

**11 TEST CODE: P1214**

Question Booklet No.

400777

Set  
**A**

Roll No.

4 0 0 1 1 1 0 7 7 7

Time Allowed : 2 Hours

Max. Marks : 100

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1. This Question-Booklet contains 100 Questions on the following :-

Section	Subject	Q.No.	Total Questions
Part-I	Electrical Engineering	1-60	60
Part-II	General Awareness, Reasoning and English	61-100	40
Total Questions			100

2. There are 12 pages in this Booklet out of which Page No. 1 is for instructions to the candidates. Page No. 12 is meant for Rough Work and page nos. from 2 to 11 contain questions of all parts. **After opening of the Booklet and before you start answering the questions you must check up this booklet and ensure that it contains all the pages (1-12) and see that no page is missing or repeated. If you find any defect in this booklet, you must get it replaced immediately from the Invigilator within first 10 minutes of start of the Examination.**
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PART-I ELECTRICAL ENGINEERING

$\frac{V_{oc}}{Z_{oc}} = \frac{V_{sc}}{Z_{sc}}$   
 $\frac{49}{Z_{oc}} = \frac{64}{87}$   
 $Z_{oc} = \frac{49 \times 87}{64} = 67.5$

$\frac{40}{Z_{oc}} = \frac{5}{Z_{sc}}$   
 $Z_{oc} = 8Z_{sc}$

- The 40 ohm coaxial transmission line is supplied from 5V signal. If the line is terminated with load resistance of 80 ohm then the voltage reflection coefficient is :-

a) 0.5      b) 3 ✓      c) 0.333 ✓      d) 2
- The resonant frequency of a series R-L-C circuit is  $f_0$  Hz. Now if the value of all the components is reduced to half, then new resonant frequency is :-

a)  $f_0$       b)  $0.5f_0$  ✗      c)  $4f_0$       d)  $2f_0$  ✓
- The open loop transfer function of unity feedback control system is  $G(s) = 9/(S(S+4))$ . The peak overshoot is :-

a) 0.06      b) 0.16      c) 0.6      d) 1.6

*Handwritten notes:*  
 $M_p = e^{-\zeta \pi / \sqrt{1-\zeta^2}}$   
 $\zeta = \frac{4}{2 \times 2} = 1$   
 $\omega_n = 2$   
 $\frac{5}{10} = \frac{1}{2} \frac{9}{S^2 + 4S + 9}$
- The Laplace transform of a function  $f(t)$  is  $F(s) = \frac{s^2 + 7s + 5}{S(s^2 + 3s + 10)}$  at  $t \rightarrow \infty$  the value of  $f(t)$  is,

a) 0.5 ✓      b) infinite ✗      c) 0      d) 2

*Handwritten notes:*  
 $\frac{4}{s} + \frac{4}{s^2 + 3s + 10}$   
 $\lim_{s \rightarrow 0} s F(s) = 4$   
 $\lim_{s \rightarrow \infty} F(s) = 0$
- Buchholz relay is used for -

a) protection of alternator ✗  
 b) protection of transformer against external faults ✗  
 c) protection of transformer against all internal faults ✓  
 d) both (b) and (c) ✓

*Handwritten notes:*  
 $P_{cu loss} = s \times R_{rotor} I^2$   
 $= \frac{s}{1-s} \text{ Mech. Power } (P_{ag})$   
 $P_{ag} \frac{s}{1-s} = s \times R_{rotor} I^2$   
 $\frac{P_{ag}}{1-s} = R_{rotor} I^2$
- A high voltage surge of 200 kV travels along an overhead line towards its junction with in a cable. The surge impedance for line and cable are 400 ohm and 20 ohm respectively. The high voltage surge transmitted through cable is :-

a) 9.5 kV      b) 38 kV      c) 19 kV      d) 200 kV ✓
- A 3-Ph power transformer of 500 MVA, 110/400 kV has a leakage reactance of 0.02 pu for the base value of 500 MVA and 110 kV. The actual leakage reactance referred to secondary of the transformer is :-

a) 3.2 ohm      b) 64 ohm      c) 6.4 ohm      d) 32 ohm

*Handwritten notes:*  
 $N_1 = 1000$   
 $\frac{0.02 \times 110^2}{500} = 0.484$
- A 3-phase, 400 V, 50 Hz, 4-pole induction motor develops 4 kW at the shaft. Consider friction & winding losses are 800 watts at 1000 rpm. Then the rotor copper loss is :-

a) 1.6 kW ✓      b) 7.2 kW      c) 2.4 kW      d) 4.8 kW
- If we wish to eliminate 7<sup>th</sup> harmonic voltage from phase voltage of an alternator, then the coil should be short pitched by an electrical angle of :-

a)  $51.42^\circ$  ✓      b)  $30^\circ$       c)  $25.71^\circ$       d)  $12.85^\circ$
- The open circuited impedance and short circuited impedance of a transmission line section are 49 ohm and 64 ohm respectively. What is the characteristic impedance of the transmission line?

a) 8/7      b) 56 ✓      c) 113      d) 56.5

*Handwritten notes:*  
 $Z_{oc} Z_{sc} = Z_c^2$   
 $49 \times 64 = Z_c^2$   
 $Z_c = \sqrt{3136} = 56$



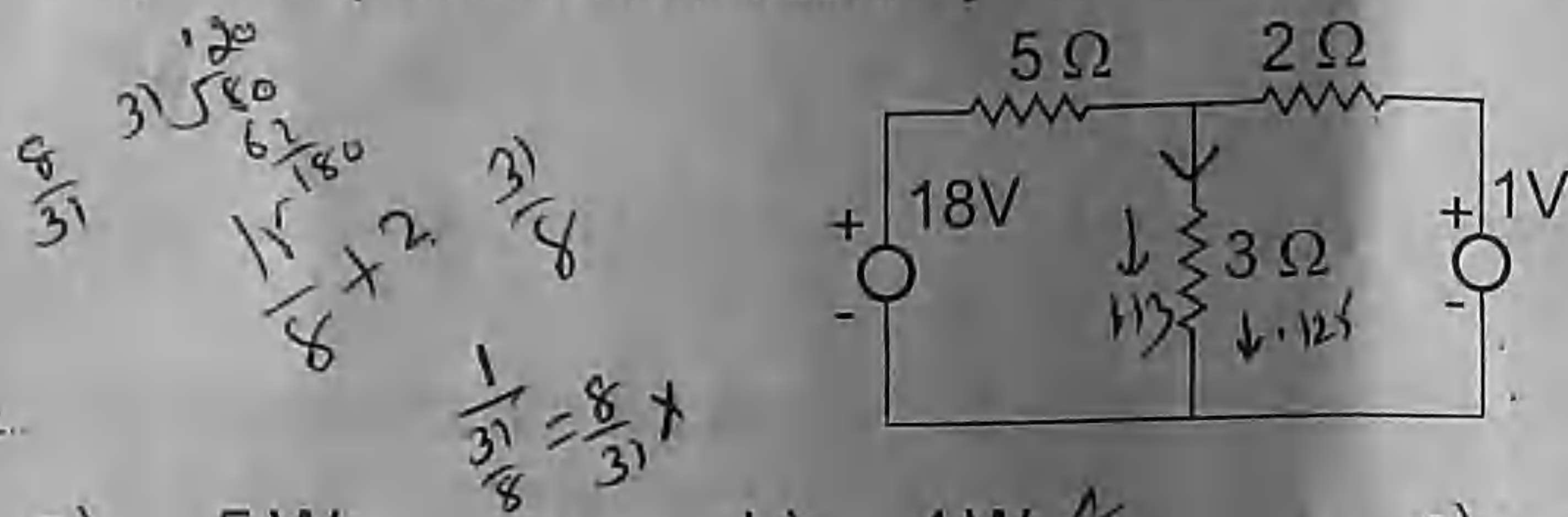
- 11) In a single phase transformer, percentage reactance drop with respect to primary is 10%. What will be the percentage reactance drop with respect to secondary :-
- a) 10% ✓ b)  $N^2 10\%$  c) 20% d) 5%
- 12) A transistor has a maximum power rating of 1W. If the collector to emitter voltage is 10V and collector current is 120 mA, then transistor will :-
- a) fails due to heating b) work properly  
c) date not sufficient d) none of the above
- 13) A current of  $i(t) = (10 + 10 \sin(t))$  A, is passed through an ideal moving iron type ammeter. What will be its reading?
- a) zero b)  $\sqrt{150}$  A ✓ c) 10A d) 20A
- 14) Tellegen's theorem can be applied to :-
- a) only for linear networks  
b) only for non-linear networks  
c) only for time varying systems  
d) for linear, non-linear, time variant and time invariant systems
- 15) A 2H inductor has 100 turns. How many turns must be added to increase the inductance to 8H :-
- a) 200 b) 400 c) 100 ✓ d) 50
- 16) A 3 phase half wave diode rectifier feeds RL load with  $R = 5\Omega$ ,  $L = 3\text{mH}$ . Find the average load current, where the supply voltage is 400 V, 50 Hz.
- a) 54.01 A b) 22A c) 100A d) 68A
- 17) For high frequency low power switched mode power converters, most suitable switching device is :-
- a) IGBT ✓ b) MOSFET c) BJT d) GTO
- 18) The Type of the standard second order system is :-
- a) Type 0 ✓ b) Type 1 c) Type 2 d) Type 3
- 19) An electrical circuits with 6 branches and 3 nodes will have :-
- a) 3 loops equations b) 4 loops equations ✓  
c) 7 loops equations d) 10 loops equations
- 20) Cogging of induction motor occurs due to :-
- a) vibrating torque  
b) harmonic synchronous torque only  
c) harmonic induction torque only ✓  
d) both harmonic induction and synchronous torques
- 21) A shunt generator delivers 50 kW at 250 V and 500 rpm. The armature resistance is  $0.02\Omega$  and shunt field resistance is  $50\Omega$ . When running as shunt motor and taking 50 kW of power at 250 V, the speed of the motor will be :-
- a) 250 rpm b) 484 rpm ✓ c) 500 rpm d) 516 rpm



- 22) A short circuit test is conducted on a 5.5 kVA, 440V / 110V single phase transformer with low voltage winding short circuited. The input voltage at full load current is 40V. The wattmeter reads 250W. For zero voltage regulation, the power factor would be :-
- a) 0.866 leading
  - b) 0.866 lagging
  - c) 0.5 leading
  - d) 0.5 lagging

- 23) A single phase, 230V, 50 Hz, 4-pole, capacitor start induction machine has the following stand still impedances :-  
 Main winding :  $Z_m = 6 + j4\Omega$   
 Aux winding :  $Z_a = 8 + j6\Omega$   
 The value of the starting capacitor required to produce  $90^\circ$  phase difference between the currents in the Main and Auxiliary windings will be :-
- a) 176.84  $\mu\text{F}$
  - b) 187.24  $\mu\text{F}$
  - c) 265.26  $\mu\text{F}$
  - d) 280.86  $\mu\text{F}$

- 24) The power consumed by the  $3\Omega$  resistor in the following diagram is :-

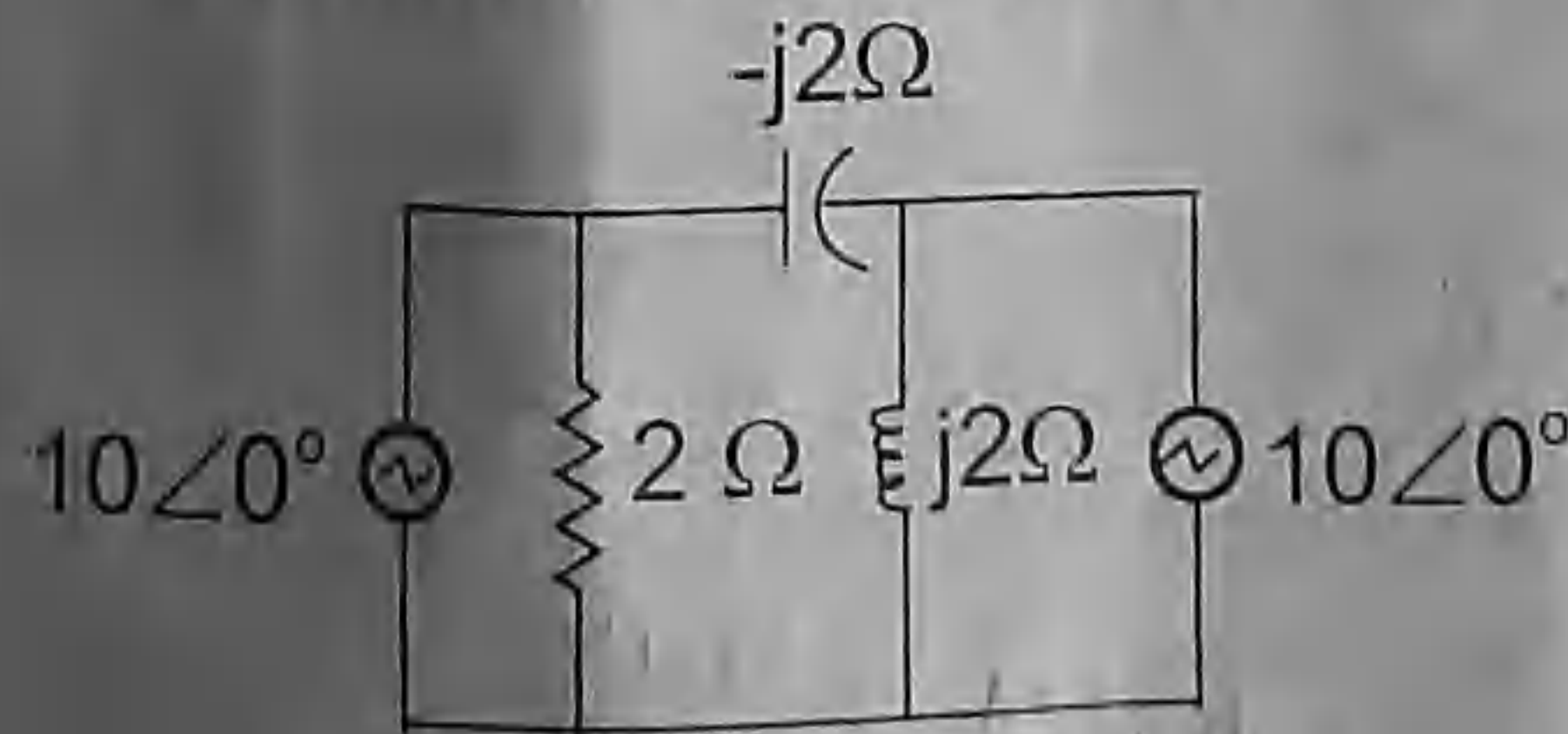


- a) 5W
- b) 4W ✓
- c) 3W
- d) 0W

- 25) Which of the following conditions may be satisfied for the interconnection of two-port networks?
- a) Voltages at the input and output ports of the interconnected network must be same
  - b) Current entering & leaving at a port of the interconnected network must be same
  - c) Interconnected network must be symmetric
  - d) Interconnected network must be reciprocal

- 26) For a  $3\Phi$  power measurement using two wattmeter method, if the power factor is 0.5 (leading), then one of the wattmeter will read :-
- a)  $W/2$
  - b) zero ✓
  - c)  $\sqrt{2} W$
  - d)  $W/\sqrt{3}$

- 27) Current in capacitor and inductor shown in figure would respectively be :-



- a) 0;  $5 \angle -90^\circ$
- b)  $5 \angle 90^\circ$ ;  $5 \angle -90^\circ$
- c)  $5 \angle 90^\circ$ ;  $2 \angle -90^\circ$
- d)  $5 \angle 90^\circ$ ;  $10 \angle -90^\circ$

- 28) A 160 km, 110 kV, 50 Hz 3 phase transmission line has conductor diameter of 10.4 mm and are spaced 2.4 m apart in equilateral triangular configuration, air temperature and pressure are respectively  $27^\circ\text{C}$  and 73.15 cm of Hg. The power loss due to corona for all 3 phases would be :-

- a) 107 kW
- b) 214 kW
- c) 322 kW
- d) 428 kW



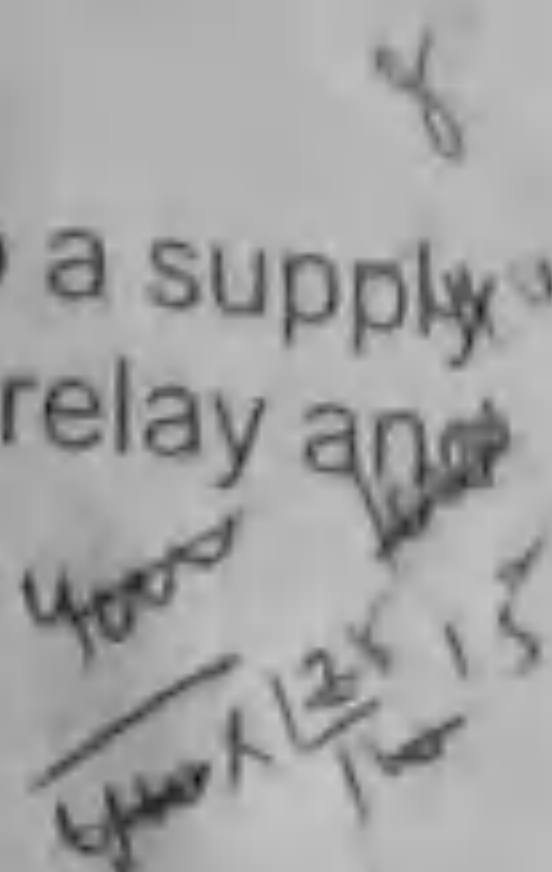
29) The number of current transformers (CTs) and potential transformers (PTs) generally used for metering in three phase three wire system are :-

a) 3 CTs and 3 Pts  
 b) 2 CTs and 3 Pts  
 c) 2 CTs and 2 Pts  
 d) 3 CTs and 2 Pts



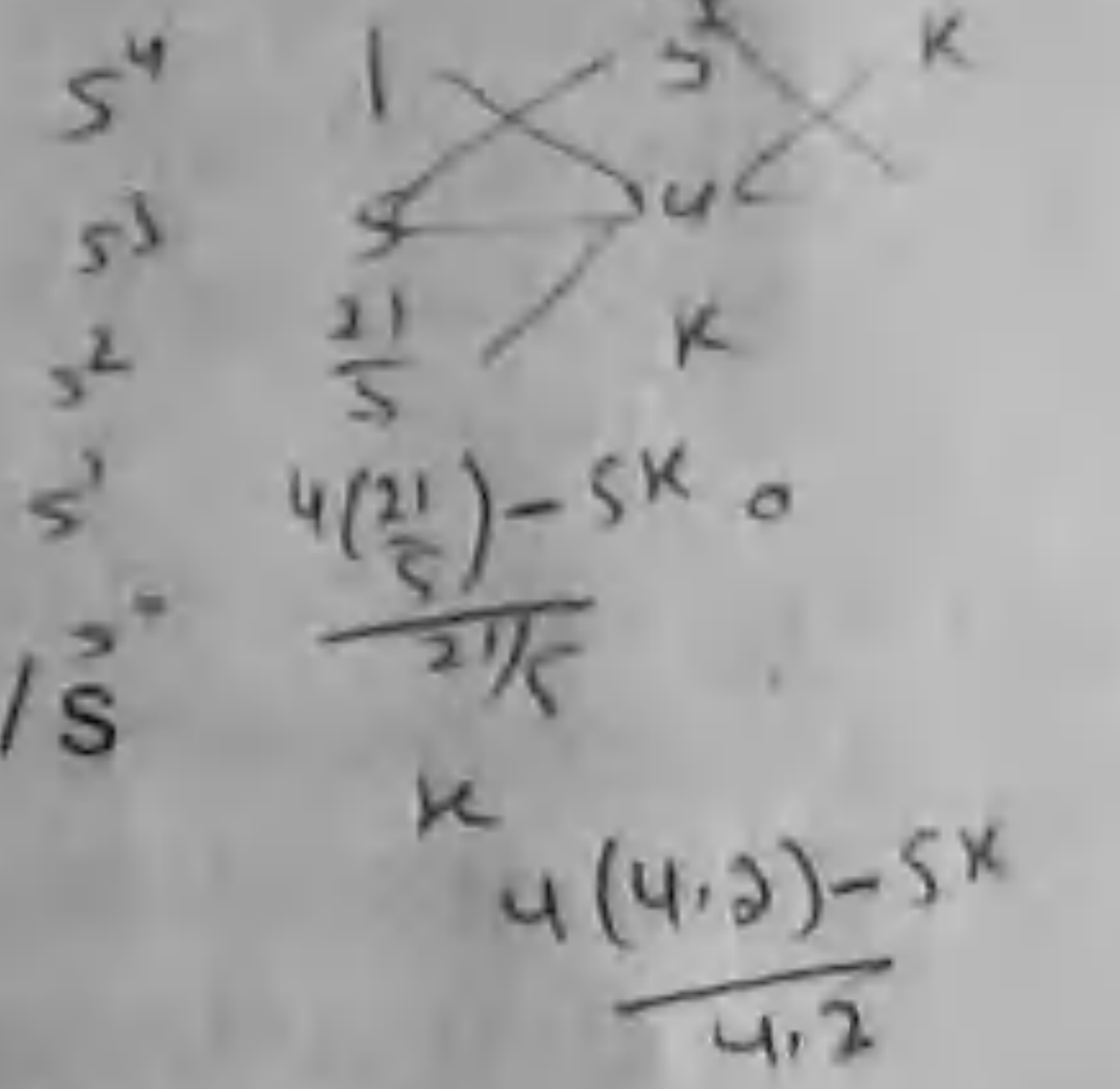
30) A 5A, 2.2s IDMT relay having relay setting of 125% TMS = 0.6. It is connected to a supply through a CT of ratio 400/5. If the fault current is 4000 A, the operating current of relay and plug setting multiplier would respectively be :-

a) 5A; 4  
 b) 5A; 8  
 c) 6.25A; 4  
 d) 6.25A; 8



31) An automatic control system has characteristic equation described as  $s^4 + 5s^3 + 5s^2 + 4s + K = 0$

a) The system is stable for all values of  $K > 0$   
 b) The system is stable for all values of  $0 < K < 3.333$   
 c) The system is oscillatory with natural frequency of oscillation of  $\sqrt{10}$  rad/s  
 d) The system is unstable



32) A multimeter has sensitivity of  $200 \text{ k}\Omega/\text{V}$ . It is used to measure the voltage across a circuit having an output impedance of  $1 \text{ k}\Omega$  and an open circuit voltage of  $6 \text{ V}$  on its  $10 \text{ V}$  scale. The error in measurement would be :-

a) -0.5%  
 b) 0.5%  
 c) -0.7%  
 d) 0.7%

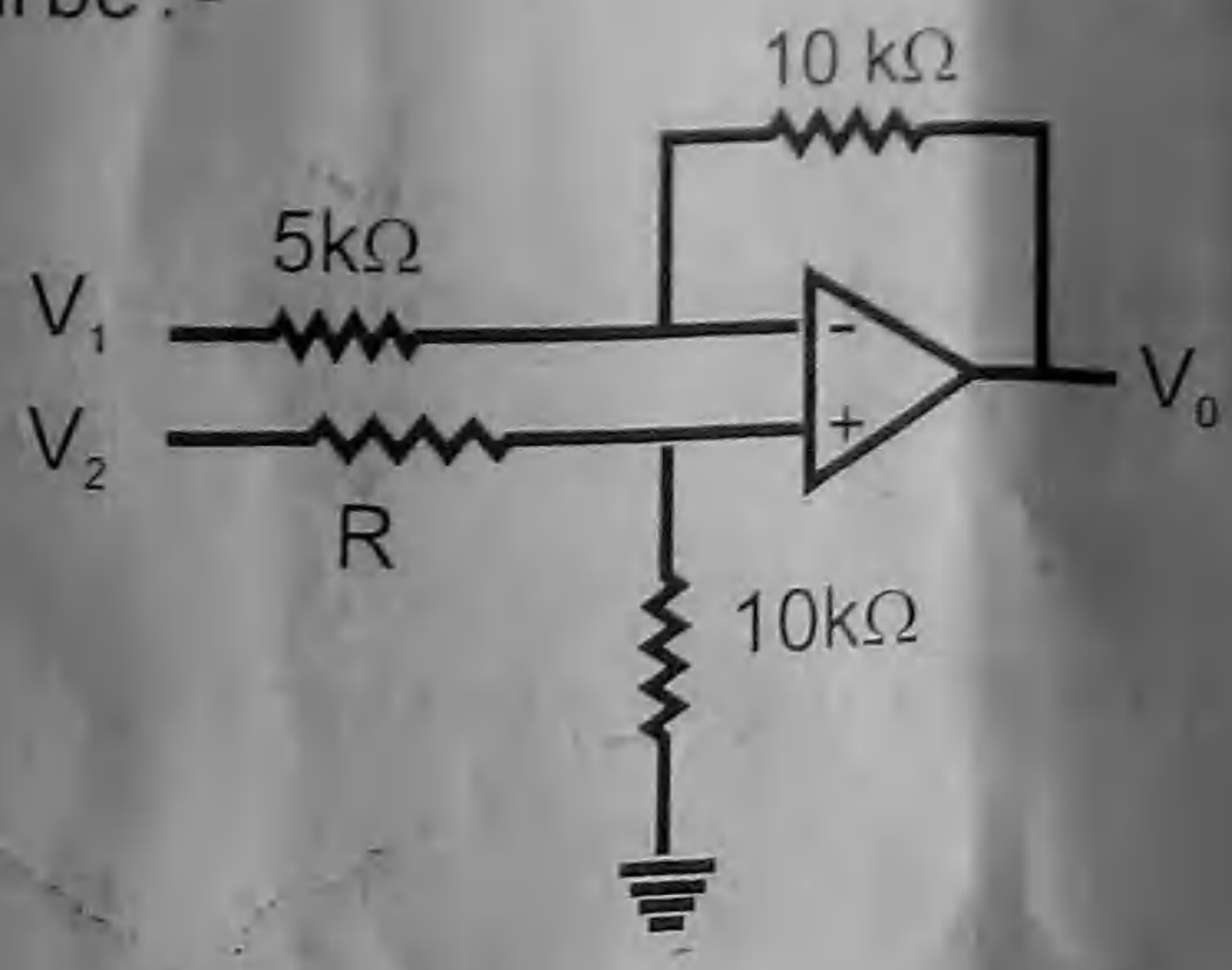
33) A strain gauge has a gauge factor of 2.4 and is mounted on a steel beam whose module of elasticity is  $2 \times 10^6$ . The unstained resistance is given as  $120 \Omega$ . It increased to  $120.1 \Omega$  when beam is stressed. At the point where gauge is mounted the stress will be :-

a)  $6.8 \times 10^6 \text{ N}$   
 b)  $68 \times 10^6 \text{ N}$   
 c)  $6.8 \times 10^8 \text{ N}$   
 d)  $68 \times 10^8 \text{ N}$

34) Short circuit current gain of a bipolar junction transistor when a change in  $I_E$  of  $1 \text{ mA}$  produces a change in  $I_C$  of  $0.99 \text{ mA}$ , would be :-

a) 0.77  
 b) 0.88  
 c) 0.99  
 d) 1.11

35) For a given Op-amp circuit, it is desired to have an output of  $V_0 = \frac{V_2}{3} - 2V_1$  the value of resistor R will be :-



Handwritten notes for question 35:  $F.S. = 10$ ,  $M.A.V. = 6$ ,  $Z_0 = 1 \text{ k}\Omega$ ,  $S = 200 \text{ k}\Omega/\text{V}$

Handwritten characteristic equation:  $5s^2 + 10s + 0 = 0$

a)  $40 \text{ k}\Omega$   
 b)  $30 \text{ k}\Omega$   
 c)  $80 \text{ k}\Omega$   
 d)  $100 \text{ k}\Omega$

36) Small size of Compact Florescent Lamp (CFL) is realised due to its operation with :-

a) high voltage maintained throughout  
 b) high frequency  
 c) high grade of florescent material  
 d) oscillations due to magnetic resonance



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- 37) Transmission losses in HVDC links are :-
- a) Minimum in Monopolar configuration  
 b) Minimum in Homopolar configuration  
 c) Minimum in Bipolar configuration  
 d) Same in all configurations
- 38) The range of firing angles of a three phase voltage controller feeding pure resistive load is :-
- a)  $0^\circ \leq \alpha \leq 180^\circ$   
 b)  $0^\circ \leq \alpha \leq 120^\circ$   
 c)  $0^\circ \leq \alpha \leq 150^\circ$   
 d)  $90^\circ \leq \alpha \leq 150^\circ$
- 39) DC - DC converters operating under discontinuous conduction mode, when compared to their continuous conduction mode will have :-
- a) high gain ( $V_o/V_s$ )  
 b) low gain ( $V_o/V_s$ )  
 c) gain depending on duty ratio  
 d) gain of same value
- 40) For low speed high power reversible drives :-
- a) Cycloconverter - fed AC drives are suitable  
 b) Current source inverters fed AC drives are suitable  
 c) Six step voltage source inverter fed AC drives are suitable  
 d) Induction motor fed from AC voltage controller is suitable
- 41) A first order low pass filter is given with  $R = 50 \Omega$  and  $C = 5 \mu F$ . What is the frequency at which the gain of the voltage transfer function of the filter is 0.25 :-
- a) 4.92 kHz  
 b) 0.49 kHz  
 c) 2.46 kHz  
 d) 24.6 kHz
- 42) In a linear circuit the superposition principle can be applied to calculate the :-
- a) voltage and power  
 b) voltage and current  
 c) current and power  
 d) voltage, current and power
- 43) A PMMC zero to 10 A ammeter is not provided with any controlling mechanism and the moving parts are free to rotate. If a current of 1 A dc is passed through the moving coil, then the instrument :-
- a) will read 1 A  
 b) will read 10 A  
 c) pointer will continuously rotate  
 d) pointer will remain stationary
- 44) Which of the following properties are associated with the state transition matrix :-
- i)  $\Phi(-t) = \Phi^{-1}(t)$   
 ii)  $\Phi(t_1/t_2) = \Phi(t_1)\Phi^{-1}(t_2)$   
 iii)  $\Phi(t_1 - t_2) = \Phi(-t_2)\Phi(t_1)$
- Select the correct answer from the options given below :-
- a) i, ii & iii  
 b) i & ii  
 c) ii & iii  
 d) i & iii
- 45) Bundled conductors in EHV transmission line system provide :-
- a) reduced capacitance  
 b) increased capacitance  
 c) increased inductance  
 d) increased voltage gradient



- 46) Which of the following are the effects of increasing the reverse bias voltage across p-n junction :-
- Decrease in junction capacitance
  - Increase in carrier generation current
  - Increase in carrier recombination in the depletion layer
- Select the correct answer from the options given below:



- i) alone
- i) and ii)
- ii) and iii)
- i), ii) and iii)

- 47) Class AB operation is often used in power ( large signal ) amplifier in order to :-

- get maximum efficiency ✓
- remove even harmonics
- overcome cross-over distortion
- reduce collector dissipation

- 48) A 4 input multiplexer can be used to implement :-

- four combinational functions of 2 variables each
- two combinational functions of 4 variables each ✓
- one combinational functions of 4 variables
- one combinational functions of 3 variables

- 49) Which one of the following is the causal system? [  $y(t)$  is output and  $u(t)$  is an input step function].

- $y(t) = \sin [ u(t+3) ]$
- $y(t) = 5u(t) + 3 u(t- 1)$  ✓
- $y(t) = 5u(t) + 3 u(t+ 1)$
- $y(t) = \sin(u(t-3)) + \sin (u(t+ 3 ))$

- 50) The autocorrelation function  $R_x(\tau)$  of the signal  $X(t) = V \sin \omega t$  is given by :-

- $(\frac{1}{2}) V^2 \cos \omega t$
- $V^2 \cos \omega t$
- $V^2 \cos^2 \omega t$
- $2V^2 \cos^2 \omega t$

- 51) If the HLT instruction of a 8085 microprocessor is executed :-

- the microprocessor is disconnected from the system bus till the reset is pressed.
- the microprocessor enters into a halt state and the buses are tri-stated.
- the microprocessor halts execution of the program and returns to monitor. ✓
- the microprocessor reloads the program from the locations 0024 and 0025H.

- 52) The contents of the accumulator in an 8085 microprocessor are altered after the execution of the instruction.

- CMPC
- CPI 3A
- ANI 5C
- ORA A

- 53) A memory has a total of 8 memory chips, each with 12 address lines and 4 data lines. The total size of the memory system is :-

- 6 kbytes
- 32 kbytes
- 48 kbytes
- 64 kbytes



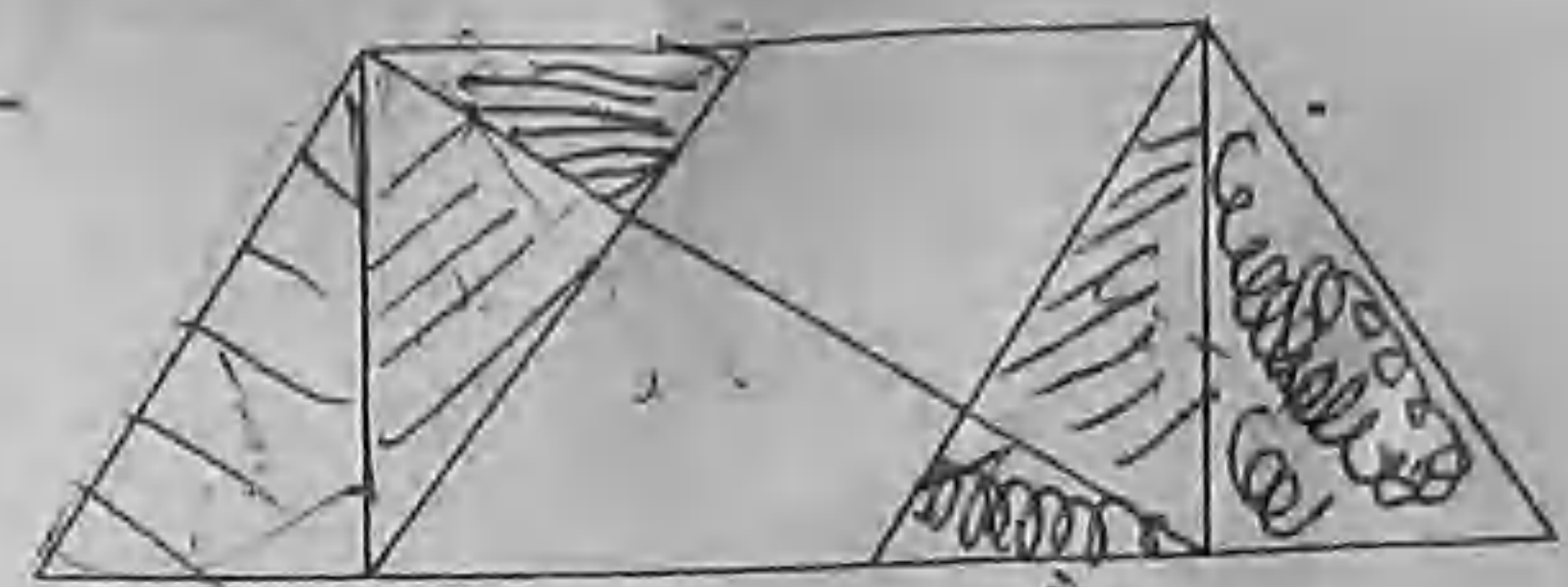








74) Find the number of triangles in the given figure :-



- a) 8      b) 10      c) 12 ✓      d) 14

75) Look at this series :- E2, \_\_\_\_\_, C8, B16, A32. What number should fill the blank ?

- a) F16      b) G4      c) D4 ✓      d) F3

76) Suresh spends 25% of his salary on house rent, 5% on food, 15% on transport, 10% on clothes and the remaining amount of Rs. 36,000 is saved. What is Suresh's income ?

- a) Rs. 80,000 ✓      b) Rs. 80,500  
c) Rs. 70,500      d) None of the above

77) AC, FH, KM, PR, ?

- a) UW ✓      b) VW      c) UX      d) TV

78) Find the odd one out :-

- a) Echo      b) Resonance      c) Tone      d) Ear ✓

79) In a certain code, PAINTER is written NCGPRGP, then REASON would be written as :-

- a) PCYQMN      b) PGYQMN      c) PGYUMR ✓      d) PGYUPM

80) A told B, "The girl I met yesterday was the youngest daughter of the brother-in-law of my friend's mother." How is the girl related to A's friend?

- a) Niece      b) Cousin ✗      c) Friend ✓      d) Daughter

**Direction (Q 81 – 85) :** - In the following questions, choose the word that is most opposite in meaning to the word given.

- 81) INDIGENCE  
a) Affluence      b) Pauper      c) Poverty      d) Starvation
- 82) STUBBORN  
a) Pliable      b) Mulish      c) Bolshie      d) Commoner
- 83) PUTRID  
a) Fetid      b) Rancid      c) Fresh      d) Moldy
- 84) DEPLORABLE  
a) Execrable      b) Excellent      c) Dire      d) None of the above
- 85) FRAIL  
a) Brittle      b) Strong      c) Sturdy      d) Feeble

**Directions ( Q 86 – 90 ) :** In the following questions choose the word which best expresses the meaning of the given word.

- 86) ALERT  
a) Energetic      b) Observant ✓      c) Intelligent      d) Watchful



- 87) RECKLESS  
 a) Courageous      b) Rash      c) Bold      d) Daring
- 88) INEBRIATE  
 a) Dreamy      b) Stupefied      c) Unsteady      d) Drunken
- 89) MAYHEM  
 a) Celebration      b) Havoc      c) Excitement      d) Defeat
- 90) SYNOPSIS  
 a) Index ✓      b) Mixture      c) Summary ✓      d) Puzzles

**Direction ( Q 91 – 95 ) : - In the following questions, select the correct answer for changing the following nouns to verbs.**

- 91) CONFUSION  
 a) confused      b) confusing      c) confuse      d) confuses
- 92) PAINTING  
 a) paints      b) paint ✓      c) painted ✓      d) painter
- 93) MEDICINE  
 a) medicare      b) medicinal      c) medical ✓      d) medicate ✓
- 94) POLLEN  
 a) pollinate      b) pollution      c) pollute ✓      d) polls
- 95) INVESTMENT  
 a) investor      b) investing ✓      c) investiture      d) invest ✓
- 96) Shalini was not \_\_\_\_\_ by the criticism and paid no \_\_\_\_\_ even when her best friend talked against her.  
 a) bothered, attention ✓      b) troubled, mind  
 c) threatened, warning      d) deterred, heed
- 97) There is no glory in war \_\_\_\_\_ the blood it \_\_\_\_\_.  
 a) thinking, demands      b) considering, sheds  
 c) worth, costs      d) comparing, spills
- 98) Hitler cast a \_\_\_\_\_ and \_\_\_\_\_ shadow upon world history.  
 a) colossal, frightful      b) Herculean, gloomy  
 c) gigantic, horrifying      d) huge, vast
- 99) Somesh \_\_\_\_\_ me coming to his table, he smiled and \_\_\_\_\_ me a chair.  
 a) found, signaled      b) met, sat  
 c) looked, gave      d) saw, offered ✓
- 100) Although the leaders life was both \_\_\_\_\_ and painful, it was not without \_\_\_\_\_ for he had accomplished many of his goals.  
 a) magnificent, success      b) happy, frustration  
 c) thrilling, ambition      d) arduous, satisfaction



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