
- | | |
|--------------------------------|-------------------------------------|
| (A) (i) and (ii) are correct | (B) (i) and (iii) are correct |
| (C) (ii) and (iii) are correct | (D) (i), (ii) and (iii) are correct |
63. The characteristic equation of a feedback system is :
- $$s^3 + Ks^2 + 5s + 10 = 0$$
- For the system to be critically stable, the value of K should be :
- | | |
|-------|-------|
| (A) 1 | (B) 2 |
| (C) 3 | (D) 4 |

64. The phase margin of a system with the open-loop transfer function :

$$G(s)H(s) = \frac{(1-s)}{(1+s)(3+s)}$$
 is

- (A) 0° (B) 63.4°
 (C) 90° (D) ∞

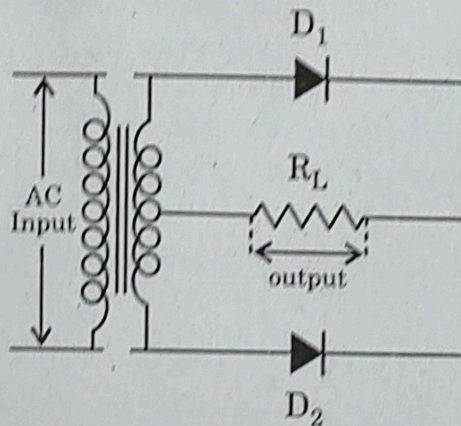
65. A linear discrete-time system has the characteristic equation,

$$z^3 - 0.64z = 0$$

The system

- (A) is stable (B) is marginally stable
 (C) is unstable (D) stability cannot be assessed

66. Identify the circuit show



- (A) Half wave rectifier (B) Full wave bridge rectifier
 (C) Center-tapped full wave rectifier (D) Buck Circuit

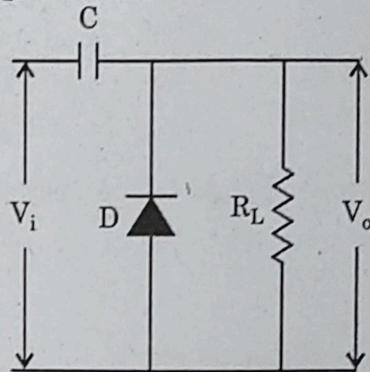
67. DC average current of a center taped full wave rectifier is :

- (A) $\frac{2I_m}{\pi}$ (B) $\frac{I_m}{\pi}$
 (C) $\frac{I_m}{2\pi}$ (D) $\frac{\sqrt{2}I_m}{\pi}$

68. Which of these is incorrect for an operational amplifier?

- (A) It has a high voltage gain
 (B) It is a direct coupled amplifier
 (C) It was originally designed to perform mathematical operations
 (D) It is only useful for amplifying AC signals

69. In an ideal op-amp, which is not true?
 (A) Slew rate is infinite (B) CMRR is zero
 (C) Input resistance is infinite (D) Open loop voltage gain is infinite
70. In a BJT, if the collector-base junction is forward-biased and the base-emitter junction is forward-biased, which region is the BJT operating in?
 (A) Saturation region (B) Active region
 (C) Cutoff region (D) Reverse active region
71. For common emitter configuration, which of the following is the correct relation?
 (A) $I_C < I_E$ (B) $I_C = \beta I_B$
 (C) $I_C = I_E$ (D) $I_C = \alpha I_E$
72. What is the circuit in the given diagram called?



- (A) Half wave rectifier (B) Full wave rectifier
 (C) Clipper (D) Clamper
73. What are the basic gates in MOS logic family?
 (A) AND and OR (B) NAND and NOR
 (C) AND and NOR (D) NAND and OR
74. What will be the frequency of the output from a JK flip-flop, when $J = 1$, $K = 1$, and a clock with pulse waveform is given?
 (A) Twice the frequency of clock input
 (B) Independent of the frequency of clock input
 (C) Half the frequency of clock input
 (D) Equal to the frequency of clock input
75. Which of the following codes is a sequential code?
 (A) 8421 code (B) 2421 code
 (C) 5421 code (D) 2441 code

76. Which of these pins will allow to activate and deactivate a multiplexer?
- (A) Preset pin (B) Logic pin
(C) Enable pin (D) Selection pin
77. The decimal equivalent of the octal number $(645)_8$ is :
- (A) $(450)_{10}$ (B) $(451)_{10}$
(C) $(501)_{10}$ (D) $(421)_{10}$
78. Ripple counters are also called
- (A) SSI counters (B) Asynchronous counters
(C) Synchronous counters (D) VLSI counters
79. Which of the following plays an important role in improving the device performance of MOSFET?
- (A) Threshold voltage (B) Dielectric constant
(C) Power supply voltage (D) Gate to drain voltage
80. With a 200 kHz clock frequency, eight bits can be serially entered into a shift register in :
- (A) 4 μ s (B) 40 μ s
(C) 400 μ s (D) 4 ms
81. Resistive switching is normally employed in
- (A) All circuit breakers (B) Bulk oil breakers
(C) Minimum oil breakers (D) Air blast circuit breakers
82. In case of a 3 phase short circuit in a system, the power fed into the system is :
- (A) mostly reactive (B) mostly active
(C) active and reactive equally (D) reactive only
83. Corona losses are minimized :
- (A) by reducing conductor size
(B) by using smooth conductors
(C) providing sharp points in line conductors
(D) reducing current density in conductors
84. The relay which is most sensitive to power swings (mal-operation) is :
- (A) mho relay (B) reactance relay
(C) impedance relay (D) all relays

85. The capacitor switching is easily done with :
- (A) vacuum CB (B) M.O. circuit breaker
(C) SF₆ circuit breaker (D) air blast CB
86. Which of the following power semiconductor device is bidirectional?
- (A) Thyristor (B) Diac
(C) BJT (D) IGBT
87. Which of the following power semiconductor device is a pulse triggered device?
- (A) BJT (B) MOSFET
(C) IGBT (D) Thyristor
88. Which one of the following triggering method of an SCR is destructive?
- (A) Forward voltage triggering
(B) Temperature triggering
(C) Light triggering
(D) Gate current triggering
89. For a three phase fully controlled bridge converter with R load, for what firing angle (α) the load current becomes discontinuous?
- (A) $\alpha < 10^\circ$ (B) $10 < \alpha < 30^\circ$
(C) $30 < \alpha < 60^\circ$ (D) $60 < \alpha < 90^\circ$
90. For a three phase 50 Hz full converter, what is the ripple frequency in the output voltage?
- (A) 50 Hz (B) 100 Hz
(C) 300 Hz (D) 150 Hz
91. Devimahatmya, otherwise known as Durgasaptasati belongs to :
- (A) Bhagavatapurana (B) Brahmavaivartapurana
(C) Padmapurana (D) Markandeyapurana
92. In which philosophy, who asserts that the 'Absolute' can be realized through knowledge alone; karma and upasana are subsidiary.
- (A) Advaita Vedanta Philosophy, Sankara
(B) Dvaita Vedanta Philosophy, Maddhva
(C) Visistadvaita Vedanta Philosophy, Ramanuja
(D) Suddhadvaita Vedanta Philosophy, Vallabha

93. Which one of the following is the only famous **War Festival of Kerala**?
- (A) Padayani (B) Kappally Kumbham Thira
(C) Chittur Konganpada (D) Kalpathy Rathotsavam
94. Who is the present President of Cochin Devaswam Board?
- (A) Sri V.K. Ayyappan (B) Sri V. Nandakumar
(C) Dr. V.K. Vijayan (D) Sri Chengara Surendran
95. The **Sukshma Sarira** concept related to the **pratistha** (idol) is based on :
- (A) Thriguna concept of Sankhyasastra
(B) Epistemology of Mimamsasastra
(C) Nine fold forms of devotion
(D) Aadhara Chakras mentioned in yogic literature
96. **Randumoorthi** temple was established by :
- (A) Suresvaracharya (B) Padmapadacharya
(C) Bilvamangalawamikal (D) Hastamalakacharya
97. 'Prajnanam Brahma' (**Consciousness is The Absolute**) is a Mahavakya which is occur in :
- (A) Mandukyopanisad (B) Brhadaranyakopanisad
(C) Aitareyopanisad (D) Chandogyopanisad
98. Who is the author of **Tantrapaddhati**?
- (A) Bhavatrata (B) Isanasivaguru
(C) Vilvamangala (D) Parameswara
99. Who was the Maharajah of Travancore signed the historic **Temple Entry Proclamation** on November 12, 1936?
- (A) Marthandavarma (B) Sthanu Ravi Varman
(C) Bhaskara Ravi Varman II (D) Chithira Thirunal Balarama Varma
100. Chandanakavu Saraswati Temple is located at :
- (A) Thirunavaya, Malappuram (B) Paravur, Ernakulam
(C) Panachikkadu, Kottayam (D) Elavur, Ernakulam