

# **SYLLABUS OF ATC Licensing, Aerodrome Control and AFIS Course**



**CIVIL AVIATION AUTHORITY OF NEPAL**  
**CIVIL AVIATION ACADEMY**  
(ICAO TRAINAIR PLUS Full Member)  
Sanothimi, Bhaktapur, Nepal

Revised in January 2020

# ENTRANCE FOR ATC LICENSING, AERODROME CONTROL AND AFIS COURSE

## MODE OF EXAMINATION

General Knowledge, Psychometric Assessment, English Test, Interview and Medical Check up

## SCHEME OF EXAMINATION

S.N.	Paper	Subject	Full Marks	Pass Marks	Mode of Question	Questions×Marks	Time
1	First	General Knowledge	50	20	Objective: Multiple Choice	$50 \times 1 = 50$	45 minutes
2	Second	Psychometric Assessment	50	20	Objective: Multiple Choice	$25 \times 2 = 50$	30 minutes
3	Third	English Test	50	20	Subjective	$1 \times 20 = 20$ $5 \times 3 = 15$ $1 \times 15 = 15$	1:30 hrs.

### **MODE OF EXAMINATION**

**General Knowledge, English Paper, Psychometric Assessment, Interview and Medical Examination**

<b>(2) General Knowledge (Objective Questions)</b>	<b>50×1= 50 marks (45 minutes)</b>
1. General knowledge	
2. Physical and Natural aspect of Nepal	
3. Population and migration of Nepal	
4. History of Nepal	
5. National luminaries of Nepal	
6. Characteristics of plural society and Nepalese society in that context	
7. Social, economic, cultural condition/costume of various ethnic groups & other communities of Nepal	
8. General knowledge on Aviation	
9. Chronological development of Nepalese Aviation.	
10. Good-governance & Civil society	
11. Characteristics of Nepalese economy	
12. Globalization and Nepal	
13. Science, technology and current affairs	
14. Regional organizations (SAARC, ASIAN, European Union, BIMSTEC)	
15. United Nation and its subsidiaries.	
16. Environment and sustainable development	
17. Gender equality and Gender equity	
18. Human Rights and commitment of Nepal	
<b>Psychometric Assessment</b>	<b>50 marks (30 minutes)</b>
1. Verbal Reasoning Test	20
2. Numerical Reasoning Test	20
3. Non-Verbal Reasoning Test	10
<b>English Test (Subjective Questions)</b>	<b>50 marks (1:30 hrs)</b>
1. Essay Writing (around 250 words)	20
2. Comprehension	15
3. Translation from Nepali into English	15
<b>Interview</b>	<b>25 marks</b>
<b>Medical Examination</b>	<b>Class -3 Medical Assessment</b>

## General Knowledge:

### 1. General Knowledge:

- ✓ Composition of the earth
- ✓ Ocean
- ✓ Continent & Geographical Area
- ✓ Latitude & Longitude
- ✓ Continental shift
- ✓ International Date line
- ✓ Trade wind, monsoon
- ✓ International time
- ✓ Solar/Lunar eclipse
- ✓ General Knowledge on universe

### 2. Physical and Natural aspect of Nepal

- ✓ Impact of geographic condition of Nepal on its national economy
- ✓ Difficulties and challenges of landlocked country

### 3. Population and migration of Nepal

### 4. History of Nepal

- ✓ Contribution of various Royal Dynasties (i.e. Kirant, Licchavi, Mall, Baise/Chaubise states, Culture of Simrounagadh and other small states and shah) to the development of cultural and religious tradition on Nepal
- ✓ Constitution of Nepal 2072 and Constitutional development.

### 5. National Luminaries of Nepal

### 6. Characteristics of plural society and Nepalese society in that context

### 7. Social, economic, cultural condition/custom of various ethnic groups & other communities of Nepal.

- ✓ General knowledge on social condition
- ✓ Challenges and prospects on initiatives for the upliftment of various socially backward ethnic groups and communities of Nepal
- ✓ Social security to women, children and helpless people
- ✓ Challenges and prospects of reform initiatives for social change

### 8. General Knowledge on Aviation

### 9. Chronological development of Nepalese aviation

- ✓ Historical development, prospects and challenges
- ✓ Role of air transportation in Nepalese economy
- ✓ Civil Aviation Policy of Nepal
- ✓ Tourism Policy of Nepal

### 10. Good Governance & Civil Society

- ✓ Concept & Fundamental elements
- ✓ Concept of Civil Society
- ✓ General Knowledge on citizen charter

### 11. Characteristics of Nepalese Economy

- ✓ Initiatives for planned economic development in Nepal
  - ✓ Current periodic plan, objectives and priorities, major policies and strategies, resource mobilization and resource allocation.
  - ✓ Tourism and civil aviation in current plan
  - ✓ Concept of privatization in Nepal
  - ✓ Privatization in operation
  - ✓ Concept and role of development region for economic development.
12. Globalization and Nepal
- ✓ Trade
  - ✓ Foreign Investment
  - ✓ Foreign aid
  - ✓ International financial institutes in economic development of Nepal
13. Science, technology and current affairs
- ✓ Some renowned scientists of world and their contributions
  - ✓ General knowledge on information technology, appropriate technology, alternative technology and its application
14. Regional organizations (SAARC, ASIAN, European Union, BIMSTEC)
15. United Nation and its subsidiaries
- ✓ Role of Nepal in UN and regional organizations
16. Environment and sustainable development
- ✓ Concept, importance and relevance of sustainable development
  - ✓ Environment related problems
17. Gender equality and Gender equity
- ✓ The difference between Gender equality and Gender equity
18. Human Rights and Commitment of Nepal
- ✓ Fundamental aspects of human rights
  - ✓ UN charter on human rights
  - ✓ Commitment of Nepal to human rights

### Sample questions

1. What is the main slogan (motto) of Nepal Tourism Year, 2011?
  - a) Together for Tourism
  - b) Tourism for ever
  - c) Tourist for all
  - d) Together for Tourist
2. The focus point inside the Earth from where earthquake is originated is called .....
  - a) Galactic center
  - b) Epicenter
  - c) Hypocenter
  - d) None of above
3. Nepal adopted liberal Aviation policy in .....AD.
  - a) 1992
  - b) 1994
  - c) 1996
  - d) 1998
4. Which one of the following is related with WTO?
  - a) SAPTA
  - b) BIMSTEC
  - c) TRIPS
  - d) SAFTA
5. The real GDP growth rate of Nepal in FY 2008/09 was ..... percent.
  - a) 3.0
  - b) 3.5
  - c) 4.0
  - d) 4.5
6. Which one of the following order is correct according to geographical location ranging from East to West?
  - a) Kanchanjunga, Makalu, Sagarmatha, Annapurna, Manaslu
  - b) Makalu, Lhotse, Annapurna, Manaslu, Dhaulagiri
  - c) Kanchanjunga, Sagarmatha, Makalu, Manaslu, Annapurna
  - d) Makalu, Lhotse, Manaslu, Annapurna, Dhaulagiri
7. The lowest administrative unit was said to be ..... in Licchavi Period, whose administrative chief was called.....
  - a) Gram - Pradhan
  - b) Tal - Talsing
  - c) Dranga - Kuthar
  - d) Bishaya - Bishayapati



## English Test

### 1. Essay writing

Sample question:

Write an essay of about 250 words explaining the role of civil aviation in Tourism.

### 2. Comprehension

Sample question:

Read the following passage and answer the questions below:

The development of the space shuttle has dramatically reduced the cost of sending loads into space. The shuttle takes off from Earth like a rocket, and land again like an aircraft. It can transport not only its own crew, but also passengers, and has a huge cargo-hold which is capable of carrying large satellites or a space laboratory.

Before the space shuttle was created, it was necessary to plan trips into space several years in advance. However, for the rest of the century it should be possible to make space flights every week or so. Any scientist or engineer needing travel onto orbit will simply take the next shuttle flight, stay as long as necessary, and then return at his or her convenience.

It is difficult to imagine the immense opportunities created by the shuttle. One of the great advantages of having a reusable space vehicle is that it can take one load after another into orbit. Very large space stations could not be launched in their complete form directly from earth, but they could be built piece by piece in space. The space shuttle is likely to be used as general 'workhorse' for the rest of the century, and the building of such stations in orbit should become common place.

Once these huge orbiting space stations are completed, they are likely to become the platforms from which hundreds of robot space ships could be launched cheaply and easily to explore the solar system and to start mining operation on the Moon. The technology needed for this is already developed and available. And because of commercial and military pressures to developed space technology, it is likely that governments will be increasingly willing to start extensive programmes of space engineering, exploration and research.

#### Questions:

- a) What is space shuttle and how does it work?
- b) How has the shuttle made space travel easy?
- c) What are the main advantages of reusable space shuttle?
- d) How can the space platforms be used?
- e) For what purposes are the space stations likely to be used by the governments?

### 3. Translation from Nepali into English

#### Sample question:

नेपालको अन्तिम संविधान २०६३ को भाग १५ राष्ट्रिय मानव अधिकार आयोगसम्बन्धी छ । आयोगको अस्तित्व केही समयपछि गठिआएको भए तापनि पहिलो पटक यो संवैधानिक अङ्गको रूपमा स्थापित भएको छ । यसमा एक अध्यक्ष -को सेवा निवृत्त प्रधान न्यायाधीश वा सर्वोच्च अदालतका न्यायाधीश हुनु पर्दछ । यसमा अरु चार जना सदस्यहरू हुनेछन् । नदम्यहरूमा मानव अधिकार वा समाज सेवाको अनुभव हुनुपर्दछ । महिलासहित नदम्यहरू विविध पृष्ठभूमिबाट आएको हुनु पर्नेछ । सदस्यहरू संवैधानिक परिषद्को सिफारिसमा प्रधानमन्त्रीबाट नियुक्त हुनेछन् ।

राष्ट्रिय मानव अधिकार आयोगका कामहरूमा मानव अधिकारको उल्लङ्घनका उजुरीबारे छानवीन तथा अनुसन्धान गर्ने, मानव अधिकारको उल्लङ्घन गर्ने व्यक्तिलाई दण्ड दिनेतगायत अन्य कारबाहीका लागि अधिकारीवर्गमा सिफारिस गर्ने, मानव अधिकार उल्लङ्घन गर्नेलाई अदालतमा कारबाही चलाउन सुझाव दिने, मानव अधिकारका प्रचार-प्रसार गर्ने तथा नागरिक समाजसँग सहकार्य गर्ने आदि प्रमुख छन् ।

आयोगले नेपालमा पचासौं कानूनहरू मानव अधिकारका मानकहरूसँग मेल खान्छन् कि छैनन् भन्ने अध्ययन गर्नु पर्दछ । साथै, मानव अधिकारसम्बन्धी सन्धि-सम्झौताका प्रावधानहरू सरकारबाट कसरी अपनाइएको छ भन्नेबारे आयोगले अनुगमन गर्नुका साथै देशमा भइरहेको मानव अधिकारका पालनामा सुधार ल्याउन प्रस्ताव पेश गर्नुपर्दछ । आयोगलाई आफ्नो काम गर्ने केही विशेष अधिकार प्रदान गरिएको छ । आफूलाई सूचना उपलब्ध गराउन यसले जनतासँग आह्वान गर्न सक्नेछ । र, मानव अधिकारको उल्लङ्घनको प्रमाण जुटाउन कुनै व्यक्तिको आवास वा कार्यालयमा प्रवेश गर्न सक्नेछ । मानव अधिकारको उल्लङ्घनबाट पीडित भएकालाई क्षतिपूर्ति दिनुपर्ने आदेश दिनसक्ने छ ।



## Psychometric Assessment

### Some Characteristics

- Stressful occupation
- Quick with Numeric computation and mathematics
- Decision making skills and process
- Excellent short term memory
- Visual memory abilities
- Degree of situation awareness
- Excellent hearing and speaking skills

1. **Verbal Reasoning Test** 20
  - 1.1 Series
  - 1.2 Analogy
  - 1.3 Classification
  - 1.4 Coding-Decoding
  - 1.5 Direction sense test
  - 1.6 Assertion and Reason
  - 1.7 Situation Reaction Test
  - 1.8 Courses of action
  
2. **Numerical Reasoning Test** 20
  - 2.1 Series
  - 2.2 Analogy
  - 2.3 Classification
  - 2.4 Coding-Decoding
  - 2.5 Height & Distance
  - 2.6 Arithmetical Reasoning
  
3. **Non-Verbal Reasoning Test** 10
  - 3.1 Series
  - 3.2 Analogy
  - 3.3 Classification
  - 3.4 Water images
  - 3.5 Matrix

Sample questions :

## 1. Verbal Reasoning Test

### 1.1 Series

Directions: In each of the following questions, various terms of an alphabet series are given with one or more terms missing as shown by (?) Choose the missing terms out of the given alternatives.

- 1 M, N, O, L, R, I, V ?  
(a) A (b) E (c) F (d) H (e) Z
- 2 Z, S, W, O, T, K, Q, G, ?, ?  
(a) N, C (b) N, D (c) O, C (d) O, D
- 3 b e d f ? h j ? l  
(a) i m (b) m i (c) i n (d) j m
- 4 AB, DEF, HIJK, ? STUVWX  
(a) LMNO (b) LMNOP (c) MNOPQ (d) QRSTU
- 5 AI, BJ, CK, ?  
(a) DL (b) DM (c) GH (d) LM
- 6 AZ, GT, MN, ?, YB  
(a) JH (b) SH (c) SK (d) TS

Answer

1. (b) : The given sequence is a combination of two series :  
I. M, O, R, V and II. N, L, I, ?

The pattern in I is :  $M \xrightarrow{-2} O \xrightarrow{-2} R \xrightarrow{-2} V$

The pattern in II is :  $N \xrightarrow{-2} L \xrightarrow{-2} I \xrightarrow{-2} (E)$

So, the missing letter is E.

2. (a) : The given sequence is a combination of two series :

I. Z, W, T, Q ? and II. S, O, K, G, ?

The pattern in I is :  $Z \xrightarrow{-2} W \xrightarrow{-2} T \xrightarrow{-2} Q \xrightarrow{-2} (N)$

The pattern in II is :  $S \xrightarrow{-2} O \xrightarrow{-2} K \xrightarrow{-2} G \xrightarrow{-2} (C)$

3. (a) : The series may be divided into groups as shown :

b e d / f ? l / j ? l

Clearly in the first group, the second and third letters are respectively three and two steps ahead of the first letter. A similar pattern would follow in the second and third groups.

4. (c) : The number of letters in the terms of the given series increases by one at each step. The first letter of each term is two steps ahead of the last letter of the preceding term. However each term consists of consecutive letters in order.

5. (a) : 1st letter : A  $\rightarrow$  B  $\rightarrow$  C  $\rightarrow$  (D)  
 2<sup>nd</sup> letter : I  $\rightarrow$  J  $\rightarrow$  K  $\rightarrow$  (L)  
 6. (b) : 1st letter : A  $\rightarrow$  G  $\rightarrow$  M  $\rightarrow$  (S)  $\rightarrow$  Y  
 2<sup>nd</sup> letter : Z  $\rightarrow$  T  $\rightarrow$  N  $\rightarrow$  (H)  $\rightarrow$  B

### 1.2 Analogy

Directions: In each of the following questions, there is a certain relationship between two given words on one side of :: and one word is given on another side of :: which another word is to be found from the given alternatives, having the same relation with this words of the given pair bear. Choose the correct alternative.

- Food : Stomach :: Fuel : ?  
 (a) Plane (b) Truck (c) Engine (d) Automobile
- Moon : Satellite :: Earth : ?  
 (a) Sun (b) Planet (c) Solar system (d) Asteroid
- Laugh : Joy :: Weep : ?  
 (a) Grief (b) Remorse (c) Baby (d) Punishment
- Good : Bad :: Virtue : ?  
 (a) Blame (b) Sin (c) Despair (d) Vice
- Melt : Liquid :: Freeze : ?  
 (a) Ice (b) Condense (c) Solid (d) Crystal
- Fear : Threat :: Anger : ?  
 (a) Compulsion (b) Panic (c) Provocation (d) Force
- Doctor is related to patient in the same way as Lawyer is related to .....?  
 (a) Customer (b) Accused (c) Magistrate (d) Client
- Happiness is related to Sorrow in the same way as Comfort is related to .... ?  
 (a) Hardship (b) Rest (c) Poverty (d) Difficulty

### Answers

- (c) : Food is processed by the stomach to provide energy for functioning of the body. Similarly, fuel is processed by the engine to provide energy for the functioning of automobile.
- (b) : Moon is a satellite and earth is a planet.
- (a) : First indicates the second.
- (d) : The words in each pair are antonyms of each other.
- (c) : Second is the physical state obtained as a result of the process denoted by the first.
- (c) : First arises from the second.
- (d) : First works for and earns from the second.
- (a) : The words in each pair are antonyms of each other.

### 1.3 Classification:

Directions: In each of the following questions, five words have been given, out of which four are alike in some manner and the fifth one is different. Choose out the odd one.

1. (a) Dog (b) Horse (c) Goat (d) Cat (e) Fox
2. (a) Tomato (b) Carrot (c) Ginger (d) Potato (e) Turmeric
3. (a) Chicken (b) Snake (c) Swan (d) Crocodile (e) Frog
4. (a) Tall (b) Huge (c) Thin (d) Sharp (e) Small
5. (a) Seal (b) Scorpion (c) Fish (d) Cat (e) Lion
6. (a) Zinc (b) Iron (c) Aluminum (d) Copper (e) Mercury

#### Answers

- 1 (c) : All except Fox are domestic animals, while fox is a wild animal.
- 2 (a) : All except Tomato grow underground.
- 3 (a) : All except Chicken can live in water.
- 4 (d) : All except Sharp are related to dimension.
- 5 (a) : All except Seal are creatures related to signs of zodiac.
- 6 (e) : Mercury is the only liquid metal in the group.

### 1.4 Coding-Decoding

1. If POND is coded as RSTL, how is HEAR written in that code?  
(a) GHUJ (b) GHIZ (c) JIGZ (d) ZCLZ (e) None of these
2. In a certain code, TELEPHONE is written as ENOHPELET. How is ALIGATOR written in that code?  
(a) ROTAGILA (b) ROTAGAIL (c) ROTAGILE (d) ROTEGILA
3. In a certain code, INACTIVE is written as VTTCANIE. How is COMPUTER written in the same code?  
(a) PMOCRETU (b) ETUPMOCR (c) UTEPMOCR (d) MOCPETUR
4. In a certain code, CAT is written as SATC and DEAR is written as SEARD. How would SING be written in the same code?  
(a) BGINS (b) SGNIS (c) SINGS (d) GNISS
5. If SYSTEM is coded as SYSMET and NEARER as AENRER, then FRACTION will be coded as  
(a) CARFNOIT (b) NOITFRAC (c) FRACNO (d) CARFTION

#### Answers

- 1 (c): The first, second, third and fourth letters of the word are moved two, four, six and eight letters forward respectively to obtain the code.
- 2 (a): The letters of the word are written in a reverse order to obtain the code.



- 3 (b): All the letters of the word, except the last letter, are written in a reverse order to obtain the code.
- 4 (c): The first letter of the word is moved to the last position and 'S' is placed at the beginning, to form the code.
- 5 (c): The letters in the first half and second half of the word are written in the reverse order to obtain the code.

### 1.5 Direction sense test

1. Ram walks northwards. After a while, he turns to his right and a little further to his left. Finally, after walking a distance of one kilometer, he turns to his left again. In which direction is he moving now?  
(a) North (b) South (c) East (d) West
2. A man walks 1 Km towards East and then he turns to South and walks 5 km. Again he turns to East and walks 2 km. after this he turns to North and walks 9 km. Now, how far is he from his starting point?  
(a) 3 km (b) 4 km (c) 5 km (d) 7 km
3. Raj traveled from a point X straight to Y at a distance of 80 meters. He turned right and walked 50 meters, then again turned right and walked 70 meters. Finally, he turned right and walked 50 meters. How far is he from the starting point?  
(a) 10 m (b) 20 m (c) 50 m (d) 70 m (e) None of these
4. Laxman went 15 kms to the west from my house, then turned left and walked 20 kms. He then turned East and walked 25 kms and finally turning left covered 20 kms. How far was he from his house?  
(a) 5 kms (b) 10 kms (c) 40 kms (d) 80 kms
5. From his house, Lokesh went 15 kms to the North. Then he turned West and covered 10 kms. Then, he turned South and covered 5 kms. Finally, turning to East, he covered 10 kms. In which direction is he from his house?  
(a) East (b) West (c) North (d) South

### Answer

- 1.(d): The movements of Ram are as shown in Fig. 1.  
Clearly, he is finally walking in the direction DE i.e., West.

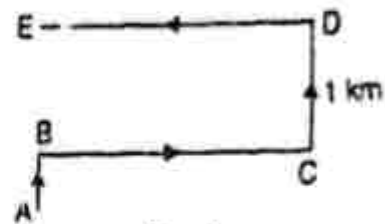


Fig. 1.

- 2.(c): The movements of the man are as shown in Fig. 2. (A to B, B to C, C to D, D to E).  
Clearly,  $DF = BC = 5$  km.

$$EF = (DE - DF) = (9 - 5) \text{ km} = 4 \text{ km}$$

$$BF = CD = 2 \text{ km}$$

$$AF = AB + BF = AB + CD = (1 + 2) \text{ km} = 3 \text{ km}$$

$$\therefore \text{Man's distance from starting point A} = AE$$

$$= \sqrt{AF^2 + EF^2}$$

$$= \sqrt{3^2 + 4^2}$$

$$= \sqrt{25}$$

$$= 5 \text{ km}$$

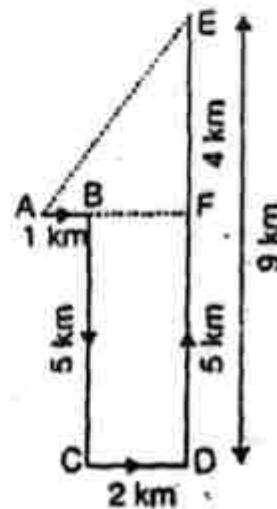


Fig. 2.

- 3.(a): The movements of Raj are as shown in Fig. 3. (X to Y, Y to A, A to B, B to C).  
 $\therefore$  Raj's distance from the starting point  
 $= XC = (XY - YC) = (XY - BA)$   
 $= (80 - 70) \text{ m} = 10 \text{ m}$ .

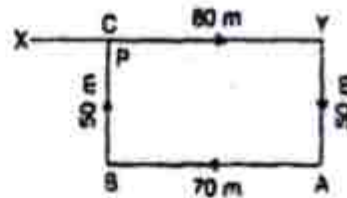


Fig. 3.

- 4.(b): The movements of Laxman are as shown in Fig. 4.  
 $\therefore$  Laxman's distance from his house at A  
 $= AE = (BE - BA)$   
 $= (CD - BA)$   
 $= (25 - 15) \text{ m} = 10 \text{ m}$ .

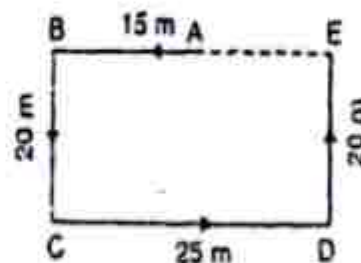


Fig. 4.



- 5.(c): The movements of Lokesh are as shown in Fig. 5. (A to B, B to C, C to D and D to E).  
Clearly, his final position is E which is to the North of his house at A.

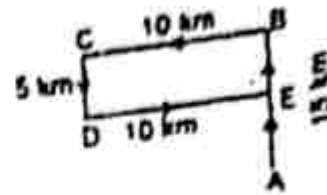


Fig. 5.

### 1.6 Assertion and Reason

Directions: In each of the questions given below, there are two statements labeled as Assertion (A) and Reason (R).

Mark your answer as per the codes provided below:

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.
- (e) Both A and R are false.

1. Assertion (A): Alcohol rather than mercury is used in a thermometer to measure a temperature of  $-60^{\circ}\text{C}$ .  
Reason (R): Alcohol has a lower freezing point than mercury.
2. Assertion (A): Salt is added to cook food at higher altitude.  
Reason (R): Temperature is lower at higher altitudes.
3. Assertion (A): Carbon monoxide when inhaled causes death.  
Reason (R): Carbon monoxide combines with haemoglobin.
4. Assertion (A): We feel colder on mountains than of plains.  
Reason (R): Temperature decreases with altitude.
5. Assertion (A): Inside the earth metals are present in molten state.  
Reason (R): Earth absorbs the sun's rays.
6. Assertion (A): There is no vaccine for AIDS.  
Reason (R): The AIDS virus changes its genetic code.

### Answers

1. (a) : Mercury freezes at  $-39^{\circ}\text{C}$ , while alcohol freezes at a point far below  $-100^{\circ}\text{C}$ . So alcohol is used to measure lower temperatures. Similarly, mercury boils at  $357^{\circ}\text{C}$  while alcohol boils at  $78^{\circ}\text{C}$ . So, mercury is used to measure high temperatures.
2. (b) : Due to decrease in pressure at higher altitudes, water boils much below  $100^{\circ}\text{C}$ , so that the food does not get sufficient heat for being cooked. Salt increases the boiling point of water.
3. (a) : Carbon monoxide, when inhaled, combines with hemoglobin of blood to form carboxyl hemoglobin which inhibits the transport of oxygen.
4. (a) : Higher above the sea level, temperature decreases at the rate of  $1^{\circ}\text{C}$  for every 165 metres of ascent making mountain peaks colder.
5. (c) : Inside the earth, the high temperature and pressure keep the metals in molten state. The earth does not absorb the sun's rays but reflects them.
6. (a) : A vaccine contains the inactivated germs of the disease. But the AIDS virus changes its genetic code and so no vaccine has been invented for it.

### 1.7 Situation Reaction Test

1. If your friend asks for some money from you, you will
  - (a) refuse to give
  - (b) ask for what purpose the money is required and then decide
  - (c) immediately give the money without enquires about the purpose
  - (d) None of these
2. In a bus you realize that someone has left his/her wallet. You would
  - (a) give the money to the beggar
  - (b) hand it over to the bus conductor
  - (c) try to find his/her contact number and inform the owner
  - (d) leave the wallet as it is

3. you have made some silly mistakes which have been pointed out to you. You will
  - (a) laugh it away
  - (b) get angry
  - (c) feel miserable
  - (d) feel thankful
4. Your classmate, who got you in a fix recently with a teacher, has met with an accident. You
  - (a) carry on with life unaffected
  - (b) feel that God taught him/her a lesson
  - (c) decide to visit him/her in the hospital
  - (d) tell others that this is the way one suffers for making others suffer
5. After a purchase the shopkeeper returns Rs. 100 extra to you. You will
  - (a) treat your friends to a lunch
  - (b) offer Rs 20 at a temple and pray for more such instance
  - (c) buy another and hope he will give another Rs. 100 extra
  - (d) return the extra money to the shopkeeper

**Answers** 1. (b) 2. (c) 3. (d) 4. (c) 5. (d)

### 1.8 Courses of Action

Directions: In each question below is given a statement followed by two courses of action numbered I and II. You have to assume everything in the statement to be true and on the basis of the information given in the statement, decide which of the suggested courses of action logically follow (s) for pursuing.

Give answer (a) if only I follows; (b) if only II follows, (c) If either I or II follows; (d) if neither I nor II follows and (e) if both I and II follow.

1. Statement	There has been a significant drop in the water level of all the lakes supplying water to the city.
Courses of action	I. The water supply authority should impose a partial cut in supply to tackle the situation.
	II. The government should appeal to all the residents through mass media for minimal use of water.
2. Statement	On an average, about twenty people are run over by trains and die everyday while crossing the railway tracks through the level crossing.



Courses of action	I. The railway authorities should be instructed to close all the level crossings.
	II. Those who are found crossing the tracks, when the gates are closed, should be fined heavily.
3. Statement	There is a substantial increase in the number of accidents causing deaths and severe injuries due to malfunctioning of the traffic signals.
Courses of action	I. The traffic police should immediately post traffic personnel at the junctions.
	II. The signal system should immediately be repaired or replaced.
4. Statement	As many as ten coaches of a passenger train have derailed and blocked both pairs of the railway tracks.
Courses of action	I. The railway authorities should immediately send men and equipment to the spot to clear the railway tracks.
	II. All the trains running in both the directions should be diverted to other routes.
5. Statement	Most of the development plans develop in papers only
Courses of action	I. The incharges should be instructed to supervise the field-work regularly.
	II. The supply of paper to such departments should be cut short.

#### Answers

1. (e) : The situation can be tackled by periodic cuts in supply, and urging people to conserve water. So both the courses follow.
2. (b) : The accidents can clearly be prevented by barring people from crossing the tracks when the gates are closed. So, only II follows.
3. (c) : Clearly, either the traffic signals should be made to function properly or traffic personnel should be deployed to guide vehicular movement in the right way. So, either I or II follows.
4. (e) : The situation demands first diverting other trains to different routes so as to avert any accident, and then clearing the tracks as soon as possible. Thus, both the courses follow.
5. (a) : Clearly, proper supervision alone can see the development in practice. So, only course I follows.

## 2. Numerical Reasoning Test

### 2.1 Series

Directions: In each of the following questions, a number series is given with one term missing. Choose the correct alternative that will continue the same pattern and replace the question mark in the given series.

1. 1, 9, 25, 49 ? 121  
(a) 64 (b) 81 (c) 91 (d) 100
2. 4, 7, 12, 19, 28, ?  
(a) 30 (b) 36 (c) 39 (d) 49
3. 11, 13, 17, 19, 23, 25, ?  
(a) 26 (b) 27 (c) 29 (d) 37
4. 6, 12, 21, ?, 48  
(a) 33 (b) 38 (c) 40 (d) 45
5. 2, 5, 9, ?, 20, 27  
(a) 14 (b) 16 (c) 18 (d) 24

### Answers

1. (b) : The given series consists of squares of consecutive odd numbers i.e.  $1^2, 3^2, 5^2, 7^2, \dots$   
So, missing term =  $9^2 = 81$ .
2. (c) : The pattern is + 3, + 5, + 7, + 9, .....  
So, missing term =  $28 + 11 = 39$ .
3. (c) : The pattern is + 2, + 4, + 2, + 4, .....  
So, missing term =  $25 + 4 = 29$ .
4. (a) : The pattern is + 6, + 9, + 12, + 15, .....  
So, missing term =  $21 + 12 = 33$ .
5. (a) : The pattern is + 3, + 4, + 5, + 6, .....  
So, missing term =  $9 + 5 = 14$ .

### 2.2 Analogy

Directions : In each of the following questions, there is a certain relationship between two given numbers on one side of :: and one number is given of another side of :: while another number is to be found from the given alternatives having the same relationship with this number as the numbers of the given pair bear choose the best alternative.

1. 42 : 56 :: 72 : ?  
(a) 81 (b) 90 (c) 92 (d) 100
2. 49 : 81 :: 100 : ?  
(a) 64 (b) 144 (c) 169 (d) None of these
3. 9 : 80 :: 100 : ?  
(a) 901 (b) 1009 (c) 9889 (d) 9999

4. 7584 : 5362 :: 4673 : ?  
 (a) 2367 (b) 2451 (c) 2535 (d) None of these
5. 3265 : 4376 :: 4673 : ?  
 (a) 2154 (b) 3562 (c) 5487 (d) 5784

#### Answers

1. (b) : Clearly,  $42 = 6 \times 7$ ;  $56 = 7 \times 8$ ;  $72 = 8 \times 9$ .  
 So missing number  $= 9 \times 10 = 90$ .
2. (b) : The relationship is  $x^2 : (x + 2)^2$ .
3. (d) : The relationship is  $x : (x^2 - 1)$ .
4. (b) : The relationship is  $x : (x - 2222)$ .
5. (d) : The relationship is  $x : (x + 1111)$ .

#### 2.3 Classification

Directions : Choose the odd numeral pair/group in each of the following questions :

1. (a) 34 - 43 (b) 55 - 62 (c) 62 - 71 (d) 83 - 92
2. (a) 2 - 8 (b) 3 - 27 (c) 4 - 32 (d) 5 - 125
3. (a) 80 - 9 (b) 64 - 8 (c) 36 - 6 (d) 7 - 49
4. (a) 1 - 0 (b) 3 - 8 (c) 6 - 35 (d) 7 - 50

#### Answers

1. (b) : In all other pairs, second number is 9 more than the first.
2. (c) : In all other pairs, second number is the cube of the first.
3. (a) : In all other pairs, one number is the square of the other.
4. (d) : In all other pairs, the sum of two number is 8.
5. (d) : In all other pairs, the second number is one less than the square of the first number.

#### 2.4 Coding - Decoding

1. In a certain code, the word DEAL is coded as 4 - 5 - 1 - 12. Following the same rule of coding, what should be the code for the word LADY?
- (a) 12 - 4 - 1 - 25 (b) 12 - 1 - 4 - 25
- (c) 10 - 1 - 4 - 23 (d) 10 - 1 - 4 - 22
2. If A = 2, M = 26, Z = 52, then BET = ?
- (a) 44 (b) 54 (c) 64 (d) 72
3. If A = 26, SUN = 27, then CAT = ?
- (a) 24 (b) 27 (c) 57 (d) 58
4. If in a certain code, BAT = 23 and CAT = 24, then how will you code BALL?
- (a) 27 (b) 28 (c) 32 (d) 120



5. If  $GO = 32$ ,  $SHE = 49$ , then  $SOME$  will be equal to  
(a) 56 (b) 58 (c) 62 (d) 64

**Answers**

- 1 (b) : Clearly, each letter is coded by the numeral denoting its position in the English alphabet.  
Thus, A is coded as 1, B as 2, C as 3, D as 4, ..., L as 12, M as 13, ..., Y as 25, Z as 26. So, the code for LADY is  $12 - 1 - 4 - 25$ .
- 2 (b) : Clearly, each letter is assigned a numerical value which is twice the numeral denoting its position in the English alphabet.  
B, E and T are 2<sup>nd</sup>, 5<sup>th</sup> and 20<sup>th</sup> letters respectively.  
So,  $BET = B + E + T = (2 \times 2) + (5 \times 2) + (20 \times 2) = 54$ .
- 3 (c) : Clearly, each letter is represented by the numeral denoting its position from the end of the English alphabet i.e. Z = 1, Y = 2, ..., M = 14, ..., B = 25, A = 26.  
Then,  $SUN = S + U + N = 8 + 6 + 13 = 27$ .  
So,  $CAT = C + A + T = 24 + 26 + 7 = 57$ .
- 4 (a) : C is one step ahead of B and the code for CAT is 1 more than that for BAT. Thus, the letters are coded by numerals denoting their positions in the English alphabet i.e. A = 1, B = 2, ..., Z = 26.  
So,  $BALL = B + A + L + L = 2 + 1 + 12 + 12 = 27$ .
- 5 (a) : In the given code, Z = 1, Y = 2, X = 3, ..., C = 24, B = 25, Z = 26.  
So,  $GO = 20 + 12 = 32$  and  $SHE = 8 + 19 + 22 = 49$ .  
Similarly,  $SOME = S + O + M + E = 8 + 12 + 14 + 22 = 56$ .

**2.5 Height and Distance**

1. Two ships are sailing in the sea on the two sides of a lighthouse. The angle of elevation of the top of the lighthouse is observed from the ships are  $30^\circ$  and  $45^\circ$  respectively. If the lighthouse is 100 m high, the distance between the two ships is :  
(a) 173 m (b) 200 m (c) 273 m (d) 300 m

Answer: Option (c)

Explanation:

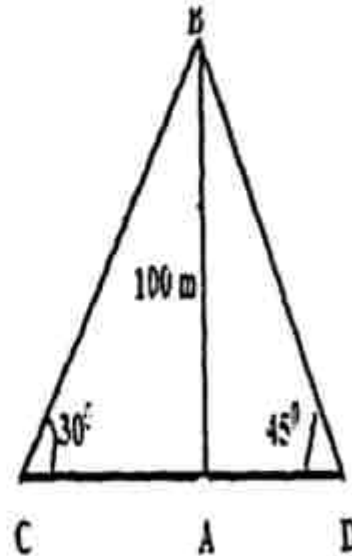
Let AB be the lighthouse and C and D be the positions of the ships.

Then,  $AB = 100$  m,  $\angle ACB = 30^\circ$  and  $\angle ADB = 45^\circ$

$$\frac{AB}{AC} = \tan 30^\circ = \frac{1}{\sqrt{3}} \Rightarrow AC = AB \times \sqrt{3} = 100\sqrt{3} \text{ m}$$

$$\frac{AB}{AD} = \tan 45^\circ = 1 \Rightarrow AD = AB = 100 \text{ m}$$

$$\begin{aligned} \therefore CD &= (AC + AD) = (100\sqrt{3} + 100) \text{ m} \\ &= 100(\sqrt{3} + 1) \\ &= (100 \times 2.73) \text{ m} \\ &= 273 \text{ m.} \end{aligned}$$



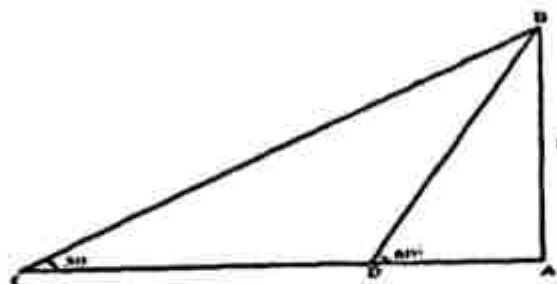
2. A man standing at a point P is watching the top of a tower. Which makes an angle of elevation of  $30^\circ$  with the man's eye. The man walks some distance towards the tower to watch its top and the angle of the elevation becomes  $60^\circ$ . What is the distance between the base of the tower and the point P?

(a) 43 units (b) 8 units (c) 12 units (d) Data inadequate

Answer: Option (d)

Explanation:

One of AB, AD and CD must have given.



So, the data is inadequate.

3. The angle of elevation of ladder leaning against a wall is  $60^\circ$  and the foot of the ladder is 4.6 m away from the wall. The length of the ladder is :

(a) 2.3 m (b) 4.6 m (c) 7.8 m (d) 9.2 m

Answer: Option (d)

Explanation:

Let AB be the wall and BC be the ladder.



Then,  $\angle ACB = 60^\circ$  and  $AC = 4.6$  m

$$\frac{AC}{BC} = \cos 60^\circ = \frac{1}{2}$$

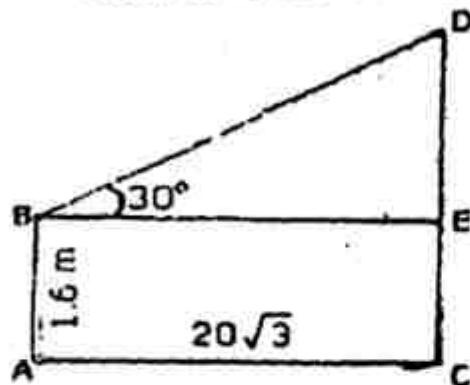
$$BC = 2 \times AC = (2 \times 4.6) \text{ m} = 9.2 \text{ m.}$$

4. An observer 1.6 m tall is  $20\sqrt{3}$  away from a tower. The angle of elevation from his eye to the top of the tower is  $30^\circ$ . The height of the tower is :

- (a) 21.6 m    (b) 23.2 m    (c) 24.72 m    (d) None of these  
Answer: Option (a)

Explanation:

Let AB be the observer and CD be the tower.



Draw  $BE \perp CD$  Then,  $CE = AB = 1.6$  m,  $BE = AC = 20\sqrt{3}$  m.

$$\frac{DE}{BE} = \tan 30^\circ = \frac{1}{\sqrt{3}}, \quad DE = 20\sqrt{3} / \sqrt{3} \text{ m} = 20 \text{ m.}$$

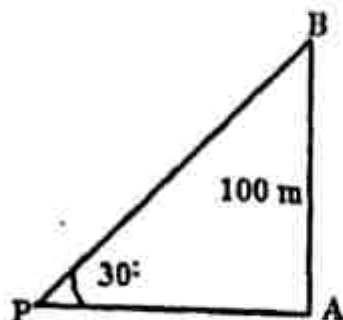
$$\therefore CD = CE + DE = (1.6 + 20) \text{ m} = 21.6 \text{ m.}$$

5. From a point P on a level ground, the angle of elevation of the top tower is  $30^\circ$ . If the tower is 100 m high, the distance of point P from the foot of the tower is :

(a) 149 m      (b) 156 m      (c) 173 m      (d) 200 m

Explanation:

Let AB be the tower.



Then,  $\angle APB = 30^\circ$  and  $AB = 100$  m

$$\frac{AB}{AP} = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$AP = (AB \times \sqrt{3}) \text{ m} = 100 \times \sqrt{3} \text{ m} = (100 \times 1.73) \text{ m} = 173 \text{ m}.$$

## 2.6 Arithmetical Reasoning

1. A shepherd had 17 sheep. All but nine died. How many was he left with?  
(a) Nil      (b) 8      (c) 9      (d) 17
2. A Bird shooter was asked how many birds he had in the bag. He replied that there were as many sparrows but six, all pigeons but six, and all ducks but six. How many birds he had in the bag in all?  
(a) 9      (b) 18      (c) 27      (d) 36
3. What is the smallest number of ducks that could swim in this formation – two ducks in front of a duck, two ducks behind a duck and a duck between two ducks?  
(a) Nil      (b) 8      (c) 9      (d) 17
4. The 30 members of a club decided to play a badminton singles tournament. Every time a member loses a game he is out of the tournament. There are no ties. What is the minimum number of matches that must be played to determine the winner?  
(a) 15      (b) 29      (c) 61      (d) None of these

2. A man wears socks of two colours - black and brown. He has altogether 20 black socks and 20 brown socks in a drawer. Supposing he has to take out socks in the dark, how many must he take out to be sure that he has a matching pair?  
 (a) 3 (b) 20 (c) 39 (d) None of these

**Answers**

1. (c): All but nine died' means 'All except nine died' i.e. 9 sheep remained alive.  
 2. (a) :There were all sparrows but six' means that six birds were not sparrows but only pigeons and ducks.  
 Similarly, number of sparrows + number of ducks = 6 and number of sparrows + number of pigeons = 6.  
 3. (a): Clearly, the smallest such number is 3. Three ducks can be arranged as shown alongside to satisfy all the three given conditions. D]

$$\frac{D}{D}$$

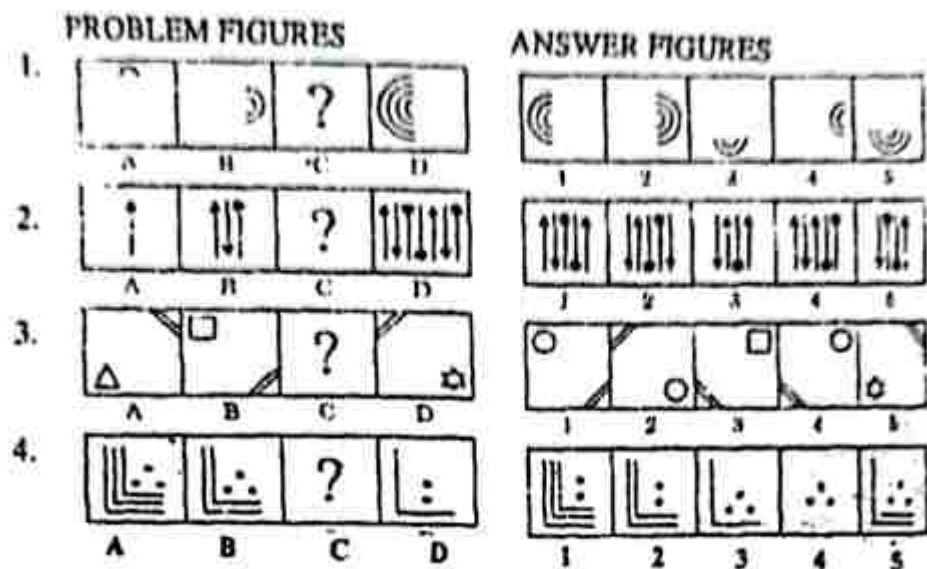
4. (b) : Clearly, every member except one (i. e. the winner) must lose one game to decide the winner. Thus, minimum number of matches to be played = 30 - 1 = 29.  
 5. (a) : Since there are socks of only two colours, so two out of any three socks must always be of the same colour.

**3. Non-Verbal Reasoning Test**

**3.1 Series**

Directions: In each of the following questions, there is a set of four figures labeled A, B, C and D called the Problem Set followed by a set of five other figures labeled 1, 2, 3, 4 and 5 called the Answer Set. Fig. (C) contains a question mark. Select a suitable figure from the Answer Set which will substitute this question mark so that a series is formed by the figures A, B, C and D taken in order. The number of the selected figure is the answer.





### Answers

1. (5): In each step, the figure rotates  $90^\circ$  CW; moves to the adjacent side of the square boundary in a CW direction and a new larger semicircle is added outside the existing semicircles.
2. (1): In one step, an arrow pointing downwards and a pin pointing upwards are added to the RHS of the existing elements. In the next step, a pin pointing downwards and an arrow pointing upwards are added to the RHS of the existing elements.
3. (4): In each step, the pair of line segments rotates  $90^\circ$  CW; it moves to the adjacent corner (of the square boundary) in a CW direction; the symbol moves to the adjacent corner in a CW direction and gets replaced by a new one.
4. (2): The number of lines and the number of dots decrease by one alternately.

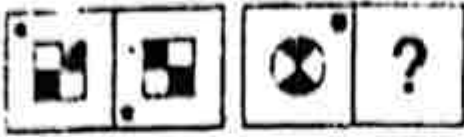
### 3.2 Analogy

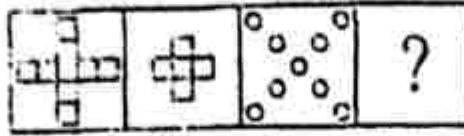
Directions: Each of the following questions consists of two sets of figures. Figures A, B, C and D constitute the Problem Set while figures 1, 2, 3, 4 and 5 constitute the Answer Set. There is a definite relationship between figures A and B. Establish a similar relationship between figures C and D by selecting a suitable figure from the Answer Set that would replace the question mark (?) in fig. (D).




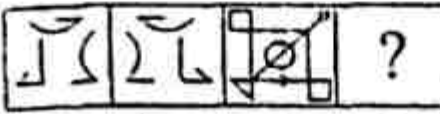
# PROBLEM FIGURES

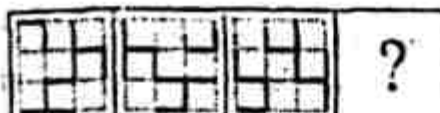
# ANSWER FIGURES

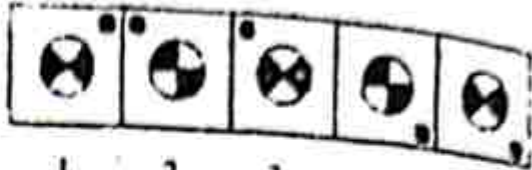
1.   
A B C D

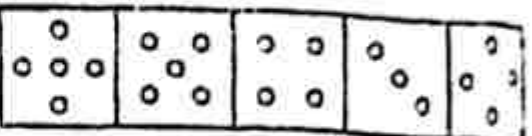
2.   
A B C D

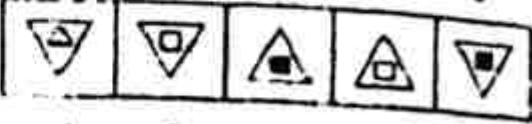
3.   
A B C D

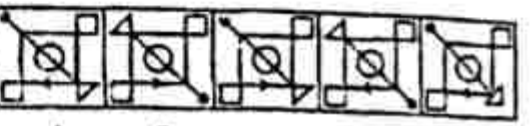
4.   
A B C D

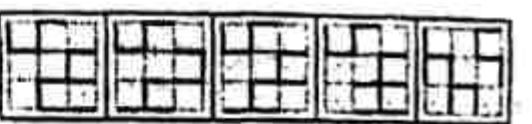
5.   
A B C D

1.   
1 2 3 4 5

2.   
1 2 3 4 5

3.   
1 2 3 4 5

4.   
1 2 3 4 5

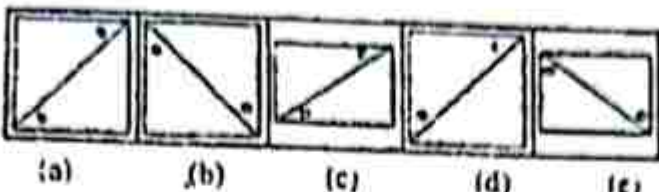
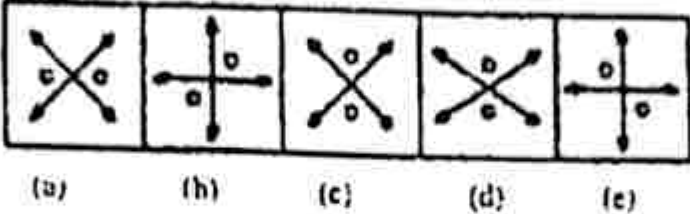
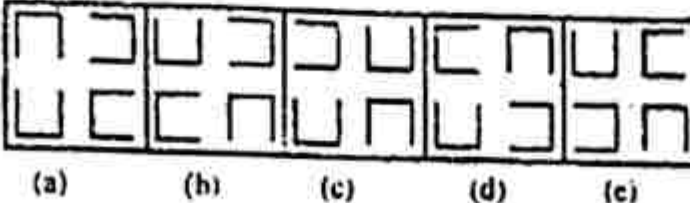
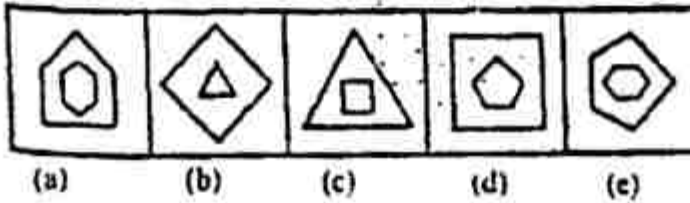
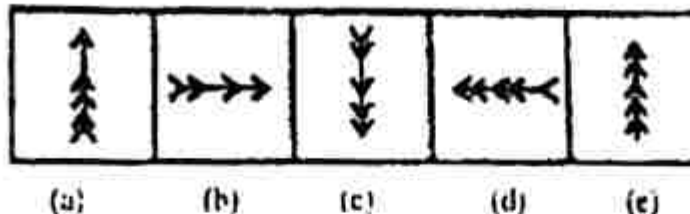
5.   
1 2 3 4 5

## Answers

1. (2): The figure gets vertically inverted.
2. (2): The complete figure rotates through  $180^\circ$  and the element that reaches the position rotates further by  $90^\circ$  CW.
3. (3): The figure rotates through  $90^\circ$  ACW.
4. (2): The four parts at the outer ends of the figure are lost.
5. (5): The inner element enlarges to become the outer element while the outer element reduces in size turns black and becomes the inner element.

## 3.3 Classification

Directions: In each problem, out of the five figures marked (a), (b), (c), (d) and (e), four are similar in a certain manner. However one figure is not like the other four. Choose the figure which is different from the rest.

1. 
- (a) (b) (c) (d) (e)
2. 
- (a) (b) (c) (d) (e)
3. 
- (a) (b) (c) (d) (e)
4. 
- (a) (b) (c) (d) (e)
5. 
- (a) (b) (c) (d) (e)

#### Answers

1. (d) : The two dots lie on the same side of the diagonal only in fig. (d).
2. (d) : In all others figures, the two double sided arrows intersect each other at right angles.
3. (c) : Only in fig. (c), two out of the four elements are opening in the same directions.
4. (b) : In each one of the figures, except fig. (b), the number of sides in the inner elements is one more than the number of sides in the outer elements.
5. (b) : Each one of the figures except fig. (b), consists of five arrowheads.

### 3.4 Water Images

Directions: In each of the following questions, you are given a combination of alphabets and/or numbers followed by four alternatives (a), (b), (c), and (d). Choose a alternatives which most closely resembles the water images of the given combination .

1. US91Q4M5W3

(a) U201Q4W2M3

(c) U201Q4W2M3

(b) U261Q4W2M3

(d) U201Q4W2M3

2. monday

(a) yadnom

(c) λsqmow

(b) ysbnom

(d) wouqsl

3. rise

(a) lizē

(c) rize

(b) esir

(d) ezi

4. wrote

(a) wrotē

(c) wlofē

(b) w rōfē

(d) wlofē

5. bridge

(a) riqdē

(c) riqdē

(b) riqdē

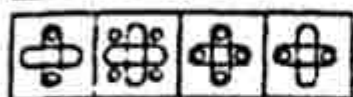
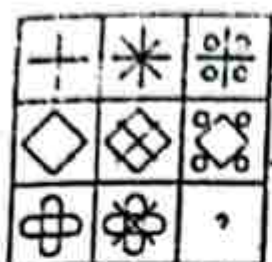
(d) riqdē

Answers 1. (d) 2. (d) 3. (a) 4. (c) 5. (b)

### 3.5 Matrix

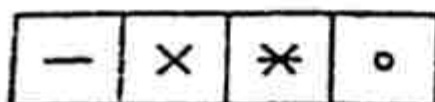
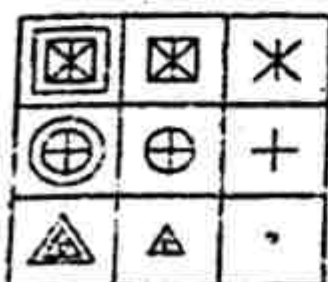
Directions: In each of the following question, find out which of the answer figures (a), (b), (c) and (d) completes the figure matrix ?

9.



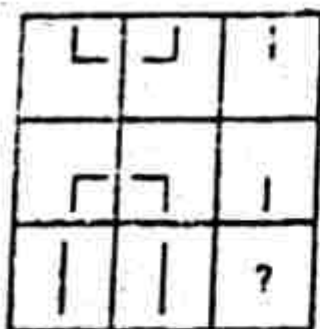
(a) (b) (c) (d)

11.



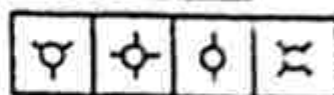
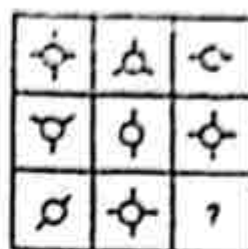
(a) (b) (c) (d)

13.



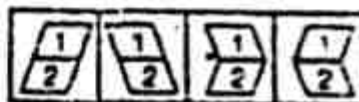
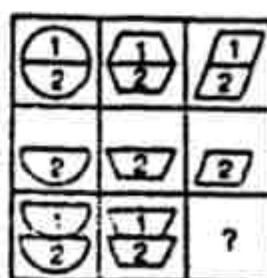
(a) (b) (c) (d)

10.



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

12.



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



**Answers**

6. (b) : In each row, the second figure is obtained from the first figure by adding two mutually perpendicular line segments at the centre and the third figure is obtained from the first figure by adding four circles outside the main figure.
10. (a) : Each row (as well as each column) contains a figure consisting of a circle and two consisting of a circle and four line segments.
11. (d) : In each row, the second figure is obtained by removing the outermost element of the first figure and the third figure is obtained by removing the outermost element of the second figure.
12. (c) : In each column, the second figure (middle figure) is obtained by removing the upper part of the first figure (uppermost figure) and the third figure (lowermost figure) is obtained by vertically inverting the upper part of the first figure.
13. (c) : In each row, the third figure is a collection of the common elements (line segments) of the first and the second figures.