Electrical Engineering

Q1 to 25 carry 1 mark each.

1. $\left(\Delta^2 - 3\Delta + 2\right) y_n = 0$

The no. of roots. In given difference equation

(a) 3, 2 (b) 2, 5
(c) 3, 5 (d) not defined

2. The value of the integral

$\int_0^{1+i} \left(x - y + ix^2\right) dz$ is

(a) $\frac{1}{3}(i+1)$ (b) $\frac{1}{3}(i-1)$

(c) $\frac{1}{3}i$ (d) i

3. $\lim_{x \to 5} \frac{2x^2 - 9x - 5}{3x^2 - 10x - 25}$

(a) $\frac{20}{11}$ (b) $\frac{11}{20}$

(c) $\frac{1}{20}$ (d) 11

4. Trace of $A = \begin{bmatrix} 5 & 2 & 3 \\ 1 & 5 & 3 \\ 3 & 9 & 15 \end{bmatrix}$ matrix is

(a) 20 (b) 10
(c) 15 (c) 25

5. Z-transform of x[-n] is

(a) $-x(z)$ (b) $x(-z)$

(c) $x\left[\frac{1}{z}\right]$ (d) $\frac{1}{x(z)}$

6. Correct statement is
(a) MIMO system can be conveniently analysed by root locus method
(b) MIMO system can be conveniently analysed by time domain anglysis method
(c) MIMO systems can be conveniently analysed by state space approach
(d) MIMO system can be conveniently analysed by Nyquist plot.

7. A stator of a $3-\phi$, 6-pole ac m/c has 90 slots. The stator w/d has 45 coils with a coil span of 6 slots.

What type of winding will be selected for this machine
(a) Double-layer, fractional slot, short-pitched winding
(b) Single-layer, fractional slot, short-pitched winding
(c) Single-layer, integral slot, full pitched winding
(d) Double-layer, fractional slot, full pitched winding

8. Armature resistance of a 6-pole lap connected d.c m/c is $0.01\,\Omega$. If the armaturerewound as a wave winding then what will be the armature resistance?
(a) .45 Ω (b) .045 Ω (c) .9 Ω (d) .09 Ω

9. A 4-pole, lap wound armature has 360 conductors and is rotated at 1500 rev/min. if the useful flux is 20 mwb, then the generated voltage
(a) 180 V (b) 80 V (c) 480 V (d) 280 V

10. The flux is maximum in the following part of a dc generator
(a) Pole core
(b) Under the inner pole
(c) Under leading pole tips
(d) Under trailing pole tips

11. The interpoles in dc have a tappering shape in order to
(a) Reduce overall weight
(b) Economies on the material required for interpoles and their windings
(c) Reduced saturation in the interpole
(d) Increase the acceleration of commutation

12. In over excitation for synchronous motor for increase excitation then armature current will be.
(a) Increase (b) Decrease
(c) Unchanged (d) None of the above

13. Electrostatic type instruments are primarily used as
(a) Ammeters (b) Watt meters
(c) Voltmeters (d) ohm meters

14. A 3-phase, 500V, motor load has a power factor of 0.4. two wattmeter connected to measure the input. They show the input to be 30 kw, the reading of the instrument is
(a) 33.85 and 4.85 kw
(b) 34.85 and -4.85 kw

(c) 34.85 and 4.85 kw
(d) -34.85 and 4.85 kw

15. Permanent magnets are tested by
(a) Ballistic methods
(b) Using an electric circuit having a mutual inductance
(c) Potentiometric methods
(d) Betteridge apparatus

16. Step function is valid for
(a) Type 1 system (b) Type 0 system
(c) Type 2 system (d) All

17. In phase lead network the effect of relative stability will be
(a) Improve (b) No any effect
(c) Reduced (d) Const.

18. In the AC link chopper firstly converted to
(a) AC to DC (b) DC to AC
(c) AC to AC (d) DC to DC

19. Peak inverse voltage in 3-pulse rectifier is.
(a) $V_m\ell$ (b) 1.155 $V_m\ell$
(c) 1.009 $V_m\ell$ (d) 1.0165 $V_m\ell$

20. Bundled conductors are used by
(a) Reduce voltage gradient
(b) Reduce reactance
(c) Reduce surge impedance
(d) All of the above

21. The load flow solution gives the
(a) Nodal voltage
(b) Phase angle
(c) Reactive power generation of the generators
(d) All of the above

22. A relay is an
(a) Manual operated device
(b) Automatic device
(c) Both (d) None

23. Which one is correct

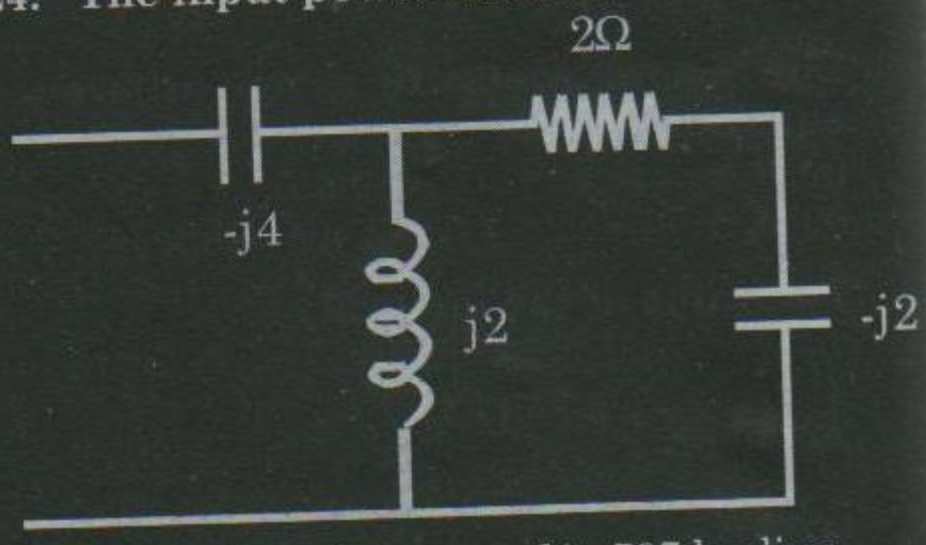
(a) $Z_{p.u.\ new} = Z_{p.u.\ old} \times \frac{MVA_{new}}{MVA_{old}} \times \left(\frac{KVA_{old}}{KVA_{new}}\right)^2$

(b) $Z_{p.u.\ new} = Z_{p.u.\ old} \times \frac{MVA_{new}}{KVA_{new}} \times \left(\frac{MVA_{old}}{KVA_{old}}\right)^2$

(c) $Z_{p.u.\ new} = Z_{p.u.\ old} \times \frac{KVA_{new}}{KVA_{old}} \times \left(\frac{MVA_{new}}{MVA_{old}}\right)^2$

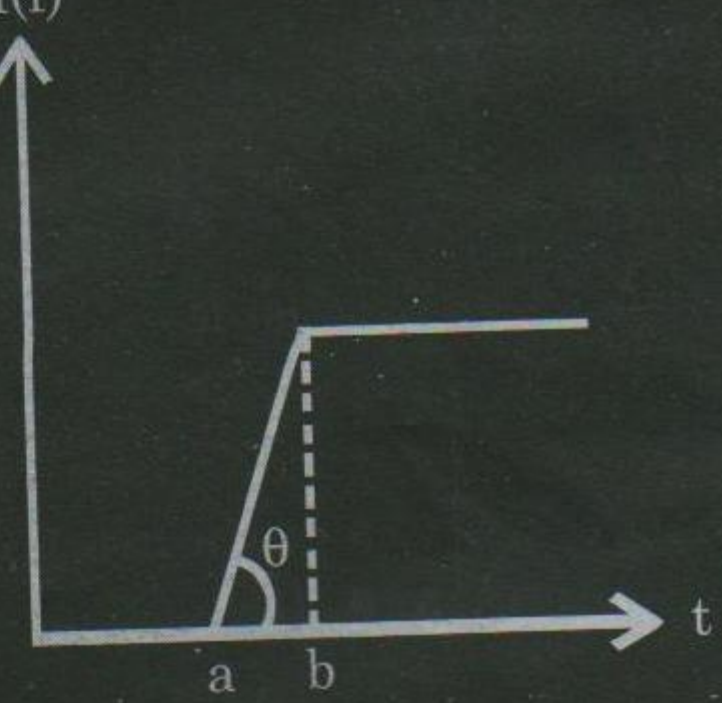
(d) $Z_{p.u.\ new} = Z_{p.u.\ old} \times \frac{KVA_{new}}{MVA_{new}} \times \left(\frac{KVA_{old}}{MVA_{old}}\right)^2$

24. The input power factor is



(a) .707 lagging (b) .707 leading
(c) .577 leading (c) .577 lagging

25. The given function the equation is



(a) $f(t) = K\left[r(t-a) + r(t-b)\right]$
(b) $f(t) = K\left[r(t+a) + r(t+b)\right]$
(c) $f(t) = K\left[r(t+a) + r(t-b)\right]$
(d) $f(t) = K\left[r(t-a) - r(t-b)\right]$

Q.26-55 carry two marks each

26. When a 100 KVA, single-phase transformer was tested, on open circuit the power consumed was 1300 w and on short circuit at full-load current the power consumed was 1200 w then the full-load efficiency at unity power factor is
(a) 90.56% (b)97% (c) 97.56% (d)90%

27. A 900 KVA load is supplied by three transformers connected in delta-delta

The primaries are connected to a 2300 v load supply line & the secondaries are connected to a 230 V load. Then the currents in the high and low voltage sides of the transformer windings when connected in open delta is

(a) The secondary line current is equal to rated secondary current of the transformer

(b) The secondary line current is equal to rated primary current of the transformer

(c) The primary line current is equal to rated primary current of transformer

(d) None of these

28. In the rotor-resistance is the speed control method of induction motor, in this the starting torque is increased for increasing resistance is always when slip is lying in

(a) $S \le 1$ (b) $S > 1$

(c) $S \ge 1$ (d) Not defined

29. A $3-\phi$, 50 Hz, 6-pole induction motor has a shaft of output of 10 kω at 930 rpm. O friction & windage loss equal to 1% of output total stator losses are 600 w. the stator input is

(a) 114.6 kω (b) 1.146 kω

(c) 1140 kω (d) 11.46 kω

30. A 250 V dc shunt motor having an armature resistance of 0.25 Ω carries an armature current of 50 A and runs at 750 rpm if the flux is reduced by 10% and the load torque is same then the speed is

(a) 1000 rpm (b) 800 rpm

(c) 1080.5 rpm (d) 828.5 rpm

31. A 1000 KVA, 50 KV/40 KV, $1-\phi$ autotransformer is fully loaded. The current in the common section of the winding is

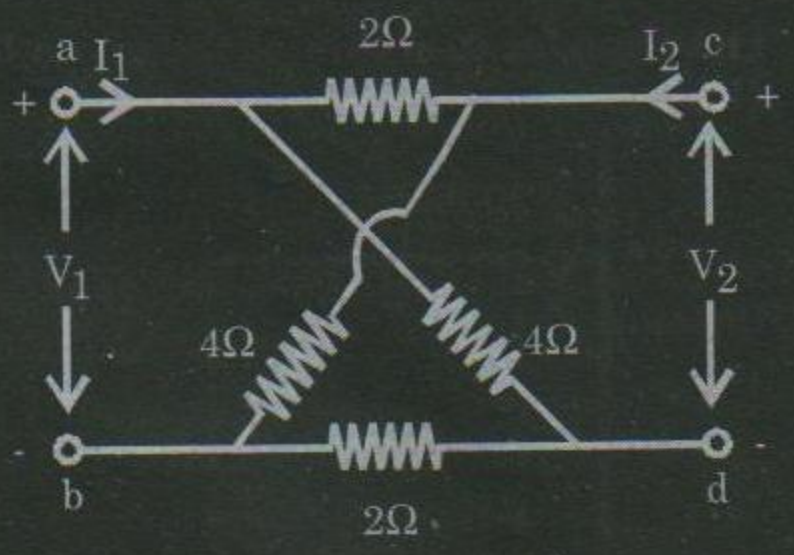
(a) .5A (b) .05A (c) 5A (d) .005A

32. The effective voltage in one phase of an alternator given frequency = 50 Hz, turns per phase = 240, flux per pole 2.08×10^6 Maxwell's is-

(a) 1058.9 V (b) 1580.9 V

(c) 1085.9 V (d) 1850.9 V

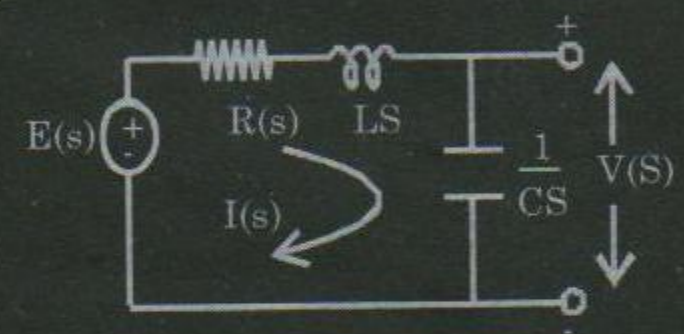
33. The given ckt the h-parameter h_{21} is



(a) $\frac{1}{3}$ (b) $-\frac{1}{3}$

(c) $\frac{8}{3}$ (d)e

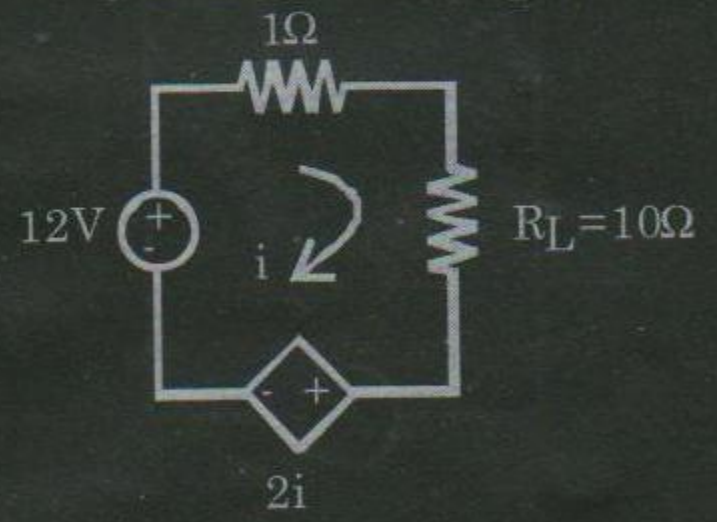
34. The transfer function of given network is



(a) $\frac{1}{LCS^2+RCS+1}$ (b) $\frac{LCS^2+1}{RCS}$

(c) $\frac{RCS}{LS^2C+1}$ (d) $LS^2C+RCS+1$

35. The o/p voltage across R_L is



(a) 9.5 V (b) 9.2 V

(c) 9.3 V (d) 9.0 V

36. The characteristic equation of feedback control system is

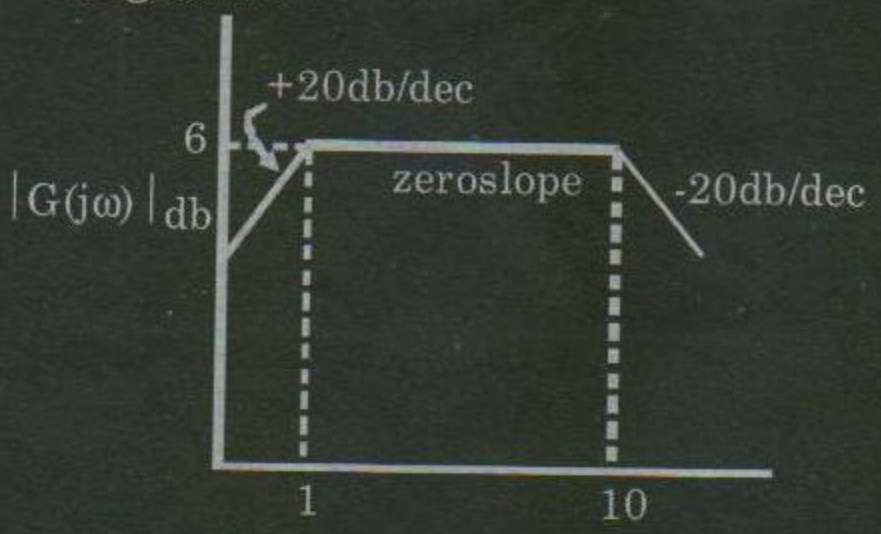
$S^4+10S^3+10S^2+2S+K=0$

The range of K for the system to be stable is

(a) $0<K<1.06$ (b) $0<K<1.96$

(c) $0<K<1.69$ (d) Not exist

37. The transfer function of the given bode diagram is



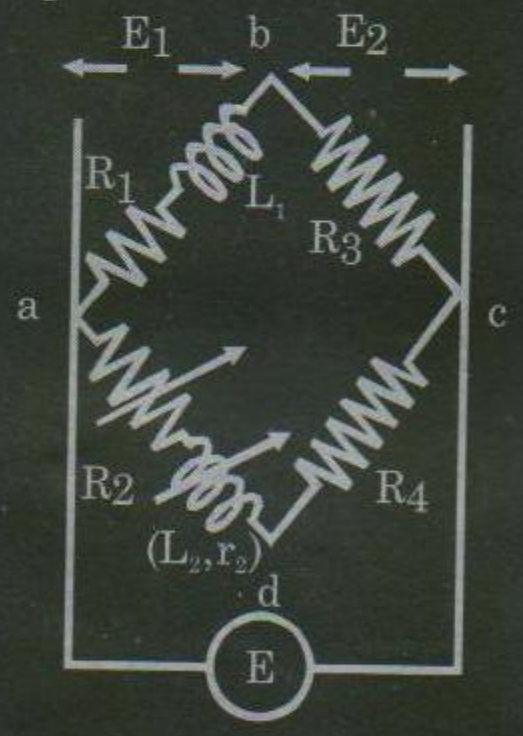
(a) $\frac{20}{S(S+1)(S+10)}$

(b) $\frac{20S}{S^2(S+1)(S+10)}$

(c) $\frac{20S}{(S+1)(S+10)}$

(d) $\frac{20S}{(S-1)(S-10)}$

38. The given bridge circuit the value of R_1 & L_1 is



(a) $L_1 = \frac{R_3}{R_4}L_2, R_1 = \frac{R_3}{R_4}(R_2 + r_2)$

(b) $L_1 = \frac{R_3}{R_4}L_2 R_1 = \frac{R_2}{R_4}(R_3 + r_2)$

(c) $L_1 = \frac{R_2}{R_3}L_2, R_1 = \frac{R_3}{R_4}R_2$

(d) $L_1 = R_1 = \frac{R_2}{R_3}L_2$

39. A thermometer reads 95.45°C and the static correction given in the correction curve is -0.08°C. The true value of temperature is

(a) 95.45°C (b) 95.37°C
(c) 95.35°C (d) 95.57°C

40. A 50 Hz overhead line has line to earth capacitance of 1μF. It is decided to use an earth fault neutralizer the reactance to neutralize the capacitance of 100% of the length of the line is

(a) 1061 Ω (b) 1060 Ω
(c) 1059 Ω (d) 1062 Ω

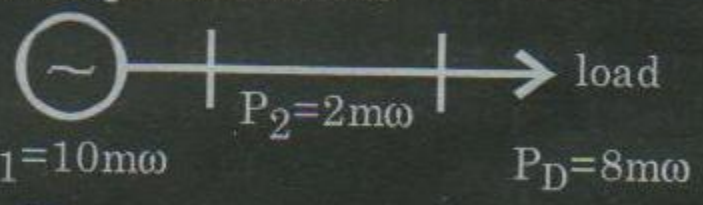
41. The percentage increase of busbar voltage required to compensator for the reactance drop when the feeder having a reactance of 3% carries a full load current at a p.f. 0.8 lagging

(a) 8% (b) 1.5% (c) 1.7% (c) 1.8%

42. A 3−ϕ transformer rated for 33 kv/6.6 kv is connected star/delta and the protecting current transformer on the low voltage side have a ratio 400/5. the ratio of current transformer on the hv side.

(a) $80 : \frac{5}{\sqrt{3}}$ (b) $\frac{5}{\sqrt{3}} : 80$
(c) 80 : 5 (d) 5 : 80

43. The incremental cost of received power and the penalty factor of the plant in above given figure. If the incremental cost of production is



$\frac{dF_1}{dP_1} = 0.1P_1 + 3.0R_s$ / Mwhr

(a) Rs3 / Mwhr & $\frac{10}{8}$ (b) Rs5 / Mwhr & $\frac{10}{8}$
(c) Rs10 / Mwhr & $\frac{3}{8}$ (d) Rs8 / Mwhr & $\frac{5}{10}$

44. A 1−ϕ 230 V, 1 kω heater is connected 1−ϕ, 230 V, 50 Hz supply through a diode. What is the power delivered to the heater element is

(a) 550 ω (b) 500 ω (c) 450 ω (d) 400 ω

45. A generator is rated for 0.95 lag p.f. the turbine rating is specified to match the

real power at rated p.f. assuming the rating of turbine fixed, determine the generator rating of 0.8 lag p.f. is specified?

(a) 19.75% (b) 18.10%
(c) 15.25% (d) 12.55%

46. A 230-V dc series motor has an armature circuit resistance of .2Ω and field resistance of 0.1Ω. At rated voltage, the motor draws a line current of 40 amps and runs at a speed of 1000 rpm. Find the speed of the motor for a line current of 20A at 230V. Assume that the flux at 20A line current is 60% of the flux at 40A line current.

(a) 1213rpm (b) 1713rpm
(c) 1125rpm (d) 1612rpm

47. The voltage at the end of a 3-plane feeder delivering 100 KVA varies between 380 and 460 volts for how many KVA must an induction regular be designed to maintain the voltage constant at 430 V.]

(a) 1213rpm (b) 1713rpm
(c) 1125rpm (d) 1612rpm

Common Data questions:

Common data for question 48 & 49

A 230 V, 50 Hz, one-pulse SCR controlled converter is trigged at a firing angle of 40° and load current extinguishes at an angle of 210°

48. Circuit turn off time is

(a) 8.222 m-sec (b) 8.333 m-sec
(c) 7.222 m-sec (d) 7.333 m-sec

49. Average output voltage is

(a) 84 V (b) 84.477 V
(c) 74.477 V (d) 74 V

Common data for question 50 to 51

A co-ordinate type potentiometer is used for determination of impedance of a coil and the results obtained as Voltage across a 1.0Ω resistor in series with the coil: +0.238V on in-phase dial and -0.085V on quadrature dial

Voltage across a 10:1 potential divider used with the coil : +.3375 V on in-phase dial and +.232V on quadrature dial

50. The resistance of the coil is

(a) .49Ω (b) 9.49Ω (c) 49.9Ω (d) 4.99Ω

51. The reactance of the coil is

(a) 10.13Ω (b) 11.13Ω
(c) 12.13Ω (d) 13.13Ω

Linked answer question

Statement for linked questions 52 and 53

A 3−ϕ, 3-core, metal sheathed cable gave the following results on test for capacitance

(i) Capacitance between two conductor bunches with the sheath and the third conductors 0.4μF per Kw

(ii) Capacitance between bunched conductors and sheath 0.625μF/km

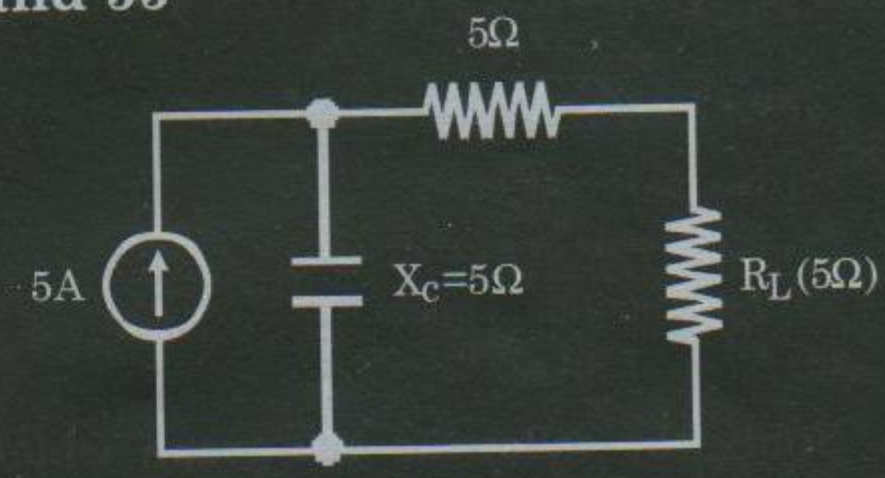
52. The capacitance between any two conductors is

(a) 2.45μF/km (b) 0.248μF/km
(b) 0.248μF/km (d) None

53. When it is connected to 10kv, 50Hz supply then the charging current per phase per km is

(a) 0.096 A (b) 0.23A
(c) 0.998A (d) 0.899A

Statement linked question 54 and 55



From above fig of circuit?

54. The steady state voltage across the capacitor will be

(a) 0V (b) 25V (c) 1V (d) 0.5V

55. The current through R_L and it at $t = 0^+$ is

(a) 0.5A (b) 25A
(c) 1A (d) 0.1A

General Aptitude (GA) Questions

Q.56 to Q.60 carry one marks each.

56. A batsman in his 17th innings making score of 85 and thereby increases his

average by 3. Then his average after 17 innings is

(a) 35 (b) 36 (c) 37 (d) 39

57. The most nearly opposite in meaning DESULTORY

(a) Apologetic (b) Independent
(c) Laudatory (d) Methodical

58. The question below consist of a pair of related words followed by four pairs of words. Select the pair that best expresses the relation in the original pair.
Knife : chopper

(a) Walking : fitness (b) Swim : float
(c) Scissors : cloth (d) Quilt : blanket

59. Sentence completion
She is a pragmatist, as _ _ _ _ _ _ to base her future on impractical dreams as she would be to build a castle on shifting sand.

(a) Determined (b) Disinclined
(c) Quick (d) Diligent

60. No act of _ _ _ _ was more pronounced than his refusal of any rewards for this discovery

(a) Abeyance (b) Egoism
(c) Abnegation (d) Submission

Q.61 to Q.65 carry two marks each.

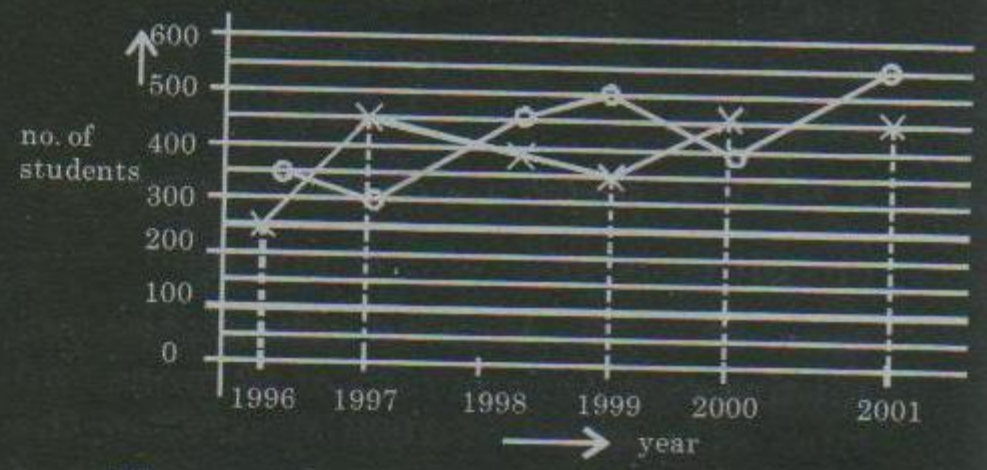
61. $\sqrt{3y+1} = \sqrt{y-1}$ the no. of roots is

(a) No real roots exist
(b) Real roots are exist
(c) Two imaginary roots
(d) None of these

62. Study the following line-graph which gives the number of students who jointed and left the school in the beginning of year for six year, from 1996 to 2001.
Initial strength of the school in 1995 = 3000.

—×— denotes no. of students who left the school

—○— denotes the no. of students who joined the school



The number of students studying in the school during 1999 was

(a) 2950 (b) 3000 (c) 3100 (d) 3150

63. A mixture of 40 litres of milk and water contains 10% water. How much water must be added to make 20% in the new mixture.

(a) 10 litres (b) 5 litres
(c) 0 litres (d) 20 litres

64. The future of women in India is quite bright and let us hope that they will justify their abilities by rising to the occasion. Napoleon was right when he declared that by educating the women we can educate the whole nation. Because a country can never rise without the contribution of 50% of their population.

The passage best supports the statement that:

(a) India is striving hard for the emancipation of women
(b) All women should be well educated
(c) A nation can progress only when women are given equal rights and opportunities as men
(d) Women ought to be imparted full freedom to prove their worth and contribute to the progress of the nation.

65. The sum of how many terms of the series 6+12+18+24.... is 1800?

(a) 16 (b) 24 (b) 20 (d) 18