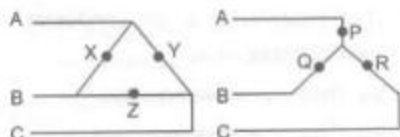


(B) More than the gain crossover frequency

(C) On both the sides of the gain crossover frequency

(D) Any of the above

30. In the given figure, three resistances $X = 1 \Omega$, $Y = 2 \Omega$ and $Z = 3 \Omega$ are connected in delta fashion. If the resistances P, Q, R represent the equivalent star network of the given delta network, then the highest value of resistance in the star network is given by :



(A) $P = 1 \Omega$

(B) $Q = 1 \Omega$

(C) $R = 1 \Omega$

(D) None of the above

31. In time domain, the speed of response is measured in terms of :

(A) Resonant peak M_p or phase margin

φ_{pm}

(B) Resonant frequency ω_r or bandwidth

ω_b

(C) Damping factor ξ or peak overshoot

M_p

(D) Rise time t_r or settling time t_s

32. Pick up the false statement from the choices given below :

(A) In a 3-ph balanced delta circuit, phase voltage is same as line voltage

(B) In a 3-ph balanced delta circuit, phase current is same as line current

(C) In a 3-ph balanced star circuit, line voltage is 1.73 times phase voltage

(D) In a 3-ph balanced star circuit, phase current is same as line current

33. Which of the following expressions represent a non-linear resistor ?

(A) $V + 10 I = 0$

(B) $I + 3 V = 0$

(C) $v = I^2$

(D) All of the above

34. Application of Norton's theorem to a circuit yields :

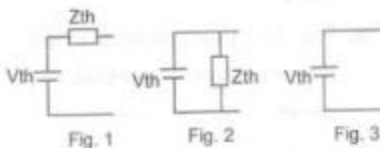
(A) Equivalent current source only

(B) Equivalent voltage source only

(C) Equivalent voltage source and impedance in series

(D) Equivalent current source and impedance in parallel

35. In view of the figures given below, pick up the correct statement as regards representation of Thevenin's equivalent circuit.

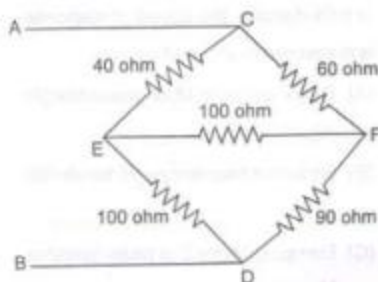


- (A) Fig. 1 only represents Thevenin's equivalent circuit
 (B) Fig. 2 only represents Thevenin's equivalent circuit
 (C) Fig. 3 only represents Thevenin's equivalent circuit
 (D) All the figures represent Thevenin's equivalent circuit
36. Which two network theorems exhibit duality?
- (A) Superposition theorem and Thevenin's theorem
 (B) Super position theorem and Norton's theorem
 (C) Thevenin's theorem and Norton's theorem
 (D) Norton's theorem and Milliman's theorem
37. Which design method is based on state space approach?
- (A) Root Locus Method

- (B) Pole Placement Method
 (C) Frequency Response Method
 (D) None of the above

38. An electron in the conduction band has :
- (A) More energy than the electron in the valence band
 (B) Lesser energy than the electron in the valence band
 (C) Same energy as that of the electron in the valence band
 (D) No energy at all
39. The resistivity of a semiconductor material increases as :
- (A) The temperature increases
 (B) The temperature decreases
 (C) The temperature remains constant
 (D) None of the above

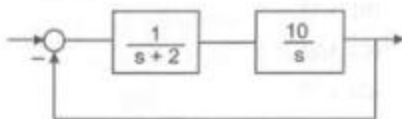
40. What is the equivalent resistance at terminals AB in the circuit shown below?



- (A) 65 Ω

- (B) 72Ω
 (C) 5Ω
 (D) 0Ω
41. A charge particle is moving with velocity u in a magnetic field B experiences force F_m . Which of the following statement is false ?
 (A) B and F_m are normal to each other
 (B) F_m depends on u
 (C) F_m can perform work
 (D) F_m is a deflecting force
42. In a coil having $R = 10 \Omega$ and $L = 15 H$, determine the energy stored in the inductor at the instant when current is $10A$ and decreasing at the rate of $5A/sec$:
 (A) $800 J$
 (B) $850 J$
 (C) $700 J$
 (D) $750 J$
43. How much resistance may be connected in parallel with 2Ω so that the equivalent resistance may be 1.2Ω ?
 (A) 4Ω
 (B) 3Ω
 (C) 2Ω
 (D) 1Ω
44. Which instruments can measure both ac and dc currents ?
 (A) MI type of instruments
 (B) PMMC type of instruments
 (C) Dynamometer type of instruments
 (D) None of the above
45. For a given two port network, the impedance parameters are given by Z_{11} , Z_{12} , Z_{21} and Z_{22} respectively. Corresponding transmission parameters of the said two port network are given by A , B , C and D respectively. Find out the correct statement as regards the relationship between impedance parameters and transmission parameters of the network :
 (A) $Z_{11} = A/C$ and $Z_{22} = D/C$
 (B) $Z_{11} = C/A$ and $Z_{22} = C/D$
 (C) $Z_{11} = AC$ and $Z_{22} = CD$
 (D) $Z_{11} = AB/C$ and $Z_{22} = BC/D$
46. What is the value of form factor in connection with single phase alternating supply systems ?
 (A) 1.01
 (B) 1.11
 (C) 1.21
 (D) 1.31
47. In a series RLC circuit at resonance, which of the following quantities attains maximum value ?
 (A) Current
 (B) Voltage

- (C) Power
(D) None of the above
48. Cut-off frequency in a resonating circuit is also called as :
- (A) Full power frequency
(B) Half power frequency
(C) Resonant frequency
(D) Corner frequency
49. What happens to the reluctance of a magnetic circuit, when an air gap is introduced to the core cross section ?
- (A) Decreases
(B) Increases
(C) Remain same
(D) None of the above
50. A control system is indicated in the figure below. The maximum percentage overshoot for the circuit subject to a unit step input function would be :



- (A) 15%
(B) 25%
(C) 35%
(D) 50%

51. In a circuit, three resistances $R \Omega$ each are connected in parallel. How much resistance may be connected in series so that the equivalent resistance be $R/2 \Omega$?
- (A) $R/6$
(B) $R/4$
(C) $R/3$
(D) $R/2$
52. In a series RLC circuit, which one does not change with change in input frequency ?
- (A) Bandwidth
(B) Quality factor
(C) Resonant frequency
(D) All of them
53. Laplace transform of unit impulse function is given by :
- (A) 1
(B) s
(C) $1/s$
(D) $1/s^2$
54. The number of roots with +ve real part for the characteristic equation $2s^3 + 4s^2 + 4s + 12 = 0$ are given by :
- (A) 0
(B) 1
(C) 2
(D) 3

55. A magnetic material develops a total magnetic flux of 80μ Wb with an mmf of 160 AT. The reluctance would be :
- (A) 2×10^{-6} units
 (B) 2×10^6 units
 (C) 0.5×10^{-6} units
 (D) 0.5×10^6 units
56. Characteristic wave impedance is given by :
- (A) E / μ
 (B) $(\epsilon / \mu)^{0.5}$
 (C) $(E_x / H_y)^{0.5}$
 (D) E_x / H_y
57. What is the average value of a perfect sine wave over a complete cycle ?
- (A) Zero
 (B) Peak value
 (C) rms value
 (D) None of the above
58. Skin effect in conductors would reduce effectively with increase in :
- (A) Diameter of the conductor
 (B) Resistivity of the material used in the conductor
 (C) Frequency of the supply
 (D) Voltage of the power supply
59. What is the unit of magnetic permeability in SI units ?
- (A) Wb
 (B) Wb/m^2
 (C) H/m
 (D) H.m
60. What does the expression $\nabla \times \mathbf{H} = \mathbf{D} + \mathbf{J}$ signify ?
- (A) Maxwell's equation
 (B) Continuity equation
 (C) Poisson's equation
 (D) Laplace's equation
61. What is the value of specific resistance of Copper in Ω/cm^3 ?
- (A) 1.0×10^{-6} units
 (B) 1.2×10^{-6} units
 (C) 1.4×10^{-6} units
 (D) 1.6×10^{-6} units
62. Pick up the correct statement as regards P-N junction diodes :
- (A) Mobility means average drift velocity per unit electric field.
 (B) Mobility means concentration of charge carriers per unit volume.
 (C) Mobility means acceptor concentration per unit volume.
 (D) Mobility means donor concentration per unit volume.

63. Identify the item shown in the figure indicated below :



- (A) Tunnel Diode
- (B) Zener Diode
- (C) Light emitting Diode
- (D) Photo sensitive Diode

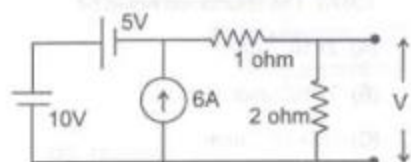
64. Which parameter or quantity may be measured by use of Maxwell's Bridge ?

- (A) Resistance
- (B) Capacitance
- (C) Inductance
- (D) Frequency

65. In case of open circuited transmission lines the reflection coefficient is given by :

- (A) 1
- (B) -1
- (C) 0.5
- (D) 0

66. The voltage V in the circuit shown in the figure below is given by :



- (A) $4/3$ V
- (B) $6/5$ V
- (C) $10/3$ V
- (D) $17/5$ V

67. What is the ratio of resistance and impedance better known as ?

- (A) Peak factor
- (B) Pitch factor
- (C) Power factor
- (D) Form factor

68. In a copper conductor the electromagnetic wave at 100 MHz penetrates to a depth of $7 \mu\text{m}$. The wavelength of the electromagnetic wave is :

- (A) $7 \mu\text{m}$
- (B) $14 \mu\text{m}$
- (C) $22 \mu\text{m}$
- (D) $44 \mu\text{m}$

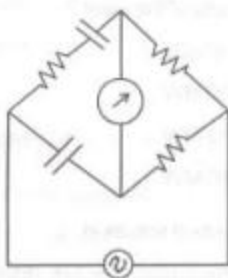
69. At which temperature does Mercury show superconductivity ?

- (A) 4.2°K
- (B) 0°K
- (C) -4.2°K
- (D) -10°K

70. The resolution of a digital voltmeter with four digit display provision is :

- (A) 10^4
- (B) 10^{-4}
- (C) $\sqrt{10^4}$
- (D) $\sqrt{10^{-4}}$

71. Identify the bridge shown in the figure below :



- (A) Wein series bridge
- (B) Schearing bridge
- (C) De Sauty bridge
- (D) Heaviside Campbell bridge

72. Which of the following is a piezo-electric material ?

- (A) Glass
- (B) Quartz
- (C) Mica
- (D) Ceramic

73. The ratio of power radiated by a short dipole antenna to that of a Hertzian dipole of same length under limiting conditions of phase constant (β) is :

- (A) 1 : 1
- (B) 1 : 2
- (C) 1 : 3
- (D) 1 : 4

74. In a perfect dielectric, the order of conduction current is nearly :

- (A) Zero
- (B) 10^{-6}
- (C) 10^6
- (D) Infinite

75. Solder material is an alloy having composition of :

- (A) Nickel and Copper
- (B) Zinc and Silver
- (C) Tin and Lead
- (D) Aluminium and Copper

PART - B

76. Transmission lines are transposed to :
- (A) Reduce copper loss
 - (B) Reduce skin effect
 - (C) Prevent interference with neighbouring telephone lines
 - (D) Prevent short-circuit between any two lines
77. When a line-to-ground fault occurs, the current in a faulted phase is 100 A. The negative sequence current in this case will be :
- (A) Zero
 - (B) 33.3 A
 - (C) 66.6 A
 - (D) 100 A
78. Mho relay is usually employed for protection of :
- (A) Short lines
 - (B) Medium lines
 - (C) Long lines
 - (D) Any line
79. Which of the following plants has lowest load factor ?
- (A) Diesel Plant
 - (B) Pumped Storage Plant
 - (C) Thermal Plant
 - (D) Nuclear Plant
80. An alternator is rated as 100 MVA, 11 kV, 6Ω . What will be the change in per unit reactance of the alternator if the capacity and voltage levels are doubled ?
- (A) Remains same
 - (B) Doubled
 - (C) Halved
 - (D) Four times
81. Which of the following holds true ?
- (A) $X_d'' < X_d < X_d'$
 - (B) $X_d' < X_d < X_d''$
 - (C) $X_d < X_d'' < X_d'$
 - (D) $X_d'' < X_d' < X_d$
82. A 200 MW generator is having a plant capacity factor of 30% and a plant load factor of 50%. What will be the reserve capacity of the plant ?
- (A) 40 MW
 - (B) 50 MW
 - (C) 60 MW
 - (D) 80 MW
83. Skin effect results in :
- (A) Reduced effective resistance but increased effective internal reactance of the conductor
 - (B) Increased effective resistance but reduced effective internal reactance of the conductor

- (C) Reduced effective resistance as well as effective internal reactance
- (D) Increased effective resistance as well as effective internal reactance
84. Shunt Inductors are primarily installed in transmission lines to :
- (A) Improve Power Factor
- (B) Improve Stability
- (C) Reduce Ferranti Effect
- (D) Improve Voltage Profile
85. When two conductors each of radius 'r' are at a distance D, the capacitance between the two is proportional to :
- (A) $\log_e(D/r)$
- (B) $\log_e(r/D)$
- (C) $1/\log_e(D/r)$
- (D) $1/\log_e(r/D)$
86. The equipment installed in power plants to reduce air pollution due to smoke is :
- (A) Induced draft fans
- (B) De-super heaters
- (C) Electrostatic precipitators
- (D) Re-heaters
87. In a transmission line having negligible resistance the surge impedance is :
- (A) $(L + C)^{1/2}$
- (B) $(C / L)^{1/2}$
- (C) $(1 / LC)^{1/2}$
- (D) $(L / C)^{1/2}$
88. Zero sequence current is absent in which of the following fault type ?
- (A) AG
- (B) AB
- (C) ABG
- (D) ABCG
89. Which of the following is not a base load plant ?
- (A) Thermal power plant
- (B) Pumped storage plant
- (C) Hydro power plant
- (D) Geothermal power plant
90. The average output voltage (Vdc) of the full wave diode bridge rectifier is :
- (A) $V_m/2$
- (B) $2V_m/\pi$
- (C) $3V_m/\pi$
- (D) $4V_m/\pi$
91. A half controlled single phase bridge rectifier is supplying an R-L load. It is operated at a firing angle (α) and load current is continuous. The fraction of cycle that the freewheeling diode conducts is :
- (A) $1/2$

(B) $\left(1 - \frac{\alpha}{\pi}\right)$

(C) $\frac{\alpha}{2\pi}$

(D) $\frac{\alpha}{\pi}$

92. The typical ratio of latching current to holding current in a 20A thyristor is :

(A) 5.0

(B) 2.0

(C) 1.0

(D) 0.5

93. A single phase full-wave half controlled bridge converter feeds an inductive load. The two SCRs in the converter are connected to a common DC bus. The converter has to have a free wheeling diode :

(A) Because the converter inherently does not provide for free wheeling

(B) Because the converter does not provide for free wheeling for high values of trigger-angles

(C) Or else the free wheeling action of the converter will cause shorting of the AC supply

(D) Or else if a gate pulse to one of the SCRs is missed, it will subsequently cause a high load current in the other SCR

94. A single phase fully controlled thyristor bridge ac-dc converter is operating at a firing angle of 25 degree and an overlap angle 10 degree 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

95. In thyristor, holding current is :

(A) More than the latching current

(B) Less than the latching current

(C) Equal to latching current

(D) None of the above

96. During forward blocking state, a thyristor is associated with :

(A) Large current and low voltage

(B) Low current and large voltage

(C) Medium current and large voltage

(D) None of the above

97. Once SCR starts conducting a forward current, its gate loses control over :

(A) Anode circuit voltage only

(B) Anode circuit current only

(C) Anode circuit voltage and current

(D) None of the above

98. The function of Snubber circuit connected across the SCR is to :
- Suppress dv/dt
 - Increase dv/dt
 - Decrease dv/dt
 - Decrease di/dt
99. A UJT exhibits negative resistance region :
- Before the break point
 - Between peak and valley point
 - After the valley point
 - Both (A) and (C)
100. For dynamic equalizing circuit used for series connected SCRs, the choice of C is based on :
- Reverse recovery characteristics
 - Turn-on characteristics
 - Turn-off characteristics
 - Rise time characteristics
101. A resistor connected across the gate and cathode of an SCR in a circuit increases its :
- dv/dt rating
 - Holding current
 - Noise Immunity
 - Turn-off time
102. Which of the following will not cause permanent damage of an SCR ?
- High current
 - High rate of rise of current
 - High temperature rise
 - High rate of rise of voltage
103. A SCR has an anode supply of sine voltage 200V rms, 50 Hz applied through a 100Ω resistor and fired at an angle of 60° . Assuming no voltage drop, the rms value of the output voltage is :
- 89.7 V
 - 126.7 V
 - 166.7 V
 - 288.28 V
104. When sine wave is given as input to Schmitt trigger then it generates :
- Sine wave
 - Saw tooth wave
 - Triangle wave
 - Square wave
105. The output clock frequency for a frequency division circuit having 11 flip-flops with an input clock frequency of 20.48 MHz is :
- 10.24 kHz
 - 5 kHz
 - 10 kHz
 - 5.12 kHz
106. On a master slave flip-flop, master is enabled :
- When gate is low
 - When gate is high
 - When gate is either low or high
 - None of the above
107. A J-K flip-flop with $J = 1$ and $K = 1$ has a 20 kHz clock input. The Q output is :
- Constant and low

- (B) Constant and high
- (C) A square wave with 20 kHz frequency
- (D) A square wave with 10 kHz frequency

108. For each of the positive edge-triggered J-K flip-flop used in the following figures, the propagation delay is ΔT and clock frequency is $(1/T)$. The output Q_1 will be of pattern :

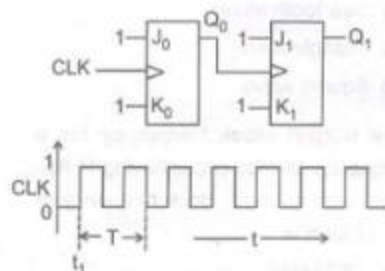
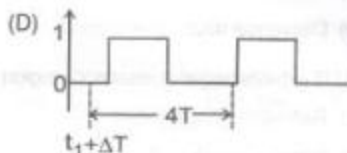
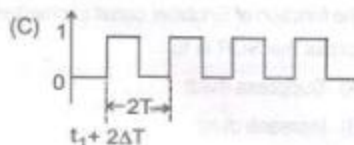
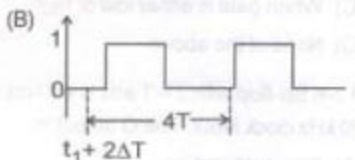
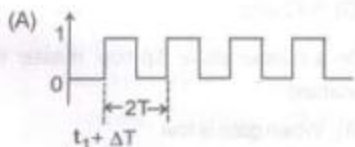
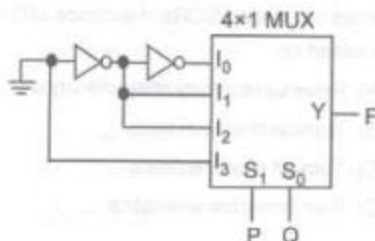


Figure for the question



109. The logic function implemented in the given circuit is. (Ground indicates logic 0)



- (A) $F = \text{AND}(P, Q)$
- (B) $F = \text{OR}(P, Q)$
- (C) $F = \text{XNOR}(P, Q)$
- (D) $F = \text{XOR}(P, Q)$

110. Thermal runaway is not possible in FET because as the temperature of FET increases :

- (A) The mobility decreases
- (B) The transconductance increases
- (C) The drain current increases
- (D) None of the above

111. The type of power amplifier that exhibits crossover distortion in its output is :
- (A) Class A
(B) Class B
(C) Class AB
(D) Class C
112. For a resonant circuit with resonant frequency of 1 MHz, $Q = 50$ and $R = 400$, find the value of C :
- (A) 250 pF
(B) 1000 pF
(C) 1.25 pF
(D) 500 pF
113. An SMPS operating at 20 kHz to 100 kHz range uses as the main switching element :
- (A) Thyristor
(B) MOSFET
(C) Triac
(D) UJT
114. Slew rate is expressed in :
- (A) A/microsec
(B) V/microsec
(C) W/microsec
(D) None of the above
115. The minimum number of NAND gates require to implement Boolean expression $A + \bar{A}\bar{B} + \bar{A}\bar{B}C$:
- (A) 1
(B) 2
(C) 4
(D) 0
116. The slowest ADC among the following is :
- (A) Flash type
(B) Successive approximation type
(C) Integrating type
(D) Counting type
117. Most of the linear ICs are based on two-transistor differential amplifier because of :
- (A) Input voltage dependent linear transfer characteristic
(B) High voltage gain
(C) High input resistance
(D) High CMRR
118. The output of logic gate is '1' when all its inputs are at logic '0'. The gate is :
- (A) NAND/EX-OR
(B) NOR/EX-OR
(C) AND/EX-NOR
(D) NOR/EX-NOR
119. The path of the magnetic flux in a transformer has :
- (A) High reluctance
(B) Low resistance
(C) High conductivity
(D) Low reluctance

120. A transformer operates :
- (A) Always at unity power factor
 - (B) Has its own power factor
 - (C) At a power factor below a particular value
 - (D) At power factor depending on the power factor of the load
121. The advantage of synchronous motor over slip-ring induction motor are that it's :
- (A) Power factor can be varied
 - (B) Speed can easily varied
 - (C) Speed is independent of supply frequency
 - (D) Rotor has two slip rings
122. A series generator is supplying power to DC bus bar. If the prime mover fails, then the machine will operate as :
- (A) DC series motor rotating in the same direction
 - (B) DC series motor rotating in the opposite direction
 - (C) DC series generator rotating in the same direction
 - (D) Machine will stop
123. A DC shunt motor having unsaturated magnetic circuit runs at 1000 rpm with rated voltage. If the applied voltage is reduced to half of the rated voltage, the motor will run at :
- (A) 2000 rpm
 - (B) 1000 rpm
 - (C) 750 rpm
 - (D) 500 rpm
124. For a stepper motor, which of the following torque has the highest numerical value ?
- (A) Detent torque
 - (B) Pull-in torque
 - (C) Pullout torque
 - (D) Holding torque
125. Which of the following motor would suit applications where constant speed is absolutely essential ?
- (A) Brushless dc motor
 - (B) Disk motor
 - (C) Permanent-magnet synchronous motor
 - (D) Stepper motor
126. The phase sequence of a 3 phase alternator is RBY. If the direction of rotation of field is reversed, then which of the following can be the phase sequence ?
- (A) RBY
 - (B) BYR
 - (C) BRY
 - (D) YRB
127. The coil span of an alternator is 180 degree. Which of the following harmonic component will be absent in the voltage ?
- (A) 3rd

- (B) 5th
 (C) 7th
 (D) 9th
128. The distribution factor for a uniformly distributed three phase alternator is :
- (A) $\frac{2\pi}{3}$
 (B) $\frac{2}{\pi}$
 (C) $\frac{3}{\pi}$
 (D) $\frac{\pi}{3}$
129. The voltage regulation for 0.95 lead pf is zero for an alternator. If so, the voltage regulation for 0.9 lead pf with all other conditions remaining same will be :
- (A) Positive
 (B) Negative
 (C) Zero
 (D) Insufficient data
130. A single phase, 2000V alternator has armature resistance and reactance of 0.8 ohm and 4.94 ohm respectively. The voltage regulation of the alternator at 100A, 0.8 leading pf is :
- (A) 7%
 (B) -8.9%
 (C) -6.3%
 (D) 0%
131. Which of the following generators is used for DC arc welding application ?
- (A) Series generator
 (B) Shunt generator
 (C) Differential compound generator
 (D) Over-compound generator
132. The power input to the rotor of a 400V, 50 Hz 6 pole three phase induction motor is 20kW. The slip is 3%. The frequency of rotor currents is :
- (A) 1 Hz
 (B) 1.5 Hz
 (C) 2 Hz
 (D) 1.2 Hz
133. What does the shunt resistance component in the equivalent circuit of an Induction motor represent ?
- (A) Windage and frictional loss only
 (B) Core losses only
 (C) Core, windage and frictional loss
 (D) Copper losses in rotor
134. In ceiling fan the angle between auxiliary winding and main winding is :
- (A) 0 degree
 (B) 90 degree
 (C) 180 degree
 (D) 270 degree

135. At dead short circuit at terminals of an alternator, the current 'I' is at :
- (A) ZPF lag
 - (B) ZPF lead
 - (C) Unity power factor
 - (D) 0.8 power factor lag
136. When alternator excitation increases and machine is operating at lagging power factor then :
- (A) Armature current increases
 - (B) Armature current decreases
 - (C) Armature current remains unchanged
 - (D) Armature voltage remains unchanged
137. In an amplitude modulated wave, the value of V_{max} is 10V and V_{min} is 5V, then % modulation is :
- (A) 25%
 - (B) 33.3%
 - (C) 50%
 - (D) 100%
138. VSWR of a transmission line is always :
- (A) Equal to 1
 - (B) Equal to 0
 - (C) Less than 1
 - (D) Greater than 1
139. Communication between satellite and ground station is through :
- (A) Tropospheric scatter
 - (B) Ground wave
 - (C) Sky wave
 - (D) Line of sight propagation
140. A mast antenna is used mainly for :
- (A) UHF
 - (B) Short wave
 - (C) Medium wave
 - (D) VHF
141. A standard AM broadcast station is allowed to transmit modulating frequencies up to 5 kHz. If the AM station is transmitting on a frequency of 980 kHz, compute the maximum and minimum upper and lower sidebands and the total bandwidth occupied by the AM station :
- (A) 10 kHz
 - (B) 975 kHz
 - (C) 990 kHz
 - (D) 20 kHz
142. AM transmitter has a carrier power of 30 W. The percentage of modulation is 85%. Calculate the total power :
- (A) 5.4 W
 - (B) 40.8 W
 - (C) 10.8 W
 - (D) 20.4 W
143. If the peak transmitted power in a radar system is increased by a factor of 16, the maximum range will be increased by a factor of :
- (A) 2
 - (B) 4

- (C) 8
(D) 16
144. A high prf implies which of the following statement is not correct ?
(A) Makes the return echoes easier to distinguish from noise
(B) Makes target tracking easier with conical scanning
(C) Increases the maximum range
(D) Has no effect on the range resolution
145. The IF BW of a radar receiver is inversely proportional to the :
(A) Pulse width
(B) prf
(C) Pulse interval
(D) Square root of the peak transmitted frequency
146. Interfacing is used in television to :
(A) Produce the illusion of motion
(B) Ensure that all the lines on the screen are scanned, not merely the alternate ones
(C) Simplify the vertical sync pulse train
(D) Avoid flicker
147. A return echo arrives after the allocated pulse interval then :
(A) It will interfere with the operation of the transmitter
(B) The receiver may be overloaded
(C) It will not be received
(D) The target will appear closer than it really is
148. The amount of solar radiation received on a unit area exposed perpendicular to sunlight is termed as :
(A) Solar insulation
(B) Solar constant
(C) Solar radiance
(D) Solar insolation
149. An IGBT has three terminals called :
(A) Collector, Emitter and Base
(B) Drain, Source and Base
(C) Drain, Source and Gate
(D) Collector, Emitter and Gate
150. A 4 pole synchronous generator driven at 1500 rpm feeds a 6 pole induction motor which is loaded to run at a slip of 5%. What is the motor speed ?
(A) 750 rpm
(B) 850 rpm
(C) 950 rpm
(D) 1050 rpm

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T. B. C. : EE – II/12-13

Test Booklet Series

Serial No. **2837**

A

TEST BOOKLET
ELECTRICAL ENGINEERING
PAPER – II

Time Allowed : $2\frac{1}{2}$ Hours

Maximum Marks : 300

: INSTRUCTIONS TO CANDIDATES :

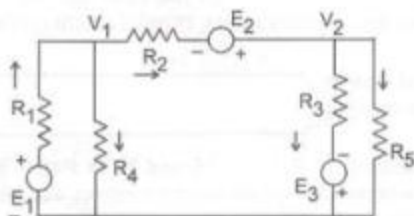
1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET **DOES NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET OF SAME SERIES ISSUED TO YOU.
2. ENCODE CLEARLY THE TEST BOOKLET SERIES **A, B, C OR D**, AS THE CASE MAY BE, IN THE APPROPRIATE PLACE IN THE ANSWER SHEET USING BALL POINT PEN (BLUE OR BLACK).
3. You have to enter your **Roll No.** on the Test Booklet in the Box provided along side. **DO NOT** write *anything* else on the Test Booklet.
4. This Test Booklet contains **150** items (questions), **75** in Part – A and **75** in Part – B. Each item (question) comprises four responses (answers). You will select the correct response (answer) which you want to mark (darken) on the Answer Sheet. In case, you feel that there is more than one correct response (answer), mark (darken) the response (answer) which you consider the best. In any case, choose **ONLY ONE** response (answer) for each item (question).
5. You have to mark (darken) all your responses (answers) **ONLY** on the **separate Answer Sheet** provided, by using **BALL POINT PEN (BLUE OR BLACK)**. See instructions in the Answer Sheet.
6. All items (questions) carry equal marks. All items (questions) are compulsory. Your total marks will depend only on the number of correct responses (answers) marked by you in the Answer Sheet. There will be negative markings for wrong answers. 25 percent of marks allotted to a particular item (question) will be deducted as negative marking for every wrong response (answer).
7. Before you proceed to mark (darken) in the Answer Sheet the responses to various items (questions) in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per the instructions sent to you with your **Admission Certificate**.
8. After you have completed filling in all your responses on the Answer Sheet and after conclusion of the examination, you should hand over to the Invigilator the **Answer Sheet** and the **Test Booklet** issued to you. You are allowed to take with you the candidate's copy/second page of the Answer Sheet, after completion of the examination, for your reference.

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SEAL

PART - A

- In a series RLC circuit, the rms value of voltage across the resistor is 30 V, across the inductor is 60 V and across the capacitor is 20 V. The rms supply voltage would be :
 - 110 V
 - 10 V
 - 220 V
 - 50 V
- The nodal equation for the circuit shown below for branch R_1 will be :



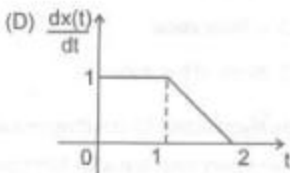
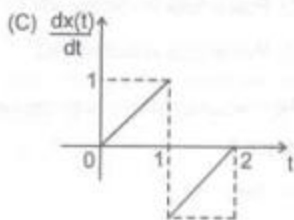
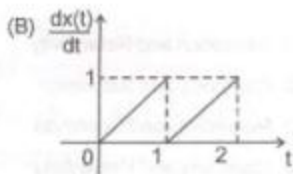
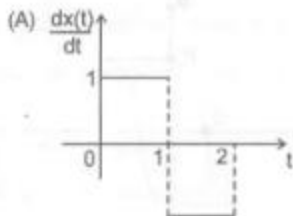
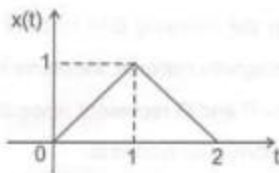
- $(V_1 - E_1) / R_1$
 - $(E_1 + V_1) / R_1$
 - E_1 / R_1
 - $(E_1 - V_1) / R_1$
- In a particular AC circuit the instantaneous values of voltage and current are given by expressions, $v = 220 \sin(157t)$ and $i = 5 \sin(157t - \pi/3)$. The frequency and power factor of the circuit are :
 - 50 Hz, 0.5 lead

- 50 Hz, 0.5 lag
 - 25 Hz, 0.5 lag
 - 25 Hz, 0.5 lead
- What will be the phase angle between voltage and current phasors in a single phase AC series circuit having $R = 10 \Omega$, $X_L = 20 \Omega$ and $X_C = 30 \Omega$, when a supply voltage of 220 V, 50 Hz is applied ?
 - 0°
 - 30°
 - 45°
 - 60°
 - Production of heat due to electric current is related to :
 - Ohm's law
 - Joule's law
 - Kelvin's law
 - Maxwell's law
 - What would be the impedance of a circuit having resistance of 3 ohms, inductive reactance of 8 ohms and capacitive reactance of 4 ohms ?
 - 15 Ω
 - 5 Ω
 - 0.5 Ω
 - 10 Ω

7. In two-wattmeter method of power measurement, if one wattmeter shows negative reading, then the power factor of the circuit is treated as :

- (A) Unity
- (B) Lagging
- (C) Leading
- (D) Zero

8. For a signal $x(t)$ shown in the figure below, what would be the derivative $\frac{dx(t)}{dt}$?



9. For a given signal $x(t) = e^{-at}u(t)$, what would be the Laplace transform ?

- (A) $2/s^2 - a$
- (B) $1/s - a$
- (C) $1/s + a$
- (D) $2/s^2 + a$

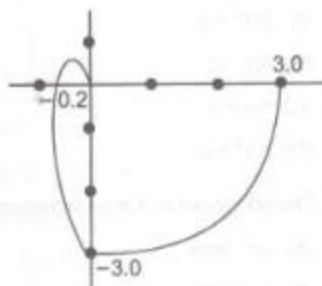
10. The phenomena of creeping occurs in :

- (A) Ammeter
- (B) Voltmeter
- (C) Wattmeter
- (D) Energy meter

11. An electro-dynamic wattmeter is not considered suitable for low power factor circuits because of :

- (A) Inductance of voltage coil
- (B) Reactance of current coil

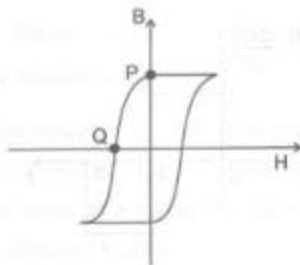
- (C) Power loss in voltage coil
(D) Power loss in current coil
12. The internal resistance of an ideal voltage source is :
- (A) Zero
(B) Infinity
(C) A finite value
(D) None of the above
13. The Nyquist plot for positive frequencies of an open loop transfer function is as shown below. The gain margin would be :



- (A) 0.2
(B) 3.0
(C) 5.0
(D) Infinite
14. Which of the following insulator is used for high frequency applications ?
- (A) Stealite

- (B) Forsterite
(C) Bakelite
(D) Porcelain

15. What would be the time taken by the current to reach half of its final value in a coil having $R = 10 \Omega$ and $L = 10H$, when a D. C. voltage of 100 V is applied.
- (A) 0.69 sec.
(B) 6.9 sec.
(C) 0.5 sec.
(D) 5.2 m. sec.
16. In the following B-H loop for a given magnetic material, the points indicated by P and Q represent respectively the information related to :



- (A) Saturation and Retaintivity
(B) Coercivity and Saturation
(C) Retaintivity and Coercivity
(D) Coercivity and Retaintivity

17. Out of the roots of the characteristic equation of several systems given below, which combination represents a marginally stable system ?

- (A) $-1 + j, -1 - j$
- (B) $-2 + 3j, -2 - 3j, -2$
- (C) $-j, j, -1$
- (D) $-2 + j, -2 - j, 2j, -2j$

18. Which of the following is not a non-linear element ?

- (A) Diode
- (B) Transistor
- (C) Heater coil
- (D) None of the above

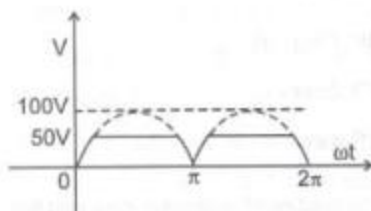
19. A unity feedback system has an open loop transfer function given by

$$G(s) = \frac{25}{s^2 + 8s}$$

The damping ratio and % peak overshoot for the system response will be :

- (A) 0.99, 1.5% respectively
- (B) 0.25, 0.5% respectively
- (C) 0.50, 1.5% respectively
- (D) 0.90, 0.5% respectively

20. A rectified sine wave is clipped at one half of its peak value as shown in the figure below. What would be the rms voltage of the clipped wave over a full cycle ?



- (A) 66.6 V
- (B) 57.1 V
- (C) 51.3 V
- (D) 42.2 V

21. A load cell essentially represents a :

- (A) Thermocouple
- (B) Thermistor
- (C) Photo-conductive device
- (D) Strain gauge

22. Hall effect transducers are generally used for the measurement of :

- (A) Magnetic field
- (B) Current
- (C) Electric field
- (D) Pressure

23. In a root-locus plot, if the number of poles and number of zeros are indicated by 'x' and 'y' respectively, the angle of asymptote is represented by :
- (A) $2\pi/x$
 (B) $2\pi/(x-y)$
 (C) $2\pi/(x+y)$
 (D) $2\pi/y$
24. The reading of wattmeter in no load test of induction motor gives :
- (A) Friction and windage loss
 (B) Copper losses on no load in the stator
 (C) Core losses
 (D) Sum of all losses
25. The expression of two voltage phasors are given by $V_1 = 47 \sin\theta$ and $V_2 = 33 \sin(\theta + 20^\circ)$ respectively. Find the phasor sum of the two by selecting the correct answer :
- (A) $V = 80 \sin(\theta + 20^\circ)$
 (B) $V = 80 \sin(\theta - 20^\circ)$
 (C) $V = 77.3 \sin(\theta - 12^\circ)$
 (D) $V = 77.3 \sin(\theta + 12^\circ)$
26. Two impedances are given by $Z_1 = (30 + j40) \Omega$ and $Z_2 = (30 - j40) \Omega$ respectively. If the two impedances are connected in parallel, the equivalent impedance of the combination would be :
- (A) $Z = (60 + j80) \Omega$
 (B) $Z = (60 - j80) \Omega$
 (C) $Z = (15 - j20) \Omega$
 (D) $Z = (15 + j20) \Omega$
27. Which of the following are available in the depletion layer of a P-N junction diode ?
- (A) Free mobile electrons only
 (B) Free mobile holes only
 (C) Both free mobile electrons and holes
 (D) Neither free mobile electrons nor holes
28. Addition of a pole to the open loop transfer function has the effect of :
- (A) Pulling the root locus to the left
 (B) Pulling the root locus to the right
 (C) Either (A) or (B)
 (D) Does not have any effect on the root locus
29. The two corner frequencies of the lead network are :
- (A) Less than the gain crossover frequency