

# MIZORAM PUBLIC SERVICE COMMISSION

## TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO THE POST OF ASSISTANT CONTROLLER OF MINES UNDER COMMERCE & INDUSTRIES DEPARTMENT GOVERNMENT OF MIZORAM, SEPTEMBER, 2023

### PAPER - IV (TECHNICAL)

Time Allowed : 3 hours

Full Marks : 200

*All questions carry equal marks of 2 each.*

*Attempt all questions.*

1. In capital budgeting technique, which one is also known as traditional method of investment appraisal?
  - (a) Non-discounting technique
  - (b) Profitability Technique
  - (c) Discounting technique
  - (d) None of the above
2. Which method in an investment appraisal method is based on the discounted cash flow?
  - (a) Net equity budgeting method
  - (b) Net present value method
  - (c) Net future value method
  - (d) All of the above
3. The monetary value of an asset decrease due to
  - (a) Unfavourable market conditions
  - (b) Wear and tear
  - (c) Obsolescence
  - (d) All of the above
4. The calculation of depreciation using declining-balance method
  - (a) ignores salvage value in determining the amount to which a constant rate is applied.
  - (b) multiplies a constant percentage times the previous year's depreciation expense.
  - (c) yields an increasing depreciation expense each period.
  - (d) multiplies a declining percentage times a constant book value.
5. The net present value of Rs. 400 at the end of 5 years at 10% discount rate is
  - (a) Rs. 273
  - (b) Rs. 226
  - (c) Rs. 248
  - (d) Rs. 245
6. The present value of an annuity of Rs. 1000 per year for 8 years with the redemption of capital at market interest rate of 5% and with risk rate of 12% is
  - (a) Rs. 5550.3
  - (b) Rs. 4554.9
  - (c) Rs. 4207.1
  - (d) Rs. 4449.9
7. A quarry owner takes a loan of Rs. 25,000 at 8% interest for the extension of the quarry. To repay the loan, an additional saving of Rs. 2,500 per annum is necessary. The period taken for repayment is
  - (a) 21 years
  - (b) 28 years
  - (c) 25 years
  - (d) 30 years
8. If the median of noise data collected during day time within the core zone of an opencast mine is 76 dB and its mean value is 72 dB. Then, mode value of noise is
  - (a) 75 dB
  - (b) 84 dB
  - (c) 88 dB
  - (d) 90 dB

9. What is the coefficient of variation of the following series?  
83, 97, 93, 109, 124, 126, 126, 101, 102, 108
- (a) 14.1 (b) 15.9  
(c) 13.9 (d) 19.9
10. The measure of central tendencies are
- (a) mean, median, mode (b) mean, median, variance  
(c) range, variant, standard deviation (d) mean, variant, standard deviation
11. The mean deviation of the data 2, 9, 9, 3, 6, 9, 4 from the mean is
- (a) 3.23 (b) 2.89  
(c) 2.57 (d) 3.57
12. A set of measurement is found to be normally distributed with mean  $m$  standard deviation  $s$ . The interval defined by  $(m \pm a)$  includes 68% of the measurements. The value of  $a$  is
- (a)  $0.5s$  (b)  $s$   
(c)  $2s$  (d)  $3s$
13. For normal distribution which one of the followings statements is true?
- (a) mean, median and mode will coincide  
(b) mean and median coincide but they are different from mode  
(c) mean, median and mode are different from each other  
(d) median and mode coincide but they are different from mean
14. The standard deviation and mean of a data are 6.5 and 12.5 respectively. The coefficient of variation is
- (a) 32% (b) 42%  
(c) 52% (d) 62%
15. In normal distribution
- (a) mean, median and mode are different to each other (b) mean, median and mode are equal to each other  
(c) Standard deviation and mode are equal (d) None of the above
16. The condition for negative skewness is
- (a) mode = median = mode (b) mode < median < mode  
(c) mode > median > mode (d) mode  $\leq$  median  $\leq$  mode
17. In an opencast mine, accident due to transport at a particular intersection follows Poisson distribution with an average rate of 1.4 per week. What is the probability that the next week is accident-free?
- (a) 0.5377 (b) 0.3409  
(c) 0.3408 (d) 0.2466
18. The sum of the probabilities of all the elementary events of an experiment is
- (a) 1 (b) 0.75  
(c) 0.5 (d) 0.25
19. Three unbiased coins are tossed. What is the probability of getting at least 2 heads?
- (a) 1/4 (b) 1/3  
(c) 1/2 (d) 3/4
20. If the probability is 0.4 that a mining engineering job applicant has a post graduate degree, 0.6 that he has some work experience in the mine, and 0.3 that he has both. The probability that he would have a post graduate degree or some work experience in mine is
- (a) 0.7 (b) 0.1  
(c) 0.3 (d) 0.8

21. Which of the following works on principle of compression and impact?  
(a) Jaw crusher (b) Gyratory crusher  
(c) Dodge crusher (d) All of the above
22. The fine product from classification is known as  
(a) slime (b) slack  
(c) tramp (d) pulp
23. Select the primary crusher among the followings  
(a) Cone crusher (b) Roll crusher  
(c) Hammer mill (d) Jaw crusher
24. What is the maximum feed size in secondary crusher?  
(a) 5 cm (b) 15 cm  
(c) 30 cm (d) > 60 cm
25. To separate two finely divided solids from one another, the process to be selected is  
(a) Flotation (b) washing  
(c) Jigging (d) None of the above
26. Blake and Dodge are related to which type of crusher?  
(a) Gyratory (b) Cone  
(c) Jaw (d) Roll
27. The method of separation of two or more minerals of different specific gravity is  
(a) Sieving (b) Flotation  
(c) Heavy Media Separation (d) Washing
28. Which of the following works on the principle of shearing?  
(a) Ball Mill (b) Tooth crusher  
(c) Roll crusher (d) Rod mill
29. In tumbling mills, the ball filling ratio to vessel is  
(a) 60% (b) 50%  
(c) 40% (d) 30%
30. The diameter of a ball mill is 3 m and the diameter of the balls in the ball mill is 50 cm. What is the critical speed of the ball mill?  
(a) 26.7 rpm (b) 28.8 rpm  
(c) 50.0 rpm (d) 55.2 rpm
31. The process in froth flotation mainly depends on  
(a) density and strength of the material (b) density and particle size of the material  
(c) density and hydrophobicity of the material (d) density and permeability of the material
32. When the particles of same or different specific gravity come to rest at differential instants, the phenomenon is termed as  
(a) stratification (b) hindered settling  
(c) free settling (d) differential acceleration
33. Which of the following involves vibration?  
(a) Ball mill (b) Grizzly screen  
(c) Hammer mill (d) Roll mill

34. Indian coal is difficult to wash mainly due to
- (a) low specific gravity
  - (b) high ash content
  - (c) low compressive strength
  - (d) all of the above
35. Washability test for coal is done by:
- (a) float and sink method
  - (b) hindered settling method
  - (c) gravitation method
  - (d) all of the above
36. The definition of coal under the Coal Mine Regulation (CMR) 2017 is
- (a) All organic and inorganic substances
  - (b) All organic and inorganic substances including natural gas
  - (c) Both (a) & (b)
  - (d) anthracite, bituminous coal, lignite, peat and any other form of carbonaceous matter sold or marketed as coal
37. The Coal Mine Regulations (CMR) 2017 was released by the notification of which Ministry?
- (a) Ministry of Coal
  - (b) Ministry of Mines
  - (c) Ministry of Human Resource Management
  - (d) Ministry of Labour and Employment
38. The danger zone in opencast coal mines as per CMR 2017 falls within a radius of \_\_\_\_\_ meters from the place of firing of shot.
- (a) 500
  - (b) 300
  - (c) 200
  - (d) 100
39. As per Reg.177 of MMR 1961, every fence erected on the surface shall be examined by competent person once at least in every \_\_\_\_\_ days.
- (a) 14
  - (b) 7
  - (c) 15
  - (d) 30
40. According to CMR 2017, deep hole drilling and blasting means holes more than \_\_\_\_\_ in depth and used for blasting in opencast mining operations.
- (a) One meter
  - (b) Two meter
  - (c) Three meter
  - (d) None of above
41. Based on CMR 2017, "Competent person" in relation to any work or any machinery, plant or equipment means a person who has attained the age of \_\_\_\_\_ and who has been duly appointed in writing by the manager as a person competent to supervise or perform that work.
- (a) 20
  - (b) 25
  - (c) 30
  - (d) 40
42. "Abandoned Mine Methane (AMM)" as per CMR 2017 is
- (a) natural gas recovered from abandoned coal mines or part thereof
  - (b) only Carbon dioxide gas recovered from abandoned coal mines
  - (c) only Nitrogen gas recovered from coal mines
  - (d) none of the above
43. According to Mizoram Minor Mineral Concession Rules 2000, every application for the grant of renewal of the mining lease shall be accompanied by fees of
- (a) One hundred rupees
  - (b) Two hundred rupees
  - (c) Three hundred rupees
  - (d) Five hundred rupees

44. Under the Mizoram Minor Mineral Concession Rules 2000, application for grant of mining lease shall be made to Competent Authority or his authorised agents in respect of minor minerals in
- (a) FORM A (b) FORM K  
(c) FORM C (d) FORM D
45. In the Mizoram Minor Mineral Concession Rules 2000, "Dead Rent" means..
- (a) Rent payable for every six month of the lease of the Minor Minerals  
(b) Rent payable for every year of the lease of the Minor Minerals  
(c) Rent payable for every two years of the lease of the Minor Minerals  
(d) None of above
46. In the Mines Act 1952, Section 25 deals with
- (a) Drinking Water (b) Medical Appliance  
(c) Notice of Certain disease (d) None of above
47. Serious bodily injury under the Mines Acts 1952 is defined as
- (a) Permanent loss of any part or section of body (b) Permanent loss of or injury to the sight or hearing  
(c) Both (a) and (b) (d) None of the above
48. Under which section as defined in Mines Act 1952 the central government constitutes a committee for making rules and regulations?
- (a) Sec 10 (b) Sec 11  
(c) Sec 12 (d) Sec 13
49. Under Section 23 of the Mines Act 1952, if the Chief Inspector or the said Inspector fails to inspect the place of accident, within \_\_\_\_\_ of time of accident, work may be resumed at the place of accident.
- (a) Twenty-four (b) Thirty hour  
(c) One hour (d) Seventy-two
50. Under Section 40 of the Mines Act 1952, persons below \_\_\_\_\_ years of age are prohibited to work in any mine or part thereof.
- (a) 15 (b) 16  
(c) 17 (d) 18
51. What should be the minimum period of enforced absence in case of reportable injury according to Mines Act 1952?
- (a) 24 (b) 36  
(c) 48 (d) 72
52. According to Mines Rule 1955, the Workmen's Inspector shall record a full report of the matters ascertained as a result of his inspection in an interleaved paged and bound register kept for the purpose in the mine in
- (a) Form J (b) Form U  
(c) Form C (d) Form D
53. Which section of the Mines Act 1952 gives power to inspectors to prohibit employment in mines?
- (a) 22A (b) 23  
(c) 24 (d) 25

54. Which section of the Mines Act 1952 gives power to Central Government to exempt either absolutely or subject to any specification condition any local area or any mine for the operation of all or any provision of act, rules or regulation?
- (a) 83 (b) 85  
(c) 87 (d) 88
55. How many days in a week the workmen Inspector is supposed to perform the duties as mentioned in Rule 29R of Mines Rule 1955?
- (a) 1 day (b) 2 days  
(c) 3 days (d) 4 days
56. According to Mines Rule 1955, what should be the minimum floor area of a shelter in a mine?
- (a) 8 m<sup>2</sup> (b) 12 m<sup>2</sup>  
(c) 14 m<sup>2</sup> (d) 20 m<sup>2</sup>
57. As per Mine Rule 1955, when the number of persons employed in a mine exceeds \_\_\_\_\_, the Workmen's Inspector shall be assisted by one additional Workmen's Inspector in mining discipline.
- (a) 500 (b) 1000  
(c) 1500 (d) 2000
58. Based on the Mines Rule 1955, the initial medical examination of every person employed in the mine should be arranged within a period of 'A' years of the date so notified by the Manager. What is 'A' stand for?
- (a) 2 (b) 3  
(c) 4 (d) 5
59. As per Mine Rule 1955, in respect of every medical examination, the Manager of the mine concerned shall give at least 'B' days of prior notice in writing to the person to be examined. What is 'B' stand for?
- (a) 7 days (b) 14 days  
(c) 20 days (d) 30 days
60. According to MMR 1961, if the white metal is used in the capping of ropes, then its melting point shall not exceed \_\_\_\_\_ centigrade, and its temperature when poured into the socket shall not exceed \_\_\_\_\_ centigrade.
- (a) 300 and 363 degree (b) 300 and 373 degree  
(c) 300 and 383 degree (d) None of the above
61. Based on MMR 1961, No winding rope shall be used or continued in use, if its safety factor is or becomes less than \_\_\_\_\_ in the case of shaft exceeding 1000 meters but not exceeding 1500 m in depth.
- (a) 10 (b) 9  
(c) 7 (d) 6
62. As per the Explosive Rule, 2008 a tamping rod made entirely of \_\_\_\_\_ should be used for stemming and charging of shot hole.
- (a) Wood (b) Iron  
(c) Steel (d) all of the above
63. According to Explosive Rule, 2008 the number of shots, which explode, shall be counted and unless it is certain that all the shots have exploded no person shall approach or be permitted to approach the place until \_\_\_\_\_ minutes after the firing of shots.
- (a) 15 (b) 20  
(c) 30 (d) 45

64. As mentioned in Form LE-3 of Explosive Rule, 2008 (Form LE-3), a distance of \_\_\_\_\_ meters surrounding the magazine shall be kept clear of dried grass or bush or flammable materials.
- (a) 10 (b) 15  
(c) 30 (d) 50
65. As per the Mineral Concession Rules 1960, an application for reconnaissance permit shall be made to the State Government in \_\_\_\_\_.
- (a) Form 'A' (b) Form 'K'  
(c) Form 'L' (d) Form 'M'
66. Under the Mineral Concession Rules 1960, leases can be lapsed subject to the conditions of this rule where mining operations are not commenced within a period of \_\_\_\_\_ years from the date of execution of the lease.
- (a) one (b) two  
(c) three (d) five
67. As per the Mineral Concession Rules 1960, register of applications for reconnaissance permits are maintained in \_\_\_\_\_.
- (a) Form G-1 (b) Form G-2  
(c) Form G-3 (d) None of above
68. Based on the Explosive Rule 2008, what should be the minimum safety distance for manufacturing factory and magazine of category "ZZ" to Railway line for the explosive quantity of 300 kg.
- (a) 20 meter (b) 30 meter  
(c) 45 meter (d) 60 meter
69. According to Mines Rule 1955, the quantity of drinking water to be provided in a mine or any part thereof shall be on a scale of at least \_\_\_\_\_ litres for every person employed at any one time.
- (a) One (b) Two  
(c) Three (d) Five
70. The general requirement for the air space for storage tank and dyked enclosures as per OMR 2017 is
- (a) not less than 5% of the total capacity of the tank  
(b) not less than 10% of the total capacity of the tank  
(c) not less than 15% of the total capacity of the tank  
(d) not less than 20% of the total capacity of the tank
71. What is 'Zone-1 Hazardous Area' from the shale shaker in an open air as per OMR 2017?
- (a) Within the radius of 1.0 m in all direction (b) within the radius of 1.5 m in all direction  
(c) within the radius of 2.0 m in all direction (d) within the radius of 2.5 m in all direction
72. What is the maximum gradient where locomotives cannot be used as per MMR 1961?
- (a) 1 in 4 (b) 1 in 10  
(c) 1 in 12 (d) 1 in 15
73. According to MMR 1961, Automatic Contrivance is provided for every shaft or winze exceeding \_\_\_\_\_ metres in depth.
- (a) 100 (b) 200  
(c) 300 (d) 500
74. As per the Mines Rule 1955, Welfare Officer is appointed for every mine where \_\_\_\_\_ persons are employed.
- (a) 100 or more (b) 200 or more  
(c) 300 or more (d) 500 or more
75. What should be the threshold value of peak particle velocity (PPV) for domestic house made of bricks/kuchha/cement, not belonging to owner based on the DGMS Technical Circular 7 of 1997?
- (a) 5 mm/s (b) 10 mm/s  
(c) 15 mm/s (d) 25 mm/s

**Directions (Question Nos. 76 to 83) : Choose the best alternative out of the given options:**

76. Which is the smallest prime number?

- (a) 0 (b) 1  
(c) 2 (d) 3

77. Which one of the following is the greatest number?

- (a)  $\frac{3}{5}$  (b)  $\frac{7}{9}$   
(c)  $\frac{11}{15}$  (d)  $\frac{16}{19}$

78.  $\sqrt{576}$  is equal to

- (a) 14 (b) 18  
(c) 23 (d) 24

79. If a boy covers 4 km in 20 minutes, how much distance will he cover in 45 minutes?

- (a) 8 km (b) 9 km  
(c) 7 km (d) 10 km

80. What is  $\frac{1}{6}$ <sup>th</sup> of 3?

- (a) 6 (b) 3  
(c)  $\frac{1}{2}$  (d)  $\frac{1}{3}$

81. Find the average weight of 8 students: 49 kg, 47 kg, 46 kg, 42 kg, 39 kg, 48 kg, 50 kg and 43 kg.

- (a) 44 kg (b) 42.5 kg  
(c) 47 kg (d) 45.5 kg

82. The given numbers follows a certain pattern. Find the missing number:

118, ...?..., 104, 97, 90, 83

- (a) 115 (b) 111  
(c) 107 (d) 105

83. The following arrangement follows a certain pattern. Find the missing number:

0	7
?	26

- (a) 45 (b) 50  
(c) 60 (d) 63

**Directions (Question Nos. 84 to 90): Read the following passage and answer the questions that follow.**

### Passage

Many people seem older than they are. Research into the causes of premature aging has shown that stress has a lot to do with it, because the body wears down much faster during periods of crisis. The American Institute of Stress investigated this degenerative process and concluded that most health problems are caused by stress.

Researchers at the Heidelberg University Hospital conducted a study in which they subjected a young doctor to a job interview, which they made even more stressful by forcing him to solve complex math problems for thirty minutes. Afterward, they took a blood sample. What they discovered was that his antibodies had reacted to stress the same way they react to pathogens, activating the proteins that trigger an immune response. The problem is that this response not only neutralizes harmful agents, it also damages healthy cells, leading them to age prematurely.

The University of California conducted a similar study, taking data and samples from thirty-nine women who had high levels of stress due to the illness of one of their children and comparing them to samples from women with healthy children and low levels of stress. They found that stress promotes cellular aging by weakening cell structures known as telomeres, which affect cellular regeneration and how our cells



age. As the study revealed, the greater the stress, the greater the degenerative effect on cells.

These days, people live at a frantic pace and in a nearly constant state of competition. At this fever pitch, stress is a natural response to the information being received by the body as potentially dangerous or problematic. Theoretically, this is a useful reaction, as it helps us survive in hostile surroundings. Over the course of our evolution, we have used this response to deal with difficult situations and to flee from predators.

The alarm that goes off in our head makes our neurons activate the pituitary gland, which produces hormones that release corticotropin, which in turn circulates through the body via the sympathetic nervous system. The adrenal gland is then triggered to release adrenaline and cortisol. Adrenaline raises our respiratory rate and pulse and prepares our muscles for action, getting the body ready to react to perceived danger, while cortisol increases the release of dopamine and blood glucose, which is what gets us “charged up” and allows us to face challenges.

- 84.** The author’s main purpose in writing this passage is to
- (a) argue that stress causes most health problems in the body
  - (b) discuss the research done on stress
  - (c) explain that stress actually helps us to survive
  - (d) highlight the impact of stress on longevity
- 85.** According to the passage, which of the following is true?
- (a) In stressful situations, our blood becomes pathogenic
  - (b) Telomeres have a degenerative effect on our cells
  - (c) Stress is a natural response to predators
  - (d) The main organizer of the body’s response to stress is corticotropin
- 86.** What does the author mean by “fever pitch”?
- (a) excitement
  - (b) high fever
  - (c) high pitch in music
  - (d) first pitch in a baseball game

**Directions (Question Nos. 87 & 88): Which of the following is similar in meaning to the words printed in bold as used in the context of the passage?**

**87. trigger**

- (a) respond
- (b) elicit
- (c) shoot
- (d) create

**88. predators**

- (a) marauders
- (b) preys
- (c) rangers
- (d) enemies

**Directions (Question Nos. 89 & 90): Which of the following is opposite in meaning to the words printed in bold as used in the context of the passage?**

**89. degenerative**

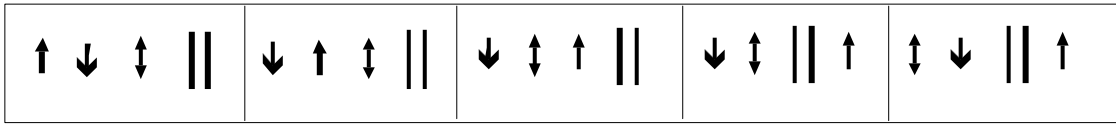
- (a) decline
- (b) decadent
- (c) restore
- (d) effete

**90. frantic**

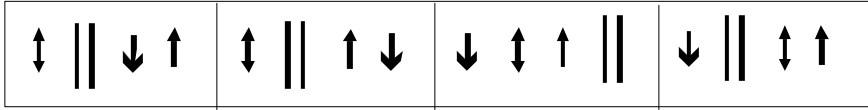
- (a) agitated
- (b) frenzied
- (c) delirious
- (d) collected

**Directions (Question Nos. 91 to 95):** In each of the questions given below, find out the correct answer out of the four answer figures, if the problem figures continue in the same sequence.

91. Problem figures



Answer figures

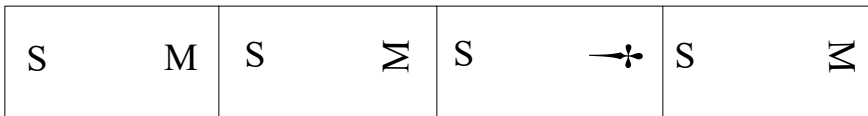


(a) (b) (c) (d)

92. Problem Figures



Answer Figures

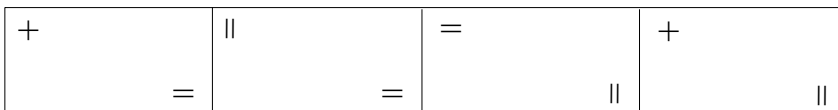


(a) (b) (c) (d)

93. Problem figures

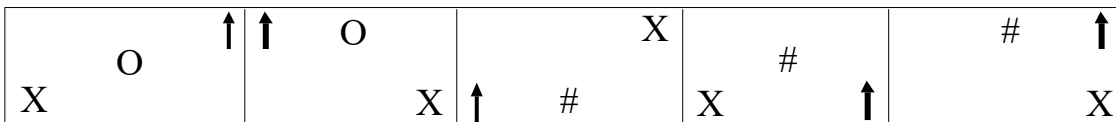


Answer Figures

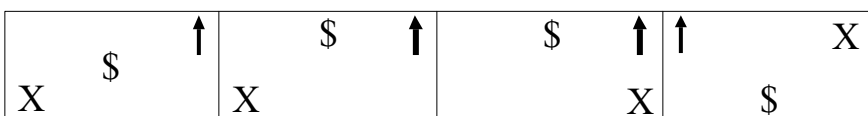


(a) (b) (c) (d)

94. Problem Figures

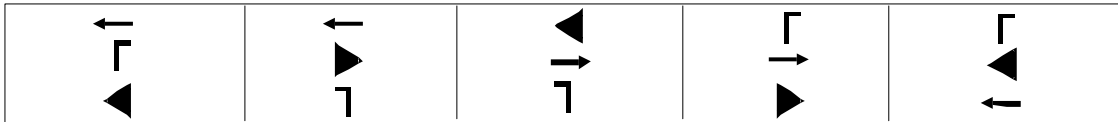


Answer Figures



(a) (b) (c) (d)

95. Problem Figures



Answer Figures



(a) (b) (c) (d)

**Directions (Question Nos. 96 to 100):** In each of the question below are given two statements followed by two conclusions numbered I and II. You have to take the two given statements to be true even if they seem to be at variance from commonly known facts and decide which of the given conclusion (s) logically follow (s) from the two given statements, disregarding commonly known facts. Give your answer as :

96. Statements I: Some hats are caps.  
II: Some caps are mats.  
Conclusions I: Some caps are hats.  
II: Some mats are caps.

- (a) If only conclusion I follows
- (b) If only conclusion II follows
- (c) If either I or II follows
- (d) If both I and II follow

97. Statements I: Some fools are intelligent.  
II: Some intelligent are great.  
Conclusions I: Some fools are great.  
II: No great is fool.

- (a) If only conclusion I follows
- (b) If only conclusion II follows
- (c) If either I or II follows
- (d) If both I and II follow

98. Statements I: Some stones are bricks.  
II: Some bricks are trees.  
Conclusions I: Some stones are trees.  
II: Some trees are bricks.

- (a) If only conclusion I follows
- (b) If only conclusion II follows
- (c) If either I or II follows
- (d) If both I and II follow

99. Statements I: Some cities are villages.  
II: Some towns are villages.  
Conclusions I: Some cities are towns.  
II: No town is city.

- (a) If only conclusion I follows
- (b) If only conclusion II follows
- (c) If either I or II follows
- (d) If both I and II follow

100. Statements I: Some adults are boys.  
II: Some boys are old.  
Conclusions I: Some adults are not old.  
II: Some boys are not old.

- (a) If only conclusion I follows
- (b) If only conclusion II follows
- (c) If either I or II follows
- (d) If both I and II follow