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Note: (1) Answer all questions.

(2) Each question carries 1 mark. There are no negative marks.

(3) Answer to the questions must be entered only on OMR Answer Sheet provided separately by Completely shading with **Ball Point Pen (Black) only.**

(4) The OMR Answer Sheet will be invalidated if the circle is shaded using Pencil or if more than one circle is shaded against each question.

Section A : Electrical Engineering

1. Millman's theorem yields equivalent
   (1) Impedance or Resistance (2) Current source
   (3) Voltage source (4) Voltage or Current source

2. For the network shown in Fig. 1, when I = 0, V = 20 V and when R = 0, I = 10 A. If now R = 3 Ω what is the value of the current I?

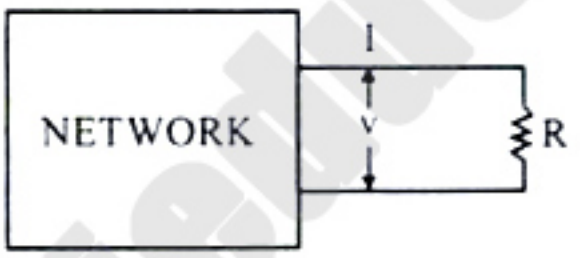

Fig. 1

   (1) 6.67 A (2) 6.0 A (3) 4.0 A (4) 10.0 A

3. In a pure resistive circuit, the average power P_{avg} is _____ the peak power P_{max}.
   (1) Double (2) One-half of (3) One-fourth (4) Equal to

4. When the power transferred to the load is maximum, the efficiency of the power transfer is :
   (1) 25% (2) 75% (3) 50% (4) 100%

5. The source impedance $Z_s = (6 + j\,8)\ \Omega$ in the circuit shown (Fig. 2). Maximum real power is transferred to the load impedance when Z_L is equal to

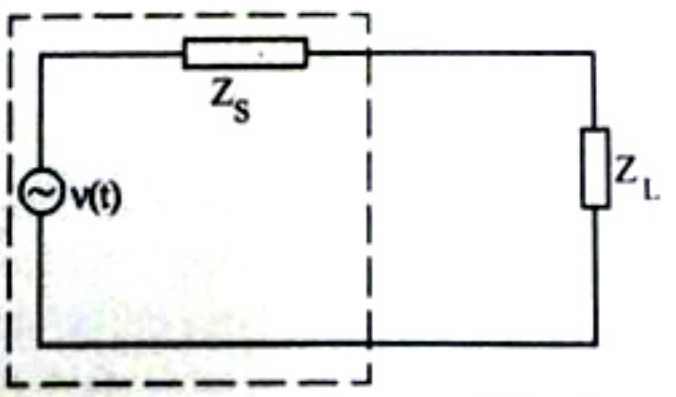

Fig. 2

   (1) $(6 + j\,8)\ \Omega$ (2) $6\ \Omega$ (3) $10\ \Omega$ (4) $(6 - j\,8)\ \Omega$

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6. Fig. 3 shows two coils with coupling coefficient of 0.6, $L_1 = 0.4$ H and $L_2 = 2.5$ H. The mutual inductance M is equal to

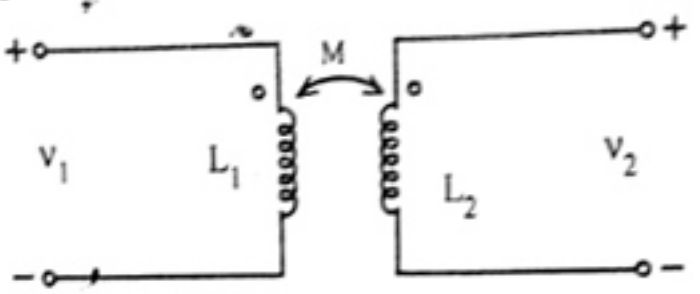

Fig. 3

(1) 0.6 H (2) 2.9 H (3) 2.1 H (4) 1.45 H

7. In dc machines, the armature windings are placed on the rotor because of the necessity for
(1) electromechanical energy conversion (2) generation of voltage
(3) commutation (4) development of torque

8. The fall in speed of a dc generator due to increase in load can be corrected by
(1) cooling the armature. (2) increasing the excitation.
(3) reducing the load voltage. (4) increasing the input to the prime mover.

9. Two transformers, each having iron loss of P_i watts and full-load copper loss of P_c, are put to back to back test and full-load current is allowed to flow through the secondaries, the total input power will be
(1) $2P_i$ (2) $2P_c$ (3) $P_i + P_c$ (4) $2(P_i + P_c)$

10. The desirable properties of transformer core material are
(1) low permeability and low hysteresis loss.
(2) high permeability and high hysteresis loss.
(3) high permeability and low hysteresis loss.
(4) low permeability and hysteresis loss.

11. In a synchronous machine, if the field flux axis ahead of the armature field axis in the direction of rotation, the machine is operating as
(1) synchronous motor (2) synchronous generator
(3) asynchronous motor (4) asynchronous generator

12. In an induction motor if the flux density is reduced to one-half of its normal value then the torque will
(1) reduce to one-half (2) reduce to one-fourth
(3) remain unchanged (4) increase four times

13. How can the steady-state error in a system be reduced?
(1) By decreasing the type of system (2) By increasing system gain
(3) By decreasing the static error constant (4) By increasing the input

14. The purpose of guard ring in transmission lines is to
(1) reduce the earth capacitance of the lowest unit.
(2) increase the earth capacitance of the lowest unit.
(3) reduce the transmission lines losses.
(4) reduce the reactance of the line.

15. Load flow studies involve solving simultaneous
(1) linear algebraic equations. (2) non-linear algebraic equations.
(3) linear differential equations. (4) non-linear differential equations.

16. Which portion of the power system is least prone to fault?
(1) alternators (2) switchgear (3) transformers (4) overhead lines

17. In the solution of load-flow equation, Newton-Raphson (NR) method is superior to the Gauss-Seidal (GS) method, because
(1) the time taken to perform one iteration in the NR method is less when compared to the time taken in the GS method.
(2) number of iteration required is not independent of the size of the system in the NR method.
(3) number of iteration required in the NR method is more when compared to that in the GS method.
(4) convergence characteristics of the NR method are not affected by the selection of slack bus.

18. A voltage source inverter will have better performance if its
(1) load inductance is small and source inductance is large.
(2) both load and source inductance are small.
(3) both load and source inductances are large.
(4) load inductance is large and source inductance is small.

19. A 3-phase wound rotor induction motor is controlled by a chopper-controlled resistance in its rotor circuit. A resistance of 2 Ω is connected in the rotor circuit and a resistance of 4 Ω is additionally connected during OFF periods of the chopper. The OFF period of the chopper is 4 ms. The average resistance in the rotor circuit for the chopper frequency of 200 Hz is
(1) 26/5 Ω (2) 24/5 Ω (3) 18/5 Ω (4) 16/5 Ω

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20. The main function of economiser of a boiler plant is to
(1) increase steam production
(2) reduce fuel consumption
(3) increase steam pressure
(4) increase life of the boiler

21. A dc chopper is fed from a constant voltage mains the duty ratio of chopper is progressively increased while the chopper feeds an RL load. The per unit current ripple would
(1) increase progressively
(2) decrease progressively
(3) decrease to a minimum value at $\alpha = 0.5$ and then increase
(4) increase to a maximum value at $\alpha = 0.5$ and then decrease

22. The Boolean expression $Y(A, B, C) = A + BC$ is to be realized using 2-input gates of only one type. What is the minimum number of gates required for the realization?
(1) 1 (2) 2 (3) 3 (4) 4 or more

23. The output f of the 4-to-1 MUX shown in the Fig. 4 is

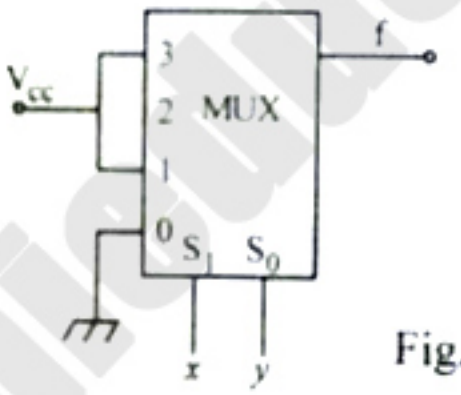

Fig. 4

(1) $\overline{xy} + x$ (2) $x + y$ (3) $\overline{x} + \overline{y}$ (4) $xy + \overline{x}$

24. For an n-channel MOSFET and its transfer curve shown in the Fig. 5, the threshold voltage is

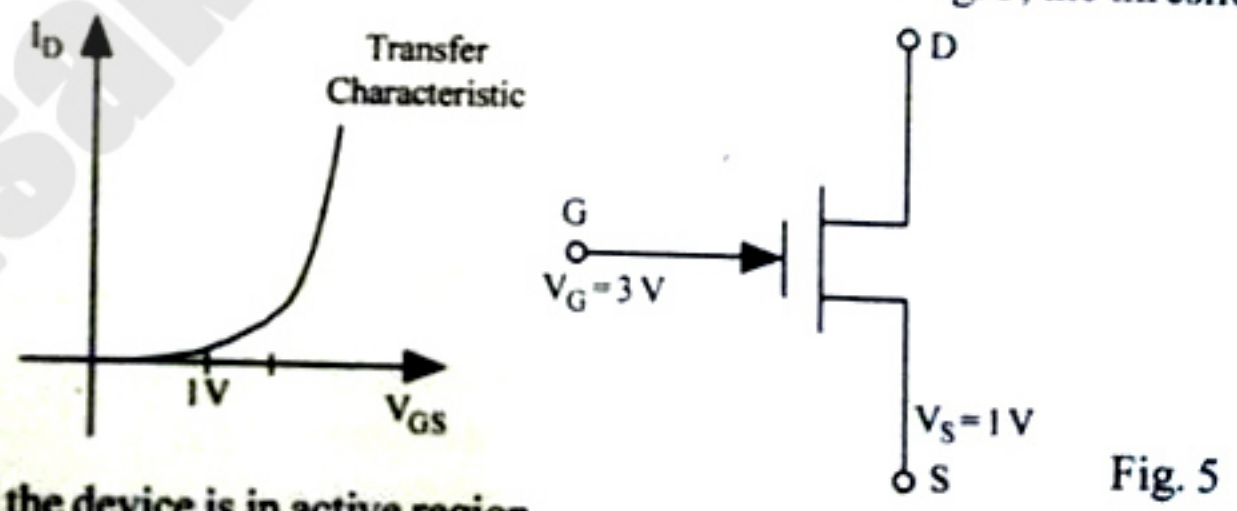

Fig. 5

(1) 1 V and the device is in active region
(2) –1 V and the device is in saturation region
(3) 1 V and the device is in saturation region
(4) –1 V and the device is in active region

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25. The Common Mode Rejection Ratio (CMRR) of a differential amplifier (where A_d = differential gain, A_c = common mode gain)

(1) $\frac{A_d}{A_c}$ (2) $\frac{A_d - A_c}{A_d}$ (3) $20 \log_{10} \frac{A_d}{A_c}$ (4) $20 \log_{10} \frac{A_c}{A_d}$

26. What is the Gray code word for the binary number 101011?

(1) 101011 (2) 110101 (3) 011111 (4) 111110

27. Ideally, the damping torque should be

(1) Proportional to velocity of the moving system and operating current.
(2) Proportional to the velocity of the moving system but independent of operating current.
(3) Independent of the velocity of the moving system and proportional to the operating current.
(4) Independent of the velocity of the moving system and operating current.

28. An ac voltmeter using full-wave rectification and having a sinusoidal input has an ac sensitivity equal to

(1) 1.414 times dc sensitivity (2) dc sensitivity
(3) 0.9 times dc sensitivity (4) 0.707 times dc sensitivity

29. An electrodynamometer type wattmeter is connected (as shown in the given Fig. 6) in a 3-phase supply and having a 3-phase balanced load, E and I are the value of phase voltage and current and ϕ is the phase angle between them. The wattmeter reading will be

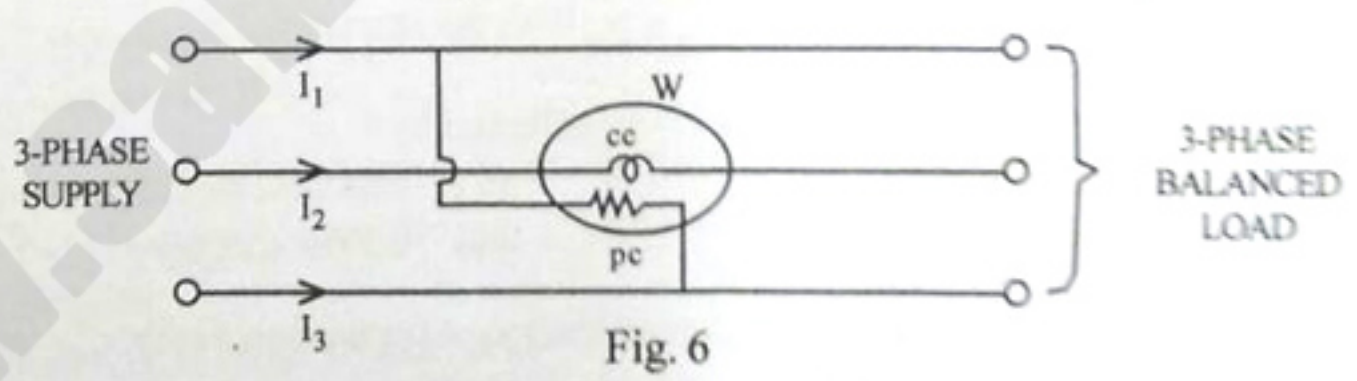

Fig. 6

(1) proportional to EI sin ϕ (2) proportional to EI cos ϕ
(3) proportional to EI tan ϕ (4) zero

30. Three-pulse converter has a freewheeling diode across its load. The operating range of the converter is

(1) $0° \le \alpha \le 150°$ (2) $60° \le \alpha \le 120°$ (3) $30° \le \alpha \le 150°$ (4) $180° \le \alpha \le 360°$

31. The material used in liquid fuses is
(1) SF_6
(2) distilled water
(3) carbon tetra chloride
(4) transformer oil

32. The arc voltage in a circuit breaker is
(1) in the phase with the arc current
(2) lagging the arc current by 90°
(3) leading the arc current by 90°
(4) lagging the arc current by 180°

33. Buchholz relay is
(1) located in the conservator tank
(2) located in the transformer tank itself
(3) connected in the pipe connecting main tank of transformer and conservator
(4) installed in the circuit breaker

34. For protection of rotating machines against lightning surges _____ is used.
(1) lightning arrester
(2) capacitor
(3) combination of lightning arrester and capacitor
(4) lightning conductor and arrester

35. The inrush current of a transformer at no load is maximum if the supply voltage is switched on
(1) at peak voltage value
(2) at zero voltage value
(3) at half voltage value
(4) at 0.866 time voltage value

36. The positive, negative and zero-sequence impedances of a solidly grounded system under steady-state condition always follow the relations
(1) $Z_0 < Z_1 < Z_2$ (2) $Z_1 > Z_2 > Z_0$ (3) $Z_1 < Z_2 < Z_3$ (4) $Z_0 > Z_1 > Z_2$

37. The stability of the power system is not affected by
(1) generator reactance
(2) line reactance
(3) line losses
(4) output torque

38. The 'Equal area criterion' for the determination of transient stability of a synchronous machine connected to an infinite bus
(1) ignores line as well as synchronous machine resistance and shunt capacitances.
(2) assumes accelerating power acting on the rotor as constant.
(3) ignores the effect of voltage regulator and governor but considers the inherent damping present in the machine.
(4) takes into consideration the possibility of machine losing synchronism after it has survived during the first swing.

39. Reflector mirrors employed for exploiting solar energy are called the
(1) Mantle (2) Heliostats (3) Diffusers (4) Ponds

40. The capital cost of a power plant depends on
(1) Total installed capacity only.
(2) Total number of units only.
(3) Total installed capacity and number of units as well.
(4) Neither the installed capacity nor number of units.

41. The load duration curve for unity load factor will be of
(1) Rectangular shape (2) Triangular shape
(3) L-shape (4) I-shape

42. The knowledge of diversity factor helps in computing
(1) Plant capacity (2) Average load
(3) Units (kWh) generated (4) Peak demand

43. In parallel RLC resonance circuit at resonance the current will be
(1) Minimum (2) Maximum (3) Zero (4) Infinite

44. A transformer has negative voltage regulation when its load power factor is
(1) Zero (2) Unity (3) Leading (4) Lagging

45. Load factor is the
(1) Ratio of maximum load on the station to sum of consumer's maximum load.
(2) Ratio of average demand to maximum demand.
(3) Factor used for increasing load.
(4) Reciprocal of (1).

46. The skin effect in conductors is due to non uniform distribution of current in it and major portion of current is near the _____ of conductor.
(1) Surface (2) Center
(3) Complete cross section area (4) Axis

47. In lead acid battery the density of acid indicates the
(1) charge of the battery (2) level of acid
(3) e.m.f. of the battery (4) damage of the plates

48. Breaking capacity of a circuit breaker is usually expressed in terms of
(1) Ampere (2) Volts (3) MW (4) MVA

49. _____ is used for heating non-conducting materials.
(1) Eddy current heating
(2) Arc heating
(3) Induction heating
(4) Dielectric heating

50. Spot welding is used for
(1) Thin metal
(2) Rough and irregular surface
(3) Castings only
(4) Thick sections

51. For arc welding current range is usually
(1) 10 to 15 A (2) 30 to 40 A (3) 50 to 100 A (4) 100 to 350 A

52. According to the Routh Hurwitz stability criterion for a stable system, which of the following statement is correct?
(1) Roots are in right half of the S plane
(2) Roots are in the left half of the S plane
(3) Roots are in right half of the S plane and on imaginary axis
(4) Roots are in the left half of S plane and on imaginary axis

53. If the gain of the open loop system is doubled, the gain margin
(1) Is not affected
(2) Gets doubled
(3) Becomes half
(4) Becomes one-forth

54. Phase margin is the amount of angle to make the system
(1) Oscillatory (2) Stable (3) Unstable (4) Exponential

55. The voltage gain of a common-source JFET amplifier depends up on its
(1) Input impedance
(2) Amplification factor
(3) Dynamic drain resistance
(4) Drain load resistance

56. A four-quadrant operation requires two full converters connected in
(1) Series
(2) Parallel
(3) Back to back
(4) Series Cascade

57. Oscillator independent of phase shift is
(1) Relaxation (2) Wein bridge (3) Clapp (4) All of these

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58. In a dual converter the circulating current
(1) allow smooth reversal of load current but increases the response time.
(2) does not allow smooth reversal of load current, but reduces the response time.
(3) allows smooth reversal of load current with improved speed of response.
(4) flows only if there is no interconnecting inductor.

59. A digital voltmeter has 4½ digit display the 1 V range can read upto
(1) 1000 (2) 1.111 (3) 1.999 (4) 1999

60. For a short transmission line with r/x ratio of is 1.0, the regulation will be zero when the load power factor is
(1) Unity (2) 0.707 lead
(3) 0.707 lag (4) Zero power factor lead

61. A battery consists of n series connected cells while voltage of each cell is v volts and capacity k. The voltage and capacity of battery is
(1) Voltage of battery = n*v, Capacity of battery = Capacity of each cell
(2) Voltage of battery = n*v, Capacity of battery = n*Capacity of each cell
(3) Voltage of battery = v, Capacity of battery = n*Capacity of each cell
(4) Voltage of battery = v, Capacity of battery = Capacity of each cell

62. Torque angle 'δ' is the angle between
(1) Rotor field axis and resultant field axis
(2) Stator field axis and rotor field axis
(3) Stator field axis and mutual field axis
(4) Stator field axis and resultant field axis

63. Steady state power limit is
(1) $\frac{EV}{X}$ (2) $\frac{EV}{X}\sin\delta$ (3) $\frac{EV}{X}\cos\delta$ (4) $\frac{EV}{X}\sin 30^\circ$

64. Undamped frequency of oscillations of a synchronous machine is
(1) $\left(\frac{P_\gamma}{M}\right)^{0.5}$ (2) $\left(\frac{P_\gamma}{M}\right)^{2}$ (3) $\left(\frac{P_\gamma}{M}\right)^{4}$ (4) $\left(\frac{P_\gamma}{4M}\right)^{2}$

65. The first two rows of Routh's tabulation of a fourth order system are

s^4 1 1 0 5

s^3 2 2 0

The number of roots of the system lying on the right half of s-plane is

(1) 0 (2) 2 (3) 3 (4) 4

66. A negative sequence relay is used for protection of

(1) Generator (2) Transformer

(3) Motor (4) Long Transmission lines

67. The surge impedance for over head line is taken as

(1) 10-20 ohms (2) 50-60 ohms (3) 100-200 ohms (4) 1000-2000 ohms

68. In an ac series RLC circuit, the voltage across R and L is 20 V; voltage across L and C is 9 V and voltage across RLC is 15 V. What is the voltage across C?

(1) 7 V (2) 12 V (3) 16 V (4) 21 V

69. The motor used for electric traction is

(1) D.C. shunt motor (2) D.C. compound motor

(3) D.C. series motor (4) Synchronous motor

70. Arc resistance

(1) increases with increase in arc current (2) decrease with increase in arc current

(3) is independent of arc current (4) is independent of arc length

71. An unity feedback control system has open-loop transfer function $G(s) = 9 / [s(s+1)]$. The damping ratio ξ of the system is

(1) 1.0 (2) 0.3 (3) 0.6 (4) 0.5

72. Power in the wind is proportional to

(1) Wind velocity (2) (Wind velocity)^2

(3) (Wind velocity)^3 (4) (Wind velocity/2)

73. In order to regulate steady state error to zero, in a negative feedback control system, one employs

(1) Proportional control (2) Integral control

(3) Derivative control (4) Proportional - Derivative control

74. For a PV cell, V_{oc} = open circuit voltage; I_{sc} = short circuit current; V = load voltage and I = load current. At Maximum Power Point (MPP) for this PV cell

(1) $V < V_{oc}$ and $I = I_{sc}$ (2) $V < V_{oc}$ and $I < I_{sc}$

(3) $V = V_{oc}$ and $I = I_{sc}$ (4) $V = V_{oc}$ and $I < I_{sc}$

75. The closed loop transfer function of a control system
C (s) / R(s) = 1/(1+s)
The steady state value of output c(∞) for unit step input is equal to
(1) 1.0 (2) 0.5 (3) zero (4) 2

76. Fig. 7 shows an accurate equivalent circuit for a PV cell. For this cell

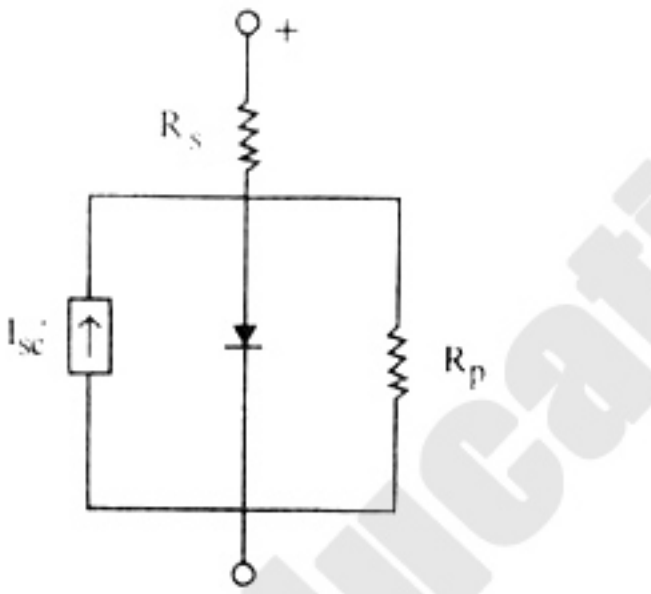

Fig. 7

(1) $R_p = R_s$ (2) $R_p < R_s$
(3) $R_p > R_s$ (4) Product of R_p and R_s is unity

77. The speed of a three-phase induction motor is controlled by variable voltage variable frequency control (i.e. keeping V/f constant). As the frequency is reduced, the slip at maximum torque
(1) Decreases (2) Increases
(3) Remains constant (4) None of the above

78. An amplifier has a voltage gain of 120. To reduce distortion, 10% negative feedback is employed. The gain of the amplifier with feedback is
(1) 141 (2) 92.3 (3) 9.23 (4) 1.41

79. The time base signal in Cathode Ray Oscilloscope (CRO) is
(1) A square wave signal (2) A sawtooth signal
(3) A triangular wave signal (4) A sinusoidal signal

80. A control system having unit damping factor will give
(1) Oscillatory response (2) Undamped response
(3) Critically damped response (4) No response

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Section B : General Awareness and Numerical Ability

81. It looks _____ it's going to rain.
(1) as (2) as if (3) although (4) supposing

82. Which sentence is right?
(1) Unless you work hárd, you will win.
(2) As it was too hot, so I switched the air cooler on.
(3) Owing to his good nature, he was liked by all.
(4) It was too dirty for holding it with hands.

83. Most students have to try and earn extra money by taking a holiday job. They turn _____ their studies and experience the real world for a while.
(1) into (2) down (3) aside from (4) to

84. In _____ nothing much happened at the meeting.
(1) quick (2) briefly (3) short (4) shortly

85. Railway Minister _____ visited Japan?
(1) Arun Jaitley (2) Suresh Prabhu
(3) Smriti Irani (4) Manohar Parrikar

86. Former President of the Board of Control for Cricket in India (BCCI), _____ passed away very recently?
(1) Alok Rawat (2) Upendra Tripathy
(3) S.M. Vijayananad (4) Jagmohan Dalmiya

87. PM Narendra Modi inaugurated first branch of _____ in China at Shanghai during his official visit to China?
(1) SBI (2) Axis Bank (3) HDFC Bank (4) ICICI Bank

88. ISRO launched _____ Multi Wavelength Space Observatory along with six foreign customer satellites through PSLV C-30 Launch Vehicle?
(1) GAGAN (2) AGNI (3) ASTROSAT (4) GSLV

89. Which Kakatiya ruler laid the foundation for the Warangal fort.
(1) Prola-1 (2) Prola-2 (3) Beta-1 (4) Rudramadevi

90. The famous shia festival of Qutub Shahi age in Telangana was
(1) Muharram (2) Ramzan (3) Nauroj (4) Bakrid

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91. Identify the birth place of 'Komaram Bheem'.
(1) Jodehgat (2) Nirmal (3) Asifabad (4) Khanajipet

92. The famous 'Telangana March' was held on
(1) 3rd September, 2012 (2) 28th September, 2012
(3) 29th September, 2012 (4) 30th September, 2012

93. In 10 years, A will be twice as old as B was 10 years ago. If A is now 9 years older than B, the present age of B is
(1) 19 years (2) 29 years (3) 39 years (4) 49 years

94. If each side of a square is increased by 25%, then the percentage change in its area is
(1) 35.25% (2) 42.35% (3) 56.25% (4) 63.45%

95. A trader mixes three varieties of groundnuts costing Rs. 50, Rs. 20 and Rs. 30 per kg in the ratio 2:4:3 in terms of weight, and sells the mixture at Rs. 33 per kg. What percentage of profit does he make?
(1) 8% (2) 9% (3) 10% (4) 11%

96. A car complete a journey in 10 hours. He travels first half of the journey at the rate of 21 km/hr and second half at the rate of 24 km/hr. Find the total journey in km.
(1) 220 km (2) 224 km (3) 230 km (4) 234 km

97. Main memory is also called as
(1) ROM (2) Hard Disk (3) RAM (4) PROM

98. Secondary storage device can perform
(1) Arithmetic operation (2) Logic operation
(3) Fetch operation (4) None of these

99. The IC chips, used in computers, is made of
(1) Iron oxide (2) Silicon
(3) Graphite (4) Silica

100. Which of the following programming languages are considered as low level language?
(1) Basic, Cobol, Fortran (2) C, C++
(3) Assembly language (4) Prolog