IMPORTANT INSTRUCTIONS

- The maximum marks are 300. Time allotted is **90 MINUTES.**
- There are four sections in the question paper having total **75 questions:**
  - Section – A : Maths (20 Questions)
  - Section – B : Science (20 Questions)
  - Section – C : English (20 Questions)
  - Section – D : Aptitude (15 Questions)
- Each question carries **4 marks.**
- **Negative Marking : ¼ (One-fourth) mark** will be deducted for every incorrect answer.
- **Use only BLUE / BLACK pen to fill the circles in bubble sheet.**
- Use of PENCIL is strictly **not allowed.**
- **Do not use marker or white fluid** to hide the mark.

SECTION – A
MATHS

1) If P and Q are the zeros of the polynomial $ax^2 + bx + c$, what is the value of $P^2 + Q^2$?

a) $\frac{b^2 + 2ac}{a^2}$ b) $\frac{a^2 + 2bc}{b^2}$ c) $\frac{a^2 + 2bc}{b^2}$ d) $\frac{b^2 - 2ac}{a^2}$

2) If the length of a rectangle is increased by 2 m and breadth is reduced by 2 m, its area decreases by 28 sq.m. If the length is reduced by 1 m and the breadth is increased by 2 m, the area increases by 33 sq. m. Find the actual measurements of the rectangle.

a) $l = 13m, b = 11m$ b) $l = 13m, b = 11m$

c) $l = 23m, b = 11m$ d) $l = 12m, b = 10m$

3) Find the value of 'p' so that $x^2 + 5px + 16 = 0$ has no real root.

a) Greater than $\frac{8}{5}$ b) Less than $\frac{-8}{5}$

c) Lies between $\frac{-8}{5}$ and $\frac{8}{5}$ d) Less than $\frac{15}{8}$

4) Find the sum of the first 18 terms of the arithmetic progression 12b, 8b, 4b….

a) 126b b) -56b c) -396b d) -288b

5) If 4 tan θ = 3, find the value of $\frac{4sin\theta - 2cos\theta}{4sin\theta + 3cos\theta}$

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

6) From a 50 m tall building, the angles of depression of the top and foot of a temple are found to be 30° and 60° respectively. What is the height of the temple?

a) 36m b) 25.3m c) 33.33m d) 30m

7) The total surface area of a cylinder is 220 sq. cm with height 6.5 cm. Find its volume.

a) 25.025 cm^3 b) 2.5025 cm^3 c) 250.25 cm^3 d) 250.25 cm^3

8) What is the chance that a non – leap year contains 53 Saturdays?

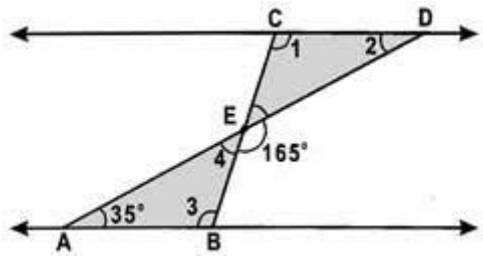
a) $\frac{2}{7}$ b) $\frac{4}{7}$ c) $\frac{1}{7}$ d) $\frac{1}{365}$

9) In the given (fig. 1), $\Delta ABE \sim \Delta DCE$

Find the difference between $\angle ABE$ and $\angle AEB$.

a) 130° c) 15°

c) 130° d) 115°



(fig. 1)

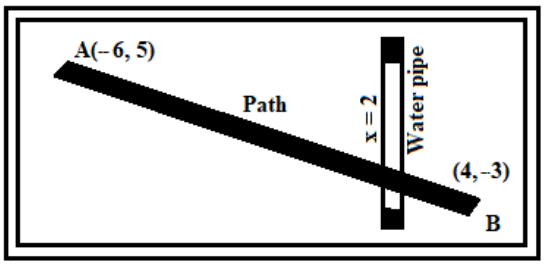
10) A group of 48 workers can complete a piece of work in 11 days. 48 workers worked on first day, 44 workers worked on second day, 40 workers worked on third day and so on. Unfortunately on the 10th day, all the work got ruined. Find the time taken by the workers left on 10th day to complete the entire work.

a) 40 days b) 41 days c) 44 days d) None of these

11) In (fig. 2) a path is to be constructed between two corners of the park, A and B. If a water pipe is being laid in the following manner inside the park, then the ratio in which the pipe divides the path between A and B will be

a) 2:1 c) 1:2

c) 1:4 d) 4:1



(fig. 2)

12) If car A travels x km for every litre of petrol, while car B travels (x+5) km for every litre of petrol, then find the total quantity of petrol used by both the cars.

I. If A and B covered a distance of 400 km each.

II. If car A uses 4 L of petrol more than car B in covering 400 km of distance.

Which of the following is true?

a) Statement I alone is sufficient to answer the question but statement II is not.

b) Only statement II is sufficient to answer.

c) Both the statements are required to answer the question.

d) None of the statement is sufficient.

13) State 'T' for true and 'F' for false.

I. The condition for the three points to be collinear is $\{x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\} = 0$.

II. The distance between the (5 sin 60°, 0) and (0, 5 cos 60°) is 1.

III. The length of the portion of the straight line 8x + 15y = 120 intercepted between the axis is 23.

IV. The distance of a point from origin, which is equidistant from both the axes is 1.

Codes

	I	**II**	**III**	**IV**		**I**	**II**	**III**	**IV**
a)	T	F	F	F	b)	T	T	F	F
c)	F	F	T	T	d)	T	T	F	F

14) Match the following:

	LIST – I		LIST - II
A.	For sec A = $\frac{17}{8}$, $\frac{3-4sin^2A}{4cos^2A-3}$ is equal to	i	$\frac{3}{7}$
B.	For tanθ = $\frac{20}{21}$, $\frac{1-\sin\theta+cos\theta}{1+\sin\theta+cos\theta}$ is equal to	ii	$\frac{33}{611}$
C.	If sinθ = $\frac{12}{13}$, then $\frac{sin^2\theta-cos^2\theta}{2sin\theta cos\theta} \times \frac{1}{tan^2\theta}$	iii	$\frac{595}{3456}$

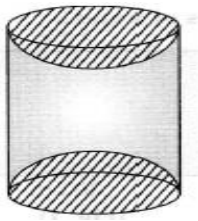
Codes

	A	B	C		A	B	C
a)	ii	iii	i	b)	ii	i	iii
c)	i	ii	iii	d)	iii	ii	i

15) Match the following:

A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in (fig. 3) If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm, match the column.

	Column – I		Column - II
(A)	Volume of cylinder	(i)	$\frac{196}{3}\pi$
(B)	Total surface area	(ii)	122.5 π
(C)	Volume of scoops	(iii)	374 cm^2
(D)	Volume of the article	(iv)	$\frac{171.5}{3}\pi$



(fig. 3)

a) (A)→(iv) (B)→(ii); (C)→(i) (D)→(iii) b) (A) → ii (B) → iii (C) → iv (D) →i
c) (A)→ iv (B) →iii (C) → i; (D) → ii d) (A) →iii (B) →iv (C) → ii (D) → i

16) If the height of the building and distance from the building foot's to a point is increased by 20%, then the angle of elevation on the top of the building
a) Increases b) Decreases c) Do not change d) None of these

17) The value of the expression $\sin^6\theta + \cos^6\theta + 3\sin^2\theta\cos^2\theta$ is
a) 0 b) 3 c) 2 d) 1

18) PQ is a tangent to a circle with centre O at the point P. If Δ OPQ is an isosceles triangle, then ∠OQP is equal to
a) 30° b) 45° c) 60° d) 90°

19) Which of the following equations has 2 as a root?
a) $x^2 - 4x + 5 = 0$ b) $x^2 + 3x - 12 = 0$ c) $2x^2 - 7x + 6 = 0$ d) $3x^2 - 6x - 2 = 0$

20) A metallic sphere of radius 10.5 cm is melted and then recast into small cones, each of radius 3.5 cm and height 3 cm. The number of such cones is
a) 63 b) 126 c) 21 d) 130

SECTION – B
SCIENCE

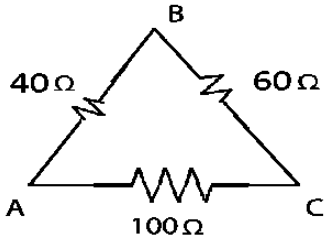
21) If an incident ray passes through the centre of curvature of a concave mirror, what happens to the reflected ray?
a) It will pass through the pole of the mirror
b) It will pass through the focus of the mirror
c) It will retrace its path
d) It will be parallel to the principal axis

22) A student sitting on the last bench in the class cannot read the writing on the blackboard clearly, but he can read the book lying on his desk clearly. Which of the following statements is correct about his defect?

a) The near point of his eye has receded away
b) The near point of his eye has come close to him
c) The far point of his eye has receded away
d) The far point of his eye has come close to him

23) Three resistors are connected to form the sides of a triangle ABC as shown in the (fig. 4). The resistance of side AB is 40 ohms, side BC is 60 ohms and that of side CA is 100 ohms. Find the effective resistance between points A and B in ohms.

a) 32 Ω c) 50 Ω
c) 64 Ω d) 200 Ω



(fig. 4)

24) Identify the type of product formed in the given chemical equation.
$Pb(OH)_2 + HNO_3 \rightarrow Pb(OH)NO_3 + H_2O$

a) An acidic salt b) A basic salt c) A base d) An acid

25) Study the reaction given below
$X + YSO_4 \rightarrow Y + XSO_4$
What could be X and Y respectively?

a) Na and Mg b) Zn and Cu c) Ag and K d) H and Al

26) Identify pathway of carbon dioxide after the exchange of gases in lungs?

a) Alveolus →bronchiole → bronchus → trachea → nose
b) Alveolus → bronchus → bronchiole → trachea → nose
c) Trachea → bronchus → bronchiole → alveolus → nose
d) Trachea → bronchiole → bronchus → alveolus → nose

27) Mg^{+2} and F^- ions differ in which of the following fundamental particles?

a) Electrons, protons and neutrons b) Protons and neutrons
c) Only electrons d) Electrons and protons

28) Match the items given in Column I with that given in Column II and choose the correct option from the codes given below

Column – I	**Column - II**
(A) Substance taking part in a reaction	1. Balanced equation
(B) Number written before a formula in the chemical equation	2. Unbalanced equations
(C) $CO + H_2 \rightarrow CH_3OH$	3. Stoichiometric coefficient
(D) $CaO + H_2O \rightarrow Ca(OH)_2$	4. Reactants
	5. Products

Codes

	A	**B**	**C**	**D**		**A**	**B**	**C**	**D**
a)	4	3	1	2	b)	4	3	2	1
c)	5	3	2	1	d)	4	2	3	1

29) State [T] for True and [F] for False.

I. Displacement reaction takes place when water is added to quicklime. It is an exothermic reaction
II. A precipitation reaction is one which involves separation of a solid substance but it can never be a decomposition reaction
III. Combination and double decomposition reactions are just opposite to each other

IV. The reaction occurring between an acid and a base to give salt and water is called a neutralisation reaction. It is an example of double decomposition reaction

V. Combustion reactions are always exothermic in nature

Choose the correct code from the following options.

Codes

	I	II	III	IV	V		I	II	III	IV	V
a)	F	T	T	F	F	b)	F	T	F	F	T
c)	F	T	F	T	T	d)	T	T	F	T	T

30) Solution X has a pH value of 12. It is added to aqueous ammonium chloride and the mixture is warmed. Which information is correct?

	Nature of X	**After warming**
(a)	Acidic	Ammonia gas is given off
(b)	Acidic	No gas is given off
(c)	Alkaline	Ammonia gas is given off
(d)	Alkaline	No gas is given off

31) State [T] for True and [F] for False.

I. The ability of a metal to be drawn into thin wires is called its malleability

II. When magnesium and aluminium metals are heated in air, they form the oxide which can turn blue litmus into red as well as red litmus into blue

III. When aluminium is treated with hot water, a gas is released which burns with 'pop' sound

IV. Aluminium can replace zinc from zinc sulphate salt but opposite reaction does not take place

V. The best conductors of heat are silver and gold

Choose the correct code from the following options.

Codes

	I	II	III	IV	V		I	II	III	IV	V
a)	T	T	F	T	F	b)	F	F	T	T	F
c)	F	F	F	T	F	d)	F	T	F	T	F

32) I. 'A' is utilised for providing energy to the plant. If it is not utilised immediately, it gets stored in the form of 'B', which acts as internal energy reserve

II. In the process of photosynthesis 'C' is reduced to 'A'

Consider the above statements and pick out the correct option for A, B and C

a) A-Protein, B-Sugar, C-Sunlight

b) A-Carbohydrate, B-Protein, C-Carbon dioxide

c) A-Carbohydrate, B-Starch, C-Carbon dioxide

d) A-Carbohydrate, B-Starch, C-Oxygen

33) Match the following columns

Column – I	**Column - II**
(A) Opening and closing of petals of a flower	1. Change in temperature
(B) Bending of tentacles	2. Light
(C) Opening and closing of Oxalis	3. Touch
(D) Drooping of leaves	4. Contact of insects

Codes

	A	B	C	D		A	B	C	D
a)	1	4	2	3	b)	2	4	3	1
c)	2	4	1	3	d)	1	2	4	3

34) Match the given matrix

Column – I	**Column - II**
(A) Myopia	1. Bifocal lens
(B) Hypermetropia	2. Cylindrical lens
(C) Presbyopia	3. Surgery
(D) Astigmatism	4. Concave lens
(E) Cataract	5. Convex lens

Codes

	A	**B**	**C**	**D**	**E**
a)	5	4	2	1	5
b)	4	5	2	1	3
c)	5	4	1	2	3
d)	4	5	1	2	3

35) Consider the following statements and choose the correct statement

I. Heat produced in heating devices is proportional to their resistance

II. Fuse wire must be connected to live wire so that even overloading current can pass through it

III. In India, domestic supply of current is 220 V, with a frequency of 50 Hz

a) I and II b) I and III c) II and III d) I, II and III

36) Why there are more herbivores than carnivores in a food chain?

I. Much energy is lost in the transfer of energy from herbivores to carnivores

II. A larger number of herbivores are needed to support a smaller number of carnivores

III. This is the way for the food chain to stay in equilibrium

Choose the correct statement that is supporting the increase in number of herbivore in a food chain

a) Only I b) II and III c) I and II d) I, II and III

37) How will information travel with in a neuron:

a) Dendrite -> Cell Body -> Axon -> Nerve ending

b) Dendrite -> Axon -> Cell Body -> Nerve ending

c) Axon -> Dendrite -> Cell Body -> Nerve ending

d) Axon -> Cell body-> Dendrite -> Nerve ending

38) Excessive exposure of human to UV-rays results in –

i) Damage to immune system

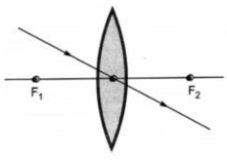
ii) Damage to lungs

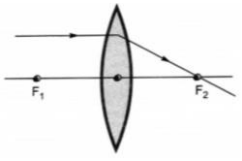
iii) Skin Cancer

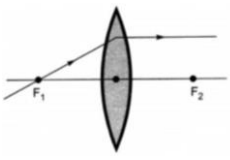
iv) Peptic ulcer

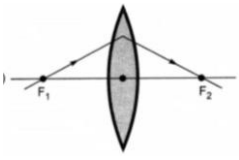
a) i) and ii) b) ii) and iv) c) i) and iii) d) iii) and iv)

39) The ray diagram showing in (fig. 5) the correct path of the ray after passing through the lens is / are

I 

II 

III 

IV 

a) II and III only b) I and II only c) I, II and III d) I, II and IV

40) An electric bulb is connected in an electric circuit. 10 C charge flows through this bulb in 5 sec. Find the current flowing through this bulb.

a) 2 A b) 5.5 A c) 7.2 A d) 11 A

SECTION – C
ENGLISH

Read the given poem and answer the questions that follow by selecting the most appropriate option.

Money is eternal
He is learning, well behind his desperate eyes,
The epistemology of loss, how to stand up
Knowing what every man must one day know
And most know many days, how to stand up

41) The poet says money is eternal. What does it mean in this extract?
   a) Money helps us purchase materials that make life worth living.
   b) Money promotes materialism and hunger for power among youngsters.
   c) Money only impacts a person's external environment.
   d) Money buys materialistic things and can be earned again, when lost.

42) What does the boy learn by losing the ball, according to the extract?
   (A) Loss is the unavoidable truth of life.
   (B) Material objects can be replaced.
   (C) Money buys happiness.
   (D) Losses in life can be prevented with care.
   (E) Life continues despite losses.
   a) (A), (B) and (E) b) (B) and (D) c) Only (A) d) (C) and (E)

43) The boy is learning how to stand up...
   This means that he is learning to be_____ in the face of difficulties.
   a) patient b) resilient c) defensive d) judgmental

44) Which option lists who is speaking these lines?
   a) An observer. b) The boy's parent.
   c) The ball salesman. d) A friend.

45) According to the poet, from whom do we mostly learn about loss?
   a) Our elders. b) Our experiences. c) Our books. d) Our teachers.

WORD AND STRUCTURE KNOWLEDGE

46) Given below are four alternatives for the given idiom. Choose the most approriate option.
   'To cast pearls before swine'.
   a) to offer food which one cannot digest
   b) to make a very difficult offer
   c) to give something to a person who does not realize the value of that thing
   d) to do a foolish thing

47) Sentence given with blanks to be filled in with an appropriate word. Four alternatives are suggested for the question. Choose the correct alternative
   Man is essentially a_____ animal and tends to associate with others
   a) sentimental b) gregarious c) selfish d) perverse

48) Given below is the sentence in Indirect Speech. Out of four options suggested, select the one which best expresses the same in Direct Speech.
   The shopkeeper asked the customer what he could do for him?
   a) The shopkeeper said to the customer, "What shall I do for you?"
   b) The shopkeeper told the customer, "What could I do for him?"
   c) The shopkeeper asked the customer, "What can I do for you?"
   d) The shopkeeper asked the customer, "What I can do for you?"

49) In the following passage some of the words have been left out. First read the passage over and try to understand what it is about. Then fill in the blank with the help of the alternatives given.

If you prefer mountains **(1)**_____ deserts, try Darjeeling, West Bangal's hills resort that **(2)** _____ at the foothills of the mighty Himalayas **(3)** _____ while in Bengal, if your spirit of adventure gets the better of you **(4)** _____ the ferry to the Sunderbans, the world's largest delta.

(1)	a)	against	b)	from	c)	with	d) to
(2)	a)	nestles	b)	cuddles	c)	sleeps	d) rests
(3)	a)	so	b)	since	c)	but	d) and
(4)	a)	ask	b)	pay	c)	pick	d) take

50) Which of the phrase (a), (b) and (c) given below the sentence should replace the underlined phrase to make the sentence grammatically correct? If the sentence is correct as it is, mark (d) as the answer.

Though we <u>have kept in mind to try and maintain</u> most facilities, we would like to request you to kindly bear with us for any inconvenience that may be caused.

(a) must keep in mind to try and maintain
(b) have kept in mind trying and maintain
(c) would keep in mind to try and maintain
(d) No correction required

51) In the following question, the sentence has been given in Active voice. From the given alternatives, choose the one which best expresses the given sentence in Passive voice.

The invigilator was reading out the instructions.

a) The instructions were read by the invigilator.
b) The instructions were being read out by the invigilator.
c) The instructions had been read out by the invigilator.
d) The instructions had been read by the invigilator.

52) Choose one word from the opitons given below that matches the definitions correctly.

A man who generally used to collect postage stamps.

a) Philatelist b) Avaricious c) Numismatist d) Accumulator

53) In the following questions three of the groups are alike while one is different. Find the ODD ONE out.

a) Chetan Bhagat b) Vikram Seth c) Ruskin Bond d) Shoba De

54) Five parts of a sentence are given. You are provided with the beginning (S1) and the ending (S5) of the sentence and other part are jumbled up. Choose the correct order of the JUMBLED parts of sentence (P, Q, R) that complete it logically.

S1 : The government did not accept the demand of 'Poorn swaraj'.
S2 : _____
S3 : _____
S4 : _____
S5 : Congress was declared an illegal party.
P : Civil Disobedience Movement was started.
Q : Thousands of people started breaking laws.
R : Gandhi ji started from his Sabarmati Ashram towards the village Dandi to break the salt law.

Choose the correct option.

a) PQR b) RQP c) QPR d) PRQ

55) Find out the RELATION between given two words in capital letter and pick up two words proportionately from the options that bear the same relation.
PAIN : SEDATIVE : _____ : _____
a) TRANCE : NARCOTIC b) ACHE : EXTRACTION
c) GRIEF : CONSOLATION d) COMFORT : STIMULANT

56) Choose ONE WORD from the options given below that matches the definitions correctly.
'Impossible to remove, erase or wash away'.
a) Indelible b) Efface c) Eradicate d) Abolish

57) Fill in the blank with the correct word from the options given below that makes the sentence meaningful.
If you smuggle goods into the country, they may be _____ by the customs authority.
a) rebuked b) possessed c) fined d) seized

58) Find the word which is similar in meaning
GUTTED
a) Banished b) Abolished c) Destroyed d) Rebuked

59) Four words are given, out of which only one is correctly spelt. Find the correctly spelt word.
a) connoisseur b) connoiseur c) connaisseur d) conoisseur

60) Parallelism maintains a consistency in the speech and expression of ideas.
Not only did Abhay despise the way Shivam dressed, _____ finding her clothes strewn all over the bed.
a) but hated also b) but also hating
c) but he also hated d) but also hated

SECTION – D
APTITUDE

61) The following question is based on the following alphabet series.
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
In the given alphabet, starting from the fifth letter from the left, if twelve letters are written in reverse order, then which letter will be the seventh to the left of the fourteenth letter from the right?
a) H b) L c) M d) N e) O

Directions (Question:62 to 64): Answer the following questions on the basis of the given conditions:
(i) Village "P" is 70 km to the north of village "T".
(ii) Village "Q" is 30 km to the east of village "R" which is 30 km to the south of village "P"
(iii) Village "S" is 20 km to the west of village "T".
(iv) Village "U" is 15 km to the west of village "P".

62) Which village lies in south-west of P?
a) S b) R c) Q d) T

63) Which village is to the north-east of village "T"?
a) S b) Q c) U d) T

64) Which village is farthest from village "P"?
a) S b) U c) Q d) T

65) Arrange the given words in the sequence in which they occur in the dictionary and then choose the correct sequence.
(i) Congress, (ii) Contract, (iii) Continue, (iv) Corridor, (v) Contempt
a) (ii), (iii), (i), (iv), (v) b) (i), (iv), (iii), (ii), (v)
c) (i), (v), (iii), (ii), (iv) d) (i), (v), (ii), (iii), (iv)

66) Ramesh starts from point A and covers a distance of 2 km in South direction. He then turns to his left and covers 1 km, then he again turns to his left and covers 3 km to reach point B. In which direction he is from the starting point?

a) South-East b) North-East c) South-West d) East

67) If '+' denotes '÷', '×' denotes '+', '÷' denotes '-'and '-' denotes '×' then 122 + 2 × 17- 10 = ?

a) 122 b) 222 c) 187 d) 231

68) Sunil is the brother of Anil. Shivani is the sister of Mohit. Anil is the son of Shivani. How Sunil is related to Mohit?

a) Brother b) Nephew c) Cousin d) Daughter

Directions (Question : 69 to 71) Study the information given below and answer the questions that follow. Five boys - P, Q, R, S and T have different coins in their pocket. Q has less coins than S. P has less coins than S. T has more coins than R and less coins than three boys. None of the boy have more coins than S.

69) If Q is having 18 coins, then which boy is having (most probably) 20 coins?

a) P b) S c) T d) R

70) If T and Q have 26 and 19 coins, then who among the following will have 18 coins?

a) P b) S c) P/R d) R

71) The number of persons having more and less coins is same for _____

a) Q b) T c) P d) R

72) Read the following information carefully and answer the question given below.

i) There are five types of cards viz. A, B, C, D and E. There are three cards of each type. These are to be inserted in envelopes of three colours - Red, Yellow and Brown. There are five envelopes of each colour.

ii) B, D and E type cards are inserted in red envelopes. A, B and C type cards are to be inserted in yellow envelopes and C, D and E type cards are to be inserted in brown envelopes.

iii) Two cards each of B and D type are inserted in red envelopes.

Which of the following combinations of colour of the envelope and the number of cards is definitely correct in respect of E - type cards?

a) Red-1, Yellow - 2 b) Yellow -1, Brown-2 c) Red - 1, Brown-2 d) None of these

73) The door of Aditya's house faces East. From the back side of his house, he walks straight 50 meters, then turns to the right and walks 50 meter's again. Finally, he turns towards left and stops after walking 25 meter's. Now, Aditya is in which direction from the starting point?

a) South-east b) North-east c) West d) North-west

74) A dealer sold six cars – M, N, O, P, Q and R– during a period of Monday to Saturday, one car on each day.

(i) The car O was sold at least before three cars.

(ii)The car R was sold on Tuesday.

(iii) Both the cars N and Q were sold at least before one car.

(iv) The car P was sold immediately after the car O.

(v) At least four cars were sold after the car Q.

If Mr. Jindal purchased a car sold on Wednesday, then the car purchased by him is

a) M b) N c) O d) P

75) How many 8's are there in the following number series each of which is exactly divisible by its immediately preceding number and also divisible by its immediately succeeding number?

8, 2, 4, 5, 1, 7, 2, 8, 4, 8, 4, 2, 2, 8, 2, 6, 9, 8, 4, 5, 4, 8, 3, 2, 8, 4, 3, 1, 8, 3

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