	INDIAN SPACE RESEARCH ORGANISATION	SET A
	Recruitment Entrance Test for Scientist/Engineer 'SC' - 2015	

1. The current I em units, flowing in a coil of a tangent galvanometer is given by the expression where
 r = Mean radius of the galvanometer coil.
 N = Number of turns of the galvanometer coil.
 H = Horizontal component of earth magnetic field.
 ϕ = Deflection of galvanometer magnetic needle.

(a) $I = (Hr / 2\pi N) * \text{Cos}\phi$	(b) $I = (2\pi Nr / H) * \text{Tan}\phi$
(c) $I = (Hr / 2\pi N) * \text{Tan}\phi$	(d) $I = (2\pi Nr / H) * \text{Cos}\phi$

2. To measure current, Ammeters are connected in

(a) Series with very low resistance	(b) Series with very High resistance
(c) Parallel with very low resistance	(d) Parallel with very High resistance

3. If a circuit is formed consisting of two dissimilar metallic conductors, and if one of the junction has a temperature of T_1 and the other is at higher temperature T_2 , a current flow in the circuit. This effect is called as

(a) Petier Effect	(b) Thompson Effect
(c) Seeback Effect	(d) Ferrenti Effect

4. Two wattmeter connected to measure the input of a balanced 3 Phase circuit indicates 2000 Watts and 500 Watts respectively. What will be the power factor of the circuit when both of the readings are positive?

(a) 0.800	(b) 0.565
(c) 0.750	(d) 0.696

5. Wheatstone Bridge is used for measurement of

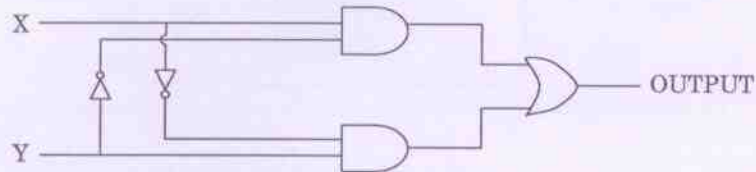
(a) Earth Resistance	(b) Very High Resistance value
(c) Medium Resistance Value	(d) Very Low resistance values

6. In a series RLC circuit, during resonance

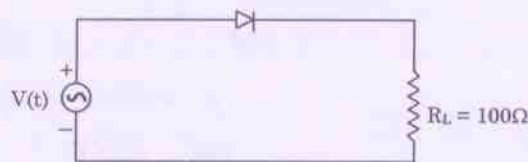
(a) Inductive reactance becomes equal to capacitive reactance
(b) Only R becomes zero
(c) Only Capacitive reactance becomes zero
(d) Only Inductive reactance becomes zero



16. A power factor meter connected in a circuit indicates pf of 0.6 lagging. To improve the power factor, we have to insert the following component in the circuit.
- (a) Inductors (b) Both inductor and resistors
(c) Capacitors (d) Resistors
17. The logic evaluated by the circuit at the output is



- (a) $X\bar{Y} + Y\bar{X}$ (b) $\bar{X}\bar{Y} + XY$
(c) $(\bar{X} + \bar{Y})XY$ (d) $\bar{X}Y + X\bar{Y} + X + Y$
18. The figure shows a half wave rectifier circuit with input voltage $v(t) = 10 \sin(100\pi t)$ volts. Assuming ideal diode characteristics with zero forward voltage drop and zero reverse current, the average power consumed in watts by the load resistance R_L is



- (a) 1 Watts (b) 0.25 Watts
(c) Zero Watts (d) 0.5 Watts
19. The truth table

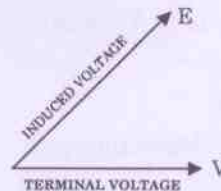
X	Y	$F(x, y)$
0	0	0
0	1	0
1	0	1
1	1	1

Represent the Boolean function

- (a) X (b) $X - Y$
(c) $X + Y$ (d) Y



32. In a tap changer, the voltage at consumer terminals is kept within the prescribed limits by varying the
- Ratio of turns between primary and secondary windings
 - Frequency
 - Flux density in core
 - Angle between magnetic axis of the primary and secondary windings
33. The residual magnetism of a self excited DC generator is lost. To build up its emf what to be done to regain the residual magnetism?
- The field winding must be excited by double the rated DC voltage
 - The armature connection must be reversed
 - The field winding connection must be reversed
 - Field winding must be excited by low voltage DC supply
34. Two DC series machines are mechanically coupled. One machine is running as a motor and the other as a generator. The iron and friction loss will be identical when
- Their speeds are identical
 - Their speeds and excitation are identical
 - Their speeds are equal and back emfs are half of the supply voltage
 - Their excitations are equal and back emfs are half of the supply voltage
35. The phaser diagram of a synchronous machine connected to an infinite bus is shown below. The machine is




- Generator and operating at lagging pf
- Generator and operating at leading pf
- Motor and operating at a leading pf
- Motor and operating at a lagging pf



36. A 3 phase synchronous motor, connected to an infinite bus, operating at a leading pf with a constant load torque, if excitation is increased (δ is load angle and ϕ power factor angle)
- (a) Both δ and ϕ decreases
 - (b) δ and ϕ both increases
 - (c) δ increases but ϕ decreases
 - (d) δ decreases but ϕ Increases
37. Magnetizing inrush current in transformer is rich in
- (a) 3rd Harmonics
 - (b) 7th Harmonics
 - (c) 2nd Harmonics
 - (d) 5th Harmonics
38. Two Induction motors A and B are identical except that the air gap of motor 'A' is 50% greater than that of motor B then
- (a) The no-load pf of Motor A will be better than that of Motor B
 - (b) The no-load pf of Motor A will be poorer than that of Motor B
 - (c) The core losses of Motor A will be more than those of Motor B
 - (d) The operating flux of Motor A will be smaller than that of Motor B
39. A 3 phase induction motor draws active power P and reactive power Q from grid. If it is operating as a generator, P and Q will respectively be
- (a) Positive and negative
 - (b) Positive and positive
 - (c) Negative and negative
 - (d) Negative and positive
40. In case of 3 Phase Short circuit in a system, the power fed into the system is
- (a) Mostly active
 - (b) Mostly reactive
 - (c) Active only
 - (d) Active and reactive both



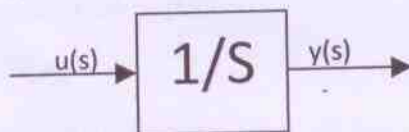
45. A sine wave as has a peak value of 12 Volts. Its crest factor is
- (a) 1.732 (b) 1.11
(c) 1.415 (d) 0.706
46. A sinusoidal voltage $V = 50 \sin \omega t$ is applied to a series RL circuit. The current in the circuit is given by $I = 25 \sin(\omega t - 53^\circ)$. The apparent power consumed by the load is
- (a) 375 VA (b) 625 VA
(c) 2500 VA (d) 750 VA
47. A band pass filter is one which
- (a) Attenuates frequencies between two designated cut off frequencies and passes all other frequencies
(b) Passes all frequencies
(c) Attenuates all frequencies
(d) Passes frequencies between two designated cut off frequencies
48. A bulb in staircase has two switches, one switch being at the ground floor and the other being at first floor. The bulb can be turned ON and also OFF by any one of the switch irrespective of the state of the other switch. The logic of switching of bulb resembles
- (a) AND gate (b) XOR gate
(c) OR gate (d) NAND gate
49. Time domain expressions for the voltage $V_1(t)$ and $V_2(t)$ is given by
- $V_1(t) = V_m \sin(10t - 130^\circ)$ and
- $V_2(t) = V_m \cos(10t + 10^\circ)$ which is the correct statement
- The anticlockwise direction of rotation of phasor may be taken as positive.
- (a) $V_1(t)$ leads $V_2(t)$ by 130° (b) $V_1(t)$ lags $V_2(t)$ by 130°
(c) $V_1(t)$ lags $V_2(t)$ by -130° (d) $V_1(t)$ leads $V_2(t)$ by -130°

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50. In practice, earth is chosen as a place of zero electric potential because it
- is non conducting
 - is easily available reference
 - keeps losing and gaining electric charge everyday
 - has almost constant potential
51. Series compensation on EHV lines is resorted to
- Improve the stability
 - Reduce the fault level
 - Improve the voltage profile
 - As a substitute for synchronous phase modifier
52. The magnetic susceptibility of a specimen is small and positive, the specimen is
- Dia magnetic
 - Ferromagnetic
 - Paramagnetic
 - Non- magnetic
53. The rate of rise of restriking voltage depends upon
- The type of circuit breaker
 - Inductance of the system only
 - The capacitance of the system only
 - The inductance and capacitance of the system only
54. A Digital Volt Meter (DVM) uses 10 MHz clock and has a voltage controlled generator which provides a width of 5μ sec/volt of unit signal. A 10 V input signal would correspond to a pulse count of
- 500
 - 250
 - 750
 - 1000



60. Register of microprocessor (μP) which keeps track of the execution of program and which contains the memory address of next instruction to be executed is called
- (a) Index register (b) Program counter
(c) Memory address register (d) Instruction register
61. OS that permits multiple programs to run simultaneously using single processor is referred as
- (a) Multitasking (b) Multi user
(c) Multithreading (d) Multiprocessing
62. The cladding which surrounds the optic fiber line is used
- (a) To protect the fiber
(b) To reduce optical interference
(c) Because it helps to guide light in the core
(d) To ensure that refractive index remains constant
63. Assuming zero initial condition, the response $y(t)$ of the system given below to a unit step input $u(t)$ is



- (a) $u(t)$ (b) $(t^2/2)u(t)$
(c) $tu(t)$ (d) $e^{-t}u(t)$
64. If the unit step response of a network is $(1 - e^{-at})$ then its unit impulse response is
- (a) αe^{-at} (b) $(1 - \alpha^{-1})e^{-at}$
(c) $\alpha^{-1}e^{-at}$ (d) $(1 - \alpha)e^{-at}$



65. The solution of the differential equation $(dy/dx)=ky$, $Y(0)=C$ is
- (a) $x = ce^{-xy}$ (b) $y = ce^{kx}$
(c) $x = ke^{cy}$ (d) $y = ce^{-kx}$
66. The trigonometric Fourier series of an even function does not have the
- (a) DC terms
(b) Sine terms
(c) Cosine terms
(d) Odd harmonic terms
67. If $x = \sqrt{-1}$ then the value of x^x is
- (a) $e^{-\pi/2}$ (b) x
(c) $e^{\pi/2}$ (d) 1
68. For the function $f(t) = e^{-t/\tau}$, the Taylor series approximation for $t \ll \tau$ is
- (a) $1+t/\tau$ (b) $1-t/2\tau^2$
(c) $1-t/\tau$ (d) $1+t$
69. If the impedance of an AC circuit is $10 \angle 60^\circ \Omega$ then resistance in the circuit is
- (a) 5Ω (b) 10Ω
(c) 8.66Ω (d) 15Ω
70. The dielectric strength of air under normal condition is
- (a) 100 kV/cm (b) 150 kV/cm
(c) 30 kV/cm (d) 50 kV/cm



71. String efficiency of 100% means in string insulators
- (a) Self capacitance is zero
 - (b) Shunt capacitance is maximum
 - (c) Self capacitance is maximum
 - (d) Shunt capacitance is zero
72. To limit current chopping in Vacuum Circuit Breakers (VCB), the contact material used has
- (a) Low vapour pressure and high conductivity properties
 - (b) High vapour pressure and high conductivity properties
 - (c) High vapour pressure and low conductivity properties
 - (d) The inductance and capacitance of the system only
73. In a three phase four wire unbalanced system, the current in the neutral wire is 18 A. The magnitude of zero sequence current is
- (a) 18 A
 - (b) 6 A
 - (c) 9 A
 - (d) 3 A
74. The positive (Z_1), negative (Z_2) and zero (Z_0) sequence impedances of a solidly grounded system under steady state condition always follow the relation
- (a) $Z_1 > Z_2 > Z_0$
 - (b) $Z_1 > Z_2 < Z_0$
 - (c) $Z_1 < Z_2 < Z_0$
 - (d) $Z_0 > Z_1 > Z_2$
75. Eddy current loss in core of a transformer is
- (a) Directly proportional to resistivity of core material
 - (b) Directly proportional to square of resistivity of core material
 - (c) Inversely proportional to square of resistivity of core material
 - (d) Inversely proportional to resistivity of core material
76. The square root of $64 \angle 36^\circ$
- (a) $8 \angle 6^\circ$
 - (b) $8 \angle 18^\circ$
 - (c) $8 \angle 36^\circ$
 - (d) $8 \angle 8^\circ$

77. Match the correct pairs :

Numerical integration scheme	Order of fitting polynomials
P. Simpson's 3/8 rule	1. First order
Q. Trapezoidal rule	2. Second order
R. Simpson's 1/3 rule	3. Third order

- | | |
|-------------------------|-------------------------|
| (a) P - 2, Q - 1, R - 3 | (b) P - 1, Q - 2, R - 3 |
| (c) P - 3, Q - 2, R - 1 | (d) P - 3, Q - 1, R - 2 |

78. What is Laplace Transform of $(\sinh(at))$?

- | | |
|---------------------|---------------------|
| (a) $s/(s^2 + a^2)$ | (b) $a/(s^2 - a^2)$ |
| (c) $a/(s^2 + a^2)$ | (d) $s/(s^2 - a^2)$ |

79. If a phasor is multiplied by j then

- (a) Only its magnitude changes
- (b) Only its direction changes
- (c) Both magnitude and direction changes
- (d) Both magnitude and direction remains unchanged

80. If two complex numbers are equal

- (a) Only their magnitude will be equal
- (b) Only their angles will be equal
- (c) Their in phase and quadrature components will be separately equal
- (d) Only their angles will not be equal



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