(Post Name: Aviator-II , Date of Exam: 25-04-2023 , Time of Exam: 9:30 AM)

1. Newton is equal to which of the following

(a) Kg-m/S
(b) m/S^2
(c) $Kg-m/S^2$
(d) Kg/m-S

2. Which of the following scientists is responsible for the exclusion principle which states that two objects may NOT occupy the same space at the same time?

(a) Heisenberg
(b) Bohr
(c) Teller
(d) Pauli

3. Millikan's oil drop experiment showed that electric charges was

(a) negative
(b) quantized
(c) positive
(d) unmeasurable

4. Which one of the following is the name of a device used to measure voltage without drawing any current from the circuit being measured?

(a) wattmeter
(b) galvanometer
(c) ammeter
(d) potentiometer

5. Which one of the following is not an example of forced oscillator?

(a) Vibration of air column in a resonance tube, when it is linked with tuning fork.
(b) Diaphragm of loud speaker vibrates when it is linked with an output amplifier
(c) Electrical circuit in a radio receiver oscillates when it is linked with broadcasting system
(d) Resonant LC circuit, when it is charged

6. Which is the correct representation of Electric displacement vector for a di-electric medium

(a) $\vec{D} = \varepsilon_0 \vec{E} + \vec{P}$ (b) $\vec{D} = \vec{E} + \frac{\vec{P}}{\varepsilon_0}$

(c) $\vec{E} = \varepsilon_0 \vec{D} + \vec{P}$ (d) None of these

7. Which of the following is not strictly a conservation principle?

(a) Principle of Conservation of Angular Momentum

(b) Principle of Conservation of Linear Momentum

(c) Principle of Conservation of Kinetic Energy

(d) Principle of Conservation of Total Energy

8. The collision of two objects where kinetic energy is not conserved, is called

(a) Elastic collision (b) Inelastic collision

(c) Oblique collision (d) Direct (Head-on) collision

9. Which one of the following is the correct expression of uncertainty principle?

(a) $\Delta p_x \Delta x \geq \frac{\hbar}{2}$ (b) $\Delta p_x \Delta v_x \geq \frac{\hbar}{2}$

(c) $\Delta E \Delta p \geq \frac{\hbar}{2}$ (d) $\Delta J \Delta t \geq \frac{\hbar}{2}$

10. According to second law of thermodynamics

(a) Heat cannot flow from colder object to a hotter object

(b) A perpetual motion machine of second kind is not possible

(c) Entropy of a system never decreases

(d) All of these

11. Which of the following is example of mass to energy conversion?

(a) Nuclear Fission
(b) Electric Cell
(c) Wind energy
(d) None of these

12. The fusion reaction takes place under _____

(a) High Temperature and Low Pressure
(b) Low Temperature and High Pressure
(c) High Temperature and High Pressure
(d) Low Temperature and Low Pressure

13. The two types of cycles proposed in the stars for fusion are _____

(a) p-p cycle and p-e cycle
(b) p-p cycle and C-N cycle
(c) p-p cycle and p-C cycle
(d) p-p cycle and p-N cycle

14. The unit used to measure the dose of radiation is _____

(a) Joule
(b) Roentgen
(c) Nuclei
(d) m^2

15. The fission of a single nucleus of ^{235}U releases 200 MeV of energy. What is the number of fissions that must occur to produce a power of 1 MW?

(a) 3.23×10^{16}
(b) 3.12×10^{16}
(c) 4.38×10^{16}
(d) 5.38×10^{16}

16. At high temperatures, which material is the best choice to be used as coolant in a nuclear reactor?

(a) Water
(b) Heavy water
(c) Molten Potassium
(d) Molten Carbon

17. The size of nucleus is of the order of _____.

(a) 10 m
(b) 10^{-5} m
(c) 10^{-9} m
(d) 10^{-15} m

18. The p-n junction diode cannot be used as _____

(a) Voltage regulator
(b) Amplifier
(c) Light emitting diode
(d) Rectifier

19. Zener diode is _____

(a) lightly doped
(b) Moderately doped
(c) heavily doped
(d) undoped

20. Meter bridge is based on

(a) Biot- severt law
(b) Ampere’s circuital law
(c) Ohm’s law
(d) Wheat-stone bridge

21. Rutherford's Model failed to explain _____

(a) The circular orbits
(b) Existence of positive charge
(c) stability of atoms
(d) charge of nucleus

22. Electric field due to uniformly charged sphere is

(a) $E = \frac{q}{4\pi\varepsilon_0 r}$
(b) $E = \frac{q}{4\pi\varepsilon_0 r^2}$
(c) $E = \frac{3q}{4\pi\varepsilon_0 r^2}$
(d) $E = \frac{3q}{2\pi\varepsilon_0 r}$

23. An electromagnetic field tensor $\vec{F}_{\mu\nu}$ is given by:

(a) $F_{\mu\nu} = \left(\frac{\partial A_\mu}{\partial x_\nu} - \frac{\partial A_\nu}{\partial x_\mu}\right)$
(b) $F_{\mu\nu} = \left(\frac{\partial A_\mu}{\partial x_\mu} - \frac{\partial A_\nu}{\partial x_\nu}\right)$
(c) $F_{\mu\nu} = \left(\frac{\partial A_\nu}{\partial x_\nu} - \frac{\partial A_\mu}{\partial x_\mu}\right)$
(d) None of these

24. Which of the following is a universal logic gate?

(a) NAND Gate
(b) NOR Gate
(c) XOR Gate
(d) Both (a) and (b)

25. Find A+AB

(a) A
(b) B
(c) 0
(d) A+B

26. What type of an antenna is used in a pulsed radar system
(a) Yagi
(b) Parabolic
(c) Conical
(d) Telescopic

27. Maximum Unambiguous Range is to detect _____?
(a) Targets
(b) Antennas
(c) Repeaters
(d) Systems

28. How is the velocity of an aircraft measured by passive radio systems?
(a) Doppler shift
(b) Velocity data is transmitted by the aircraft and received by the station
(c) Secondary surveillance method
(d) Satellite mapping

29. Which one of the following is not an input utilized by the aircraft navigation system?

(a) Sonar
(b) Radio aids
(c) Dead reckoning data
(d) Celestial measurements

30. What is Mobile communication?
(a) Allows to communicate from different locations without the use of physical medium
(b) Allows to communicate from different locations with the use of physical medium
(c) Allows to communicate from same locations without the use of physical medium
(d) Allows to communicate from same locations with the use of physical medium

31. _____ is a transmission method used in MIMO wireless communications to transmit encoded data signals independently.
(a) Multi User-MIMO
(b) STTD
(c) Spatial multiplexing
(d) Collaborative Uplink MIMO

32. Space diversity is also known as _____
(a) Frequency diversity
(b) Antenna diversity
(c) Polarization diversity
(d) Time diversity

33. What is the full form of ARINC?
(a) Aeronautical Radio, Incorporated
(b) Aircraft Radio, Incorporated
(c) Aviation Radio, Incorporated
(d) Air Radio, Incorporated

34. Aircraft AC systems operate on which of the following frequency?
(a) 4Hz
(b) 40Hz
(c) 400Hz
(d) 4000Hz

35. The international standards for avionics equipment are prepared by _____
(a) Aircraft Electronic Engineering Committee
(b) Airlines Electronic Engineering Committee
(c) Aeronautical Electronic Engineering Committee
(d) Aerospace Electronic Engineering Committee

36. Three sets *A*, *B* and *C* are such that $A = B \cap C$ and $B = C \cap A$, then

(a) $A = B$ (b) $A \subset B$
(c) $A \supset B$ (d) $A \subset B'$

37. The value of the parameter *k*, for which the function $f : R \to R$ given by $f(x) = kx + 1, k \neq 0$ is the inverse of itself, is:

(a) -2 (b) -1
(c) 1 (d) 2

38. The smallest positive integral value of *n* for which $\left(\frac{1-i}{1+i}\right)^n$ is purely imaginary with positive imaginary part, is:

(a) 1 (b) 2
(c) 3 (d) 4

39. If $n = {}^{m}C_2$, then the value of ${}^{n}C_2$ is given by

(a) $2\,({}^{m+2}C_4)$ (b) $3({}^{m+1}C_4)$
(c) $3({}^{m-1}C_4)$ (d) $2({}^{m-1}C_4)$

40. Three positive numbers form a G.P. with common ratio *r* (> 1). If the middle term of this G.P. is doubled, the new numbers are in A.P. Then *r* =

(a) $2 - \sqrt{3}$ (b) $2 + \sqrt{3}$
(c) $2\left(2 + \sqrt{3}\right)$ (d) $\frac{2+\sqrt{3}}{2}$

41. If the line passing through (3, 4) and (*x*, 5) makes and angle of 135° with the positive direction of *x*-axis, then *x* is equal to:
(a) -2 (b) -4
(c) 4 (d) 2

42. If P (at^2, $2at$) is one end of the focal chord PSQ of the parabola $y^2 = 4ax$, where S is the focus. The length of the focal chord PSQ is:

(a) $a\left(t+\frac{1}{t}\right)$ (b) $\left\{a\left(t+\frac{1}{t}\right)\right\}^2$

(c) $a\left(t+\frac{1}{t}\right)^2$ (d) $4a\left(t+\frac{1}{t}\right)^2$

43. The distance of the point P (a, b, c) from x-axis is:

(a) a (b) $\sqrt{b^2+c^2}$

(c) $\sqrt{2a^2+b^2+c^2}$ (d) $\sqrt{a^2+b^2+c^2}$

44. $\lim_{x\to 0}\frac{e^x-e^{\sin x}}{2(x-\sin x)}$ is equal to

(a) $\frac{1}{2}$ (b) $\frac{1}{4}$

(c) 1 (d) 0

45. Let $f(x)$ be the polynomial of degree 3 such that $f(3)=1, f'(3)=-1, f''(3)=0, f'''(3)=12$. Then the polynomial is:

(a) x^3-x^2+12

(b) $x^3-3x^2+8x-23$

(c) $2x^3-3x^2+17x-54$

(d) $2x^3-18x^2+53x-50$

46. The standard deviation of first 10 natural numbers is:

(a) $\frac{1}{12}\sqrt{33}$ (b) $\frac{1}{12}\sqrt{99}$

(c) $\frac{1}{2}\sqrt{33}$ (d) $\frac{1}{4}\sqrt{99}$

47. Three different numbers are selected at random from the set A = {1, 2,…, 10}. The probability that the product of two of the numbers is equal to third is:

(a) 3/10 (b) 13/120

(c) 1/40 (d) 37/40

48. $tan(cot^{-1}x)$ is equal to

(a) $\frac{\pi}{2}-x$ (b) x

(c) tan x (d) $cot(tan^{-1}x)$

49. If $\begin{vmatrix} p & q-y & r-z \\ p-x & q & r-z \\ p-x & q-y & r \end{vmatrix} = 0$, then the value of $\frac{p}{x}+\frac{q}{y}+\frac{r}{z}$ is:

(a) -1 (b) 0
(c) 1 (d) 2

50. The value of the integral $\int_0^{\pi} \frac{1}{1+e^{\cos x}}\,dx$ is:

(a) 1/*e* (b) π
(c) 0 (d) $\frac{\pi}{2}$

51. The area enclosed between the curves $y = ax^2$ and $x = ay^2 (a > 0)$ is 4/3, then the value of *a* is:

(a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{3}}$
(c) $\frac{2}{\sqrt{3}}$ (d) 2

52. If a line makes angles $\alpha, \beta \text{and} \gamma$ with the coordinate axes, then $\cos 2\alpha + \cos 2\beta + \cos 2\gamma =$

(a) 1 (b) -1
(c) -2 (d) 2

53. The solution of the differential equation $(x+y)(dx-dy) = dx+dy$ is:
(a) $x + y = c(x - y)$, where c is an arbitrary constant.
(b) $x - y = ce^{(x+y)}$, where c is an arbitrary constant.
(c) $x + y = ce^{(x-y)}$, where c is an arbitrary constant.
(d) $x - y = c(x + y)$, where c is an arbitrary constant.

54. For a vector $\vec{a}$, $|\vec{a} \times \hat{\imath}|^2 + |\vec{a} \times \hat{\jmath}|^2 + \left|\vec{a} \times \hat{k}\right|^2$ is equal to

(a) $2|\vec{a}|$ (b) $|\vec{a}|^2$
(c) $2|\vec{a}|^2$ (d) $3|\vec{a}|^2$

55. A feasible solution to an LP problem
(a) must satisfy all of the problem's constraints simultaneously.
(b) need not satisfy all of the constraints, only some of them.
(c) must be a corner point of the feasible region.
(d) must optimize the value of the objective function.

56. Binary number can be represented by:

(a) 3 (b) 4
(c) 2 (d) 0

57. Which of the following is an example of a binary number?

(a) 6AH1ER (b) 100101
(c) $202$22 (d) 222$22

58. A device that converts from decimal to binary number is known as
(a) Instructor (b) Decoder
(c) Converter (d) Encoder

59. Conversion of binary number $(101110)_2$ to hexadecimal is
(a) $(35)_{16}$ (b) $(46)_{16}$
(c) $(2E)_{16}$ (d) $(50)_{16}$

60. Which one of the following is the correct way to increment the rear end in a circular queue?
(a) rear =rear+1 (b) (rear+1) % max
(c) (rear % max) + 1 (d) None of them

61. Which of the following is the time complexity to search an element in the linked list?
(a) O(1) (b) O(n)
(c) O(logn) (d) O(nlogn)

62. Which technique is not supported by the Binary Tree?

(a) Randomized traversal (b) Preorder traversal
(c) Postorder traversal (d) Inorder traversal

63. How can we define an AVL tree?
(a) A tree which is binary search tree and height balanced tree.
(b) A tree which is a binary search tree but unbalanced tree.
(c) A tree with utmost two children
(d) A tree with utmost three children

64. Which data structure is the best for implementing a priority queue?
(a) Stack (b) Linked list
(c) Array (d) Heap

65. Which one of the following is not the type of the Queue?
(a) Linear Queue (b) Circular Queue
(c) Double ended Queue (d) Single ended Queue

66. How many types of buffer overflow in the operating system?
(a) Two (b) Six
(c) Seven (d) Five

67. What type of scheduling is round-robin scheduling?
(a) Linear data scheduling (b) Non-linear data scheduling
(c) Preemptive scheduling (d) Non-preemptive scheduling

68. Which of the following scheduling algorithms is preemptive scheduling?
(a) FCFS Scheduling (b) SJF Scheduling
(c) Network Scheduling (d) SRTF Scheduling

69. Which of the following "semaphore" can take the non-negative integer values?
(a) Binary Semaphore (b) Counting Semaphore
(c) Real Semaphore (d) Temporary Semaphore

70. Which of the following operating system does not require a command to run?
(a) Kali Linux (b) Windows
(c) Unix (d) Red Hat

71. In the relational table, which of the following can also be represented by the term "attribute"?
(a) Entity (b) Row
(c) Column (d) Tuples

72 The term "TCL" stands for_____.
(a) Ternary Control Language (b) Transmission Control Language
(c) Transaction Central Language (d) Transaction Control Language

73. In a relation database, every tuples divided into the fields are known as the_____
(a) Queries (b) Domains
(c) Relations (d) Entity

74. In which one of the following, the multiple lower entities are grouped (or combined) together to form a single higher-level entity?
(a) Specialization (b) Generalization
(c) Aggregation (d) None of the above

75. Which of the following command is a type of Data Definition language command?

(a) Create
(b) Update
(c) Delete
(d) Merge

76. Which of the following refers to the number of tuples in a relation?

(a) Entity
(b) Column
(c) Cardinality
(d) None of the above

77. To which of the following the term "DBA" referred?

(a) Data Bank Administrator
(b) Database Administrator
(c) Data Administrator
(d) None of the above.

78. The term HTTP stands for?

(a) Hyper terminal tracing program
(b) Hypertext tracing protocol
(c) Hypertext transfer protocol
(d) Hypertext transfer program

79. Which software prevents the external access to a system?

(a) Firewall
(b) Gateway
(c) Router
(d) Virus checker

80. Which topology is not supported by the network?

(a) Star
(b) Ring
(c) Bus
(d) Peer to Peer

81. Ten eggs are distributed among ABCD in ratio 1:2:3:4 randomly. It is known that A gets less eggs than B, and C gets more eggs than D. If A gets half the number of eggs of B, then which one of the following is necessarily true?

(a) C gets an even number of eggs
(b) C gets an odd number of eggs
(c) D gets an even number of eggs
(d) D gets an odd number of eggs

82. Read the following and answer the question

(i) Ramesh, Suresh, Nagesh, Devesh, Lokesh and Himanshu work at companies A,B, C, D, E and F. These companies have uniforms with shirts of Red, Yellow, Green, Brown, Purple and pink colour which its employees are supposed to wear.
(ii) Uniform of Company D has brown shirt and Uniform of Company A is Green shirt
(iii) Himanshu works in either A, B, D or F.
(iv) Company B has Pink shirt and Ramesh is its employee.
(v) Nagesh does not work in company E
(vi) Company C does not have purple shirt as uniform
(vii) Neither Nagesh Nor Devesh is employee of Company D
(viii) Suresh works in company F
(ix) Company E does not have Purple or Yellow colored uniform
(x) Lokesh works in company A.

Which colour shirt is given by the Company C?

(a) Cannot be determined (b) Brown
(c) Green (d) None of these

83. Read the following and answer the question

i) Rajesh, Mahesh, Yogesh, Nagesh and Pravesh are Doctor, Engineer, Architect, Teacher and Manager. Each one of them plays a different sport amongst Football, Cricket, Snooker, Table Tennis and Hockey
ii) Mahesh, a Doctor, plays either Cricket or Hockey
iii) Pravesh is neither Engineer nor Manager
iv) Rajesh is teacher and plays Cricket
v) Neither Pravesh nor Yogesh plays Snooker

Who plays Snooker?

(a) Yogesh (b) Nagesh
(c) Pravesh (d) Data Inadequate

84. Read the statement below and answer the question

Raju has set up a mobile manufacturing unit. He launched a cheap mobile in market and estimated that he will be able to sell 1 lakh units before competition arrives in the market. The fixed cost of the company is Rs 4 cr and the variable cost per mobile is Rs 1000. He has kept the selling price of the mobile as Rs 2000.

What shall be the break even level of sales

(a) Rs.8 crores
(b) Rs.10 crores
(c) Rs.4 crores
(d) Rs.12 crores

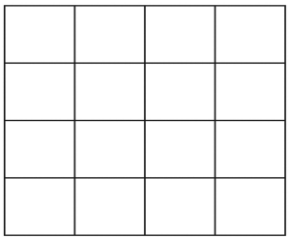
85. if$(x+y) : (x-y) = 5:3$ find the ratio of $(x^3 + y^3): (x^3 - y^3)$

(a) 113/110
(b) 125/9
(c) 55/42
(d) 65/63

86. Sum of present age of Suresh and Dinesh is equal to the age of Hema six years back. Five years from now, the ratio of age of Suresh and Dinesh will be 3:2. Rajesh is 5 years older than Hema and his present age is four times the present age of Suresh. What is present age of the Dinesh

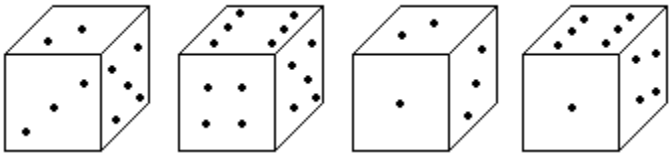
(a) 1 year
(b) 2 years
(c) 10 years
(d) 12 years

87. The number of squares contained in the figure are:



A. 25
B. 30
C. 50
D. 55

88. Shown in the figure below the side of cubes containing dots.



The face opposite to the one containing one dot contains --- dots.

(a) 2 (b) 3
(c) 4 (d) 5

89. Mirror image of the clock shows the time as quarter past ten. What is the correct time?

(a) 1:45 (b) 2:30
(c) 7:40 (d) 9:15

90. In a cube, one pair of adjacent faces is painted black, second pair of adjacent faces is painted blue and third pair of adjacent faces is painted green. The cube is now cut into 64 identical cubes

Number of small cubes with no black paint

(a) 24 (b) 36
(c) 12 (d) 42

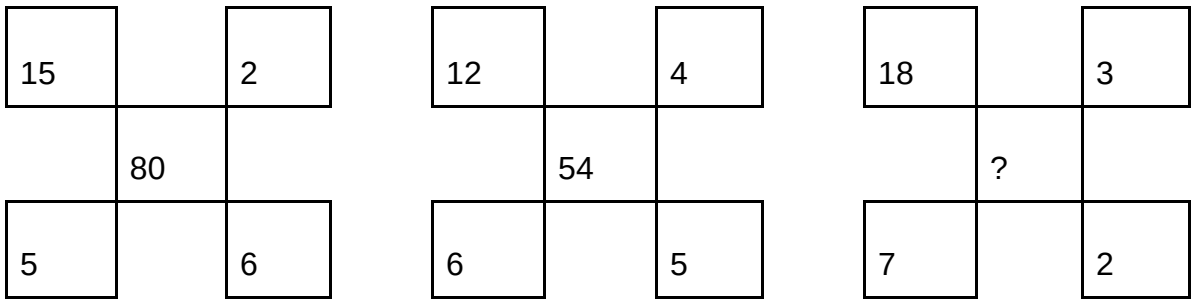
91. Read following statements for answering the question

i) Three teams comprising of 3 persons each are to be formed from 9 volunteers A,B,C,D,E,F,G,H, I.
ii) C and G must be in same team
iii) D and E must be in same team
iv) H and I cannot be in same team
v) Either I or F or both must be in team of B
vi) F must be in team no 2

What is a possible team combination

(a) AEH (b) AIH
(c) CDF (d) CGI

92. Find the missing number



(a) 46 (b) 15
(c) 55 (d) 32

93. Refer the statements below for answering the question

A,B,C and D are members of a family which has one couple, their son and their daughter. It is known that both statements of only one of them are true. Following are their statements when asked about their relationship

i) A says- (1) C is my daughter; (2) D is my husband.
ii) B says - (1) C is my son; (2) A is my mother.
iii) C says - (1) A and B are of same gender;(2) B is my sister
iv) D says - (1) B is of same gender as I; (2) C is my son

If both statements of two of them are false, find the person who's both the statements are true-

(a) A (b) C
(c) D (d) Cannot be determined

94. Read following statements for answering question

(i) In a meeting eight persons A,B,C,D,E,F,G,H are sitting around a round table
(ii) A and D are neighbours but neither is neighbour of H
(iii) B is 4th to the right of D and B and F are neighbours.
(iv) E and H are neighbours and E is 3rd to the right of F.
(v) G and C are not neighbours. G and D are not neighbours

Which of the following statements is true

(a) C sits between D and E (b) C sits between E and B
(c) C sits between A and F (d) None of the above

95. In the following question, statements are followed by two Conclusions. By considering the statements and conclusions, decide which of the conclusion(s) follows from given options:

Statement: (i) Some pens are pencils.
(ii) Some pencils are erasers.
(iii) Some erasers are not sharpeners.

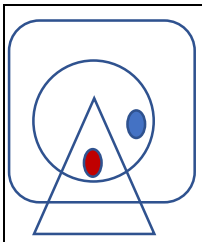
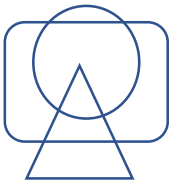
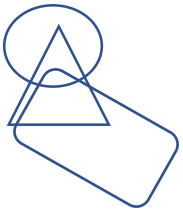
Conclusions: (i) Some pens are erasers.
(ii) Some pens are not pencil.
(iii) All pens are pencils.
(iv) Some pencils are not sharpeners.

(a) Only IV follows
(b) Only I and IV follow
(c) Only I, II and IV follow
(d) None of these

96. If P + Q means P is the mother of Q. P # Q means P is the father of Q. P – Q means P is the sister of Q, then which of the following relationship shows that M is the daughter of R?

(a) R # M + N
(b) R + N # M
(c) R – M # N
(d) None of these

97. From amongst the figures A, B, C and D, select the one which satisfies the same conditions of placement of dots as in figure X.

					
X		A	B	C	D

98. Aberrant: Abnormal:: Bigoted : ?

(a) Biased
(b) Idleness
(c) Fraud
(d) Lengthy

99. In a class of 100 students, some students participate in sports, dance and music.

Dance	:	40 students
Sports	:	28 students
Music	:	48 students
Dance and Music	:	16 students
Music and Sports	:	14 students
Sports and Dance	:	9 students
All activities	:	5 students

With the given information answer the following question:

How many students participate only in Dance?

(a) 28 (b) 26
(c) 20 (d) 22

100. In the following question, a statement is followed by two Conclusions I and II. Consider the statement and the following conclusions. Decide which of the conclusions follows from given options:

Statement: Any student who does not behave properly while in the school brings bad name to himself and also for the school.

Conclusions: I. Such student should be removed from the school.

II. Strict discipline does not improve behaviour of the students.

(a) If Conclusion I follows (b) If Conclusion II follows
(c) If neither Conclusion I nor II follows (d) If both Conclusions I and II follow