SAMPLE PAPER

Class 12

(Based on Class 12 Syllabus)

For Students in the Commerce Stream

Time Allowed : 3 hrs

Maximum Marks : 100

MATHEMATICS

Q1.Let A = { 2 , 3 , 6 }. Which of the following relations on A are reflexive ?

a) R3R3 = { (2,2) , (3,6) , (2,6) }
b) R2R2 = { (2,2) , (3,3) , (3,6) , (6,3) }
c) R1R1 = { (2,2) , (3,3) , (6,6) }
d)None of these

Ans-c
R1R1 is a reflexive on A , because (a,a)

Q2.If $\cos^{(-1)}x+\cos^{(-1)}y=2\pi\cos^{(-1)}x+\cos^{(-1)}y=2\pi$, then the value of $\sin^{(-1)})x+\sin^{(-1)}y\sin^{(-1)}x+\sin^{(-1)}y$ is

a)0 b) ππ
c)- π – π d)None of these

Ans-c

If $\cos^{(-1)}x+\cos(-1)y=2\pi\cos^{(-1)}x+\cos^{(-1)}y=2\pi$, then the value of $\sin^{(-1)}x+\sin^{(-1)}y\sin^{(-1)}x+\sin^{(-1)}y=\pi-2\pi=-\pi$.

Q3.The number of all possible matrices of order 3×33×3 with each entry 0 or 1 is

a)81 b)512 c)89 d)18

Ans-b

$2^{3x3}=2^9=512$.

Q4.If A is a matrix of order3 × 43 × 4 , then each row of A has

a) 3 elements b) 5 elements c) 12 elements d)4 elements

Ans-d

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \end{bmatrix}_{3\times4}$$

,therefore matrix A has 4 elements in each row.

Q5.If P is of order 2 × 32 × 3 and Q is of order 3 × 23 × 2, then PQ is of order

a) 2 x 22 x 2 b) 3 × 33 × 3
c) 3 × 23 × 2 d) None of these
Ans- a

Here, matrix P is of order 2 × 3 and matrix Q is of order 2 × 2 , then , the product PQ is defined only when : no. of columns in P = no. of rows in Q. And the order of resulting matrix is given by : rows in P x columns in Q.

Q6.The function f (x) = 1 + | sin x l is

a) differentiable nowhere
b)continuous nowhere
c)continuous everywhere
d)differentiable everywhere

Ans-c

f(x)=1+|sinx| f(x)=1+|sinx| is not derivable at those x for
which xforwhichsinx=0,xforwhichsinx=0, however, 1+|sinx|1+|sinx| is continuous everywhere (being the sum of two continuous functions)

Q7.Let f (x) = [x], then f (x) is

a) continuous for all x∈R
b) continuous nowhere
c)differentiable for all x∈ (R – I)
d) differentiable for all x∈R

Ans-c

f(x) = [x] is derivable at all x except at integral points i.e. on R – I .

Q8. The cross product of two parallel vectors is ?

a)1 b)0 c)perpendicular d)parallel

Ans-b

Q9.The conditional probability of an event E's complement E', given the occurrence of the event F

a) P (E'|F) = P (E|F)
b) P (E'|F) = – 1 + P (E|F)
c) P (E'|F) = 1
d) P (E'|F) = 1 - P (E|F)

Ans-d

As the total probability of an event is always 1 . therefore , P (E'|F) = 1 – P (E|F).

Q10.Two coins are tossed once ,where E :no tail appears , F : no head appears.
Find P(E/F).

a)0 b)0.35 c)0.24 d)0.25

Ans-a
S={HH,HT,TH,TT}
E={HH}
F={TT}
E∩F=φ
⇒P(E)=1/4,P(F)=1/4,P(E∩F)=0
⇒P(E/F)= $\frac{P(E\cap F)}{P(F)}$ = $\frac{0}{1/4}$ =0

Q11.Direction cosines of a line are

a)The sines of the angles made by the line with the positive directions of the coordinate axes.
b) The tangents of the angles made by the line with the negative directions of the coordinate axes.
c)The cosines of the angles made by the line with the positive directions of the coordinate axes..
d) The cotangents of the angles made by the line with the negative directions of the coordinate axes.

Ans-c

Direction cosines of a line are the cosines of the angles made by the line with the positive direction of the coordinate axis.i.e. x- axis , y-axis and z – axis respectively.

Q12.If l, m, n are the direction cosines of a line, then

a) $2l^2+ m^2+ n^2= 1$
b) $l^2+ m^2+ 2n^2= 1.l2$

c) $l^2+ 2m^2+ n^2= 1$
d) $l^2 +m^2 + n^2 = 1$

Ans-d
If l, m , n are the direction cosines of a line then , we know that , $l^2+ m^2+ n^2= 1$.

Q13.If l, m and n are the direction cosines of a line, Direction ratios of the line are the numbers which are
a) Proportional to the direction cosine l of the line
b) Inversely Proportional to the direction cosine l of the line
c)Proportional to the direction cosines of the line
d) Inversely Proportional to the direction cosines of the line

Ans-c

If l, m and n are the direction cosines of a line, Direction ratios of the line are the numbers which are Proportional to the direction cosines of the line.

Q14. Skew lines are lines in different planes which are

a) intersecting
b)parallel
c)parallel and intersecting
d)neither parallel nor intersecting

Ans-d

By definition : The Skew lines are lines in different planes which are neither parallel nor intersecting

Q15.Find the rate of change of the area of a circle with respect to its radius r when r = 3 cm .

a) 3π cm^2 /s b) 6π cm^2 /s c) 2π cm^2 /s d)None of these

Ans-b

The area of a circle (A) with radius (r) is given by,

$A=\pi r^2$

Now, the rate of change of the area with respect to its radius is given by,

$\frac{dA}{dr} = \frac{d}{dr}(\pi r^2) = 2\pi r$

Therefore,when r=3cm

$\frac{dA}{dr}$ = 2 π(3) =6 π

Hence, the area of the circle is changing at the rate of 6π cm^2 /s when its radius is 3 cm.

Q16.Find the slope of the tangent to the curve y = x^3 – 3x + 2 at the point whose x-coordinate is 3.

a)20 b)27 c)24 d)22

Ans-c

The given curve is y = x^3 – 3x + 2

$\frac{dy}{dx}$ = $3x^2$ - 3

The slope of the tangent to a curve at (x_0, y_0) is :

$$\left.\frac{dy}{dx}\right]_{X_0 - Y_0}$$

Hence, the slope of the tangent at the point where the x-coordinate is 3 is given by

$$\left.\frac{dy}{dx}\right]_{X=3} = \left.3x^2 - 3\right]_{X=3}$$

= $3(3)^2$ – 3 = 27 – 3 = 24

Q17.Which of these statements is true:

- **I. 10 kg is a scalar quantity.**
- **II. 20 m/s^2 is a vector quantity.**

a)Only I is true b)Only II is true
c)Both are true d)Both are false

Ans-c

I.10 kg is a scalar quantity because it involves only magnitude.
II. 20 m/s^2 is a vector quantity as it involves magnitude as well as direction.

Q18.The type of problems which seek to maximise (or, minimise) profit (or, cost) form a general class of problems called_____.

a)Constraint problems
b)optimisation problems
c)maximisation problems
d)None of these

Ans-b

Q19.Let x,y be two variables , and x >0, xy=1.Then,what will be the minimum value of x + y?
a)1 b)2 c)3 d)

Ans-b
Let A=x + y=x+1/x (xy=1)

$$\frac{dA}{dx} = 1 - \frac{1}{x^2} \quad , \frac{d^2A}{dx^2} = \frac{2}{x^3}$$

$$\text{Now} \quad \frac{dA}{dx} = 0 \quad \Rightarrow x = 1,-1$$

$$\text{Also at x=1,} \quad \frac{d^2A}{dx^2} = 2 > 0$$

x=1 is a minimum point of A.So minimum value of A=1 + 1/1 = 2.

Q20.f(x) = $2x^3 - 21x^2 + 36x + 7$ has a maxima at ?

a)x=1 b)x=4 c)x=5 d)None of these

Ans-a
f'(x) = $6x^2 – 42x +36$
f"(x) = 12x – 42
Now f'(x) = 0
⇒ $6(x^2 – 7x + 6)= 0$
⇒ x=1,6
Also f"(1) = 12 -42 = -30 < 0
Therefore , x has a maxima at x=1

Q21.If x= -1 and x=2 are extreme points of the function y=alogx + bx^2 ,then

a)a=3 ; b= 1/3
b)a=-3 ; b=1/2
c)a=2 ; b=1/2
d)None of these

Ans-c
$\frac{dy}{dx} = \frac{a}{x} + 2bx + 1$
Since x = -1 and x =2 are extreme points ,so dy/dx at these points must be zero.Hence,
-a-2b+1=0 and a/2 + 4b + 1 =0
⇒ a + 2b -1 =0 and a + 8b + 2 =0

$\Rightarrow$ a=2 ,b =-1/2

Q22.What will be the maximum area of a rectangle which has a perimeter of 176cms ?

a) 2210 sqcms
b) 1836 sqcms
c) 1967 sqcms
d) 1936 sqcms

Ans-d
Let the sides of the rectangle be x,y ;then
2x + 2y = 176 ....(1)
Therefore its area A=xy=x(88-x)
[From (1)] = $88x - x^2$
$\Rightarrow \frac{dA}{dx}$ = 88-2x ,
$\frac{d^2A}{dx^2} = -2 < 0$
Now $\frac{dA}{dx} = 0 \Rightarrow x = 44$;
Also then,
$\frac{d^2A}{dx^2} < 0$
So area will be maximum when x=44 and maximum area = 44x44=1936 sqcms

Q23.If ∫f(x)∫f(x) dx = f (x), then
a) f (x) = x
b)$f(x) = e^x$
c) f (x) = 0
d)None of these

Ans-b
$\int f(x)dx=f(x) \Rightarrow \frac{d}{dx}(f(x))=f(x)$

Q24.∫ log $(\frac{1}{x} - x)dx$ is equal to

a)log 2
b) $\frac{1}{2}$ log 2
c)0
d)None of these

Ans-c
$\int \log(1-x)dx - \int \log x dx = 0$

Q25.A black and a red dice are rolled. Find the conditional probability of obtaining a sum greater than 9, given that the black die resulted in a 5.

a) $\frac{4}{8}$

b) $\frac{1}{3}$
c) $\frac{4}{9}$
d) $\frac{2}{3}$
Ans- b

n(S)=36.
Let A = event of getting sum greater than 9.
= {(4,6),(5,5),(6,4),(5,6),(6,5),(6,6)}
And B = event of getting 5 on black die.
={(5,1),(5,2),(5,3),(5,4),(5,5),(5,6)}
$\Rightarrow A \cap B = \{(5,5),(5,6)\}$
$\Rightarrow P(A \cap B) = \frac{2}{36} = \frac{1}{18},$
$P(B) = \frac{6}{36} = \frac{1}{6}$
$\Rightarrow P(A/B) = \frac{P(A \cap B)}{P(B)}$
$= \frac{1/18}{1/6} = \frac{6}{18} = \frac{1}{3}$

BUSINESS STUDIES

Q26.Which function of management is concerned with finding the right people for the right job?

a)People Management b)Hiring c)Staffing d)None of these

Ans-c-Staffing

Q27.Which of the following is a technique which is used to help to improve the efficiency of workers ?

a)Mind study b)Administrative procedures
c)Functional foremanship d)Motion study

Ans-d-Motion study

Q28. The production manager of KMC Pvt Ltd. ,which manufactures fans,instructs a salesman to go slow in selling the product, whereas the marketing manager is insisting on selling fast in order to achieve the target. Which principle of management is being violated in this case?

a)Principle of order b)Unity of Command
c)Authority and Responsibility d)None of these

Ans-b- Unity of Command

Q29. Which of the following best indicates the importance of business environment?

a) Identification
b) Improvement in performance
c) Coping with rapid changes

d)All of these

Ans-d-All of these

Q30.Out of the following,what is the main purpose of making rules?

a)To choose the best option.
b)To set the company objectives.
c)To decide what is the best time to do a job.
d)To maintain discipline

Ans-d- To maintain discipline

Q31. Hiring only IIT trained engineers by a company is an example of its _____.

a)Procedure b)Strategy c)Management d)Policy

Ans-d-Policy

Q32. What is the last step in organising process?

a) Departmentalisation b)Assigning Duties
c) Identification and division of work d)Establishing reporting relationships

Ans-d- Establishing reporting relationships

Q33. Authority, Responsibility and Accountability are the elements of _____

a)Planning b)Directing c)Delegation d)Organising

Ans-c-Delegation

Q34. Which of the following does not follow the scalar chain?

a)Informal Organization
b)Divisional Structure
c)Delegation
d)Functional structure

Ans-a- Informal Organization

Q35. A tall structure has a

a) No span of management
b)Narrow span of management
c)Less levels of management
d)Wide span of management

Ans-b-Narrow span of management

Q36.Span of management refers to

a) Number of managers in top management
b) Length of term for which a manager is appointed
c) Number of subordinates under a superior
d) Number of management personnel.

Ans-c- Number of subordinates under a superior

Q37.The celebration of Holi is an example of:
a)Legal environment
b)Political environment
c)Social Environment
d) Technological Environment

Ans-c-Social environment

Q38.When employees are shifted from one job position to another as a part of the training process,what is it called?

a)Sales training
b)Job Training
c)Job rotation
d)Transfer

Ans-c-Job Rotation

Q39.Which test is helpful in assessing the individuals capacity for learning new skills?

a)Personality Test
b)General awareness test
c)Trade test
d)Aptitude test

Ans-d- Aptitude test

Q40. Staffing is a _____ function.

a)Budgetary
b)Top level
c)Planning
d)Managerial

Ans-d – Managerial function

Q41. Planning without controlling is _____.

a)Effective b)Expensive c)Meaningless d)Cost effective

Ans-c-Meaningless

Q42.Asian Mills is thinking of upgrading one of its plants with a new modern plant. Such a decision is an example of ?

a)Financing Decision
b)Working Capital Decision
c)Investment Decision
d)None of these

Ans-c-Investment Decision

Q43. In case,the government increases the tax rate on corporate profits ,then other things remaining the same, an increase in the tax rate on corporate profits will:

a)have no impact on the cost of debt.
b)make debt relatively expensive.
c)make debt relatively cheaper.
d)None of these

Ans-c- make debt relatively cheaper.

Q44. Financial leverage is called favourable if:

a) If the degree of existing financial leverage is low
b)ROI is higher than the cost of debt.
c) Return on Investment is lower than the cost of debt
d) Debt is easily available

Ans-b- ROI is higher than the cost of debt.

Q45. A Treasury Bill is basically:

a) An instrument of capital market.
b) An instrument to borrow long-term funds.
c)An instrument to borrow short term funds.
d)A Government Fixed Deposit

Ans-c- An instrument to borrow short term funds.

Q46.Which of the following do not participate in the money market?

a)NBFCs
b)Mutual Funds

c)SEBI
d)All of these

Ans- c-SEBI

Q47. Which of the following is concerned with the Quality performance of a product?

a)Marketing
b)Selling
c)Production
d) Product concept

Ans-d- Product concept

Q48. Which of the following is the part of marketing mix?

a)Price b)Product c)Place d)All of these

Ans-d-All of these

Q49.What is the standardisation mark printed on jewellery called?

a)ISI Mark
b)Hallmark
c)ISO 2009
d)Any of these

Ans-b-Hallmark

Q50.Grapevine in a company is an example of _____.

a)Lateral Communication
b)A popular snack
c)Informal Communication
d)Formal Communication

Ans-c- Informal Communication

GENERAL KNOWLEDGE

Q 51.In which year did Sher Shah Suri defeat Humayun ?

a) 1539 b) 1545 c) 1607 d) 1589
Ans-a

Q 52. Who is the Author of the famous novel "The White Tiger " ?

a) Kiran Desai b) Salman Rushdie
b) c) Aravind Adiga d) Arundhati Roy
Ans-c

Q 53. Who was the first ever recipient of the Dada Sahib Phalke Award ?

a) Prithvi Raj Kapoor b) Sohrab Modi
c) Dev Anand d) Devika Rani

Ans-d

Q 54. Yogeshwar Dutt won which medal in wrestling in the London Olympics ?
a) Gold b) Silver c) Bronze d) No Medal
Ans-c

Q 55.In which country will the next Asian Games be held ?

a) South Korea b) Vietnam
c) Indonesia d) Singapore
Ans-c

Q 56.Laisram Sarita Devi is associated with which sport ?

a) Athletics b) Boxing c) Weightlifting d) Swimming
Ans-b

Q 57. When is the World Environment Day ?

a) 1 May b) 25 November c) 6 July d) 5 June
Ans-d

Q 58. In which country are the ruins of Petra situated ?

a) Argentina b) Jordan c) Israel d) Egypt
Ans-b

Q 59. What is the old name of Zimbabwe ?

a) East Africa b) Siam c) Rhodesia d) Zaire
Ans-c

Q 60. Which city in India is famous for Glass works ?
a) Agra b) Bhopal c) Moradabad d) Ferozabad
Ans-d

Q 61. The Andes range of mountains are located in _____.

a) Europe b) North America c) Australia d) South America
Ans-d

Q 62.What is the Japanese parliament called ?

a) Duma b) Tshogdu c) Diet d) Knesset
Ans-c

Q 63. Which river flows through Berlin ?

a) Rhine b) Spree c) Daunbe d) Seine
Ans-b

Q 64.Mont Blanc Tunnel is between which two countries ?

a) France and United Kingdom b) Italy and Switzerland
c) France and Italy d) Italy and Germany
Ans-c

Q 65. Who invented the printing press ?

a) G.Bradshaw b) L.E. Waterman
c) Thomas Newcome d) J. Gutenberg
Ans-d

Q 66.Inferno ,a movie based on Dan Brown's book had an Indian actor in its cast.Who was it?

a) Naseeruddin Shah b)Amitabh Bachchan c)Irfan Khan d)No Indian actor
Ans-c

Q 67.Wuthering Heights was written by which author ?
a) Charles Dickens b) Mark Twain c) Charlotte Bronte d) Emily Bronte
Ans-d

Q 68.When is World Soil Day celebrated ?

a) 8 December b) 24 January c) 5 December d) 14 January
Ans-c

Q 69.India conducted a joint military exercise – Shakti 2016 with another country .Which country was it ?
a) Italy b) USA c) Bangladesh d) France
Ans-d

Q 70. Nathaniel Hawthorne is a famous _____.
a) Actor b)Politician c)Writer d)Singer
Ans-c

Q 71. When were the first Grammy music awards given ?

a) 1905 b) 1932 c) 1971 d) 1959

Ans-d

Q 72. Who has been elected the new president of France?

a) Le Pen b) Angela Merkel

c) Emmanuel Macron d) Francois Hollande

Ans-c

Q 73. '25' is the music album of which singer ?

a) Beyonce b) Jennifer Lopez c) Adele d) none of these

Ans-c

Q 74.Who is the president of Tanzania ?

a) Robert Mugabe b) John Magufuli

b) c) Uhuru Kenyatta d) None of these

Ans-b

Q 75.Which movie won the Oscar for Best Picture in the Academy Awards 2017 ?

a) Moonlight b)La La Land c)Jungle Book d) Manchester by the sea

Ans-a

MENTAL ABILITY

Q 76. In a certain code RADIO is XZOPL and SHEET is NBGGI ,then how will you code HEATER ?

a) BNGZIX b) BGZGIX c) BGZIGX d) GZBIXZ

Ans-c

Q 77. If FAIR is written as IENX .Then how will you write TAPE ?

a)WEVL b) WEUK c) WFUK d) XEUK

Ans-b

Study the following information and answer the question 78 given below .

P = Q means Q is the father of P

P * Q means P is the sister of Q

P ? Q means Q is the mother of P

P $ Q means P is the brother of Q

P © Q means Q is the son of P

P x Q means P is the daughter of Q

Q 78. Which of the following is not correct ?

a) R X S ? T means R is the granddaughter of T.
b) P = Q ? R means R is the grandmother of P.
c) L $ M * O means O is the sister of L.
d) M * O P ©P=Q means Q and O are husband and wife.

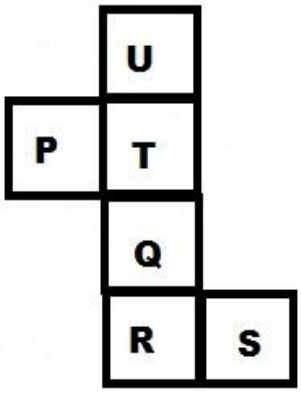
Ans-c

Q 79. Pointing towards a man in the photograph, Archana said "He is the son of only son of my grandmother ".How is the man related to Archana ?

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

Ans-c

See the diagram below which gives the plane view of a cube. Then answer the 3 questions below :-



Q 80. Which face will be opposite to face "T" after folding the cube ?

(a) P (b) Q (c) R (d) U

Answer : c – i.e. R

Q 81. Which face will be on top if face "T" is at the bottom ?

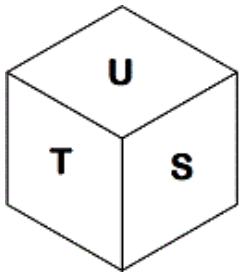
(a) Q (b) R (c) S (d) U

Answer : b – i.e. R

Q 82. Which two faces will be opposite to each other ?

(a) P & R (b) Q & S (c) P & U (d) Q & U

Answer : d – i.e. Q & U

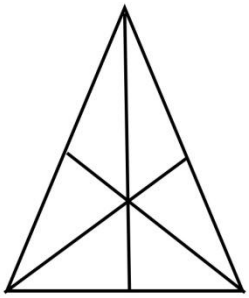


U → Q

P → S

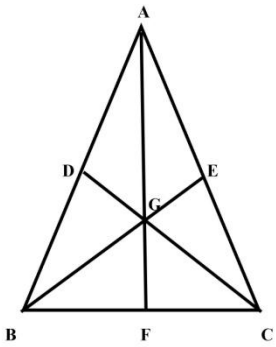
T → R

Q 83.How many triangles are there in the following figure ?



a)16 b)14 c) 7 d) 10

Answer – a

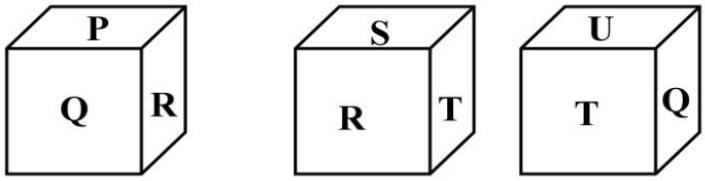


The triangles are :

- AGE , GFC ,BGF ,DGB ,ADG,EGC
- AGC , AGB, BGC
- AFC , AFB, BEC, BDC, ABE, DAC

- ABC
- Hence 16 triangles

Q 84. The six faces of a dice have been named as P,Q,R,S,T and U.The dice is rolled 3 times.The three positions of the dice are as under :

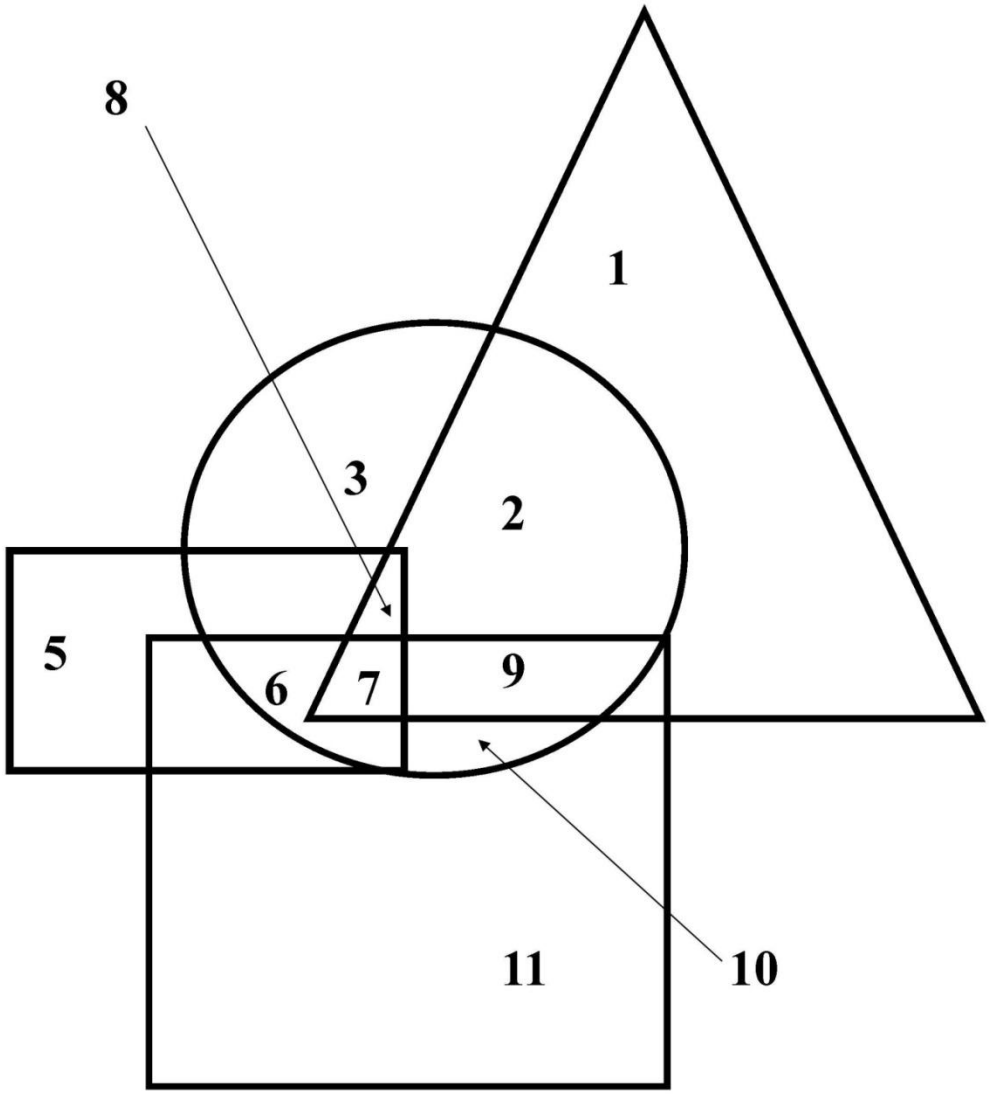


Find the alphabet opposite P.

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

Answer – c
T is opposite to P

INFO FOR Questions 85 to 87.
In the following diagram ,rectangle, square, circle and triangle represent the regions of wheat, gram, maize and rice cultivation respectively.



Q 85.Which area is cultivated by all the four commodities ?

a) 7 b) 8 c) 9 d) 2

Ans-a

Q 86. Which area is cultivated by Wheat and Maize only ?

a) 8 b) 6 c) 5 d) 4

Ans-d

Q 87. Which area is cultivated by Rice only ?

a) 5 b) 1 c) 2 d) 11
Ans-b

Q 88. A clock loses $\frac{1}{2}$ % on true time during one week and gains $\frac{1}{4}$ % on true time during the next week.If it is set right at 12 'O' clock on Saturday morning ,the what time will it indicate at the end of second week ? (1/a96)

a) 11:34 b) 11:48 c) 12:15 d) 13:03
Ans-a

Q 89. Between 2 'O' clock to 10 'O' clock, how many times will the hands of a clock be at right angles ?

a)14 b) 12 c) 16 d) 15
Ans-a

Q 90. In this question,a statement is given ,followed by two conclusions.Mark your answer as

a) If only conclusion I follows
b) If only conclusion II follows
c) If either conclusion I or II follows
d) If neither conclusion I nor II follows

STATEMENT : We follow some of the best and effective teaching and learning practices used by leading institutes all over the world –A statement by a professor of Global institute.
Conclusions : I.The Global institute is one of the leading institutes of the world.
II. Whatever is being followed by world's leading institutes will definitely be good and useful.
Answer - d

INFORMATION FOR Q 91 & 92

Five men A,B,C,D, and E read a newspaper.The one who reads first gives it to C.The one who reads last had taken it from A. E was not the first or the last to read.There were two readers between B and A.

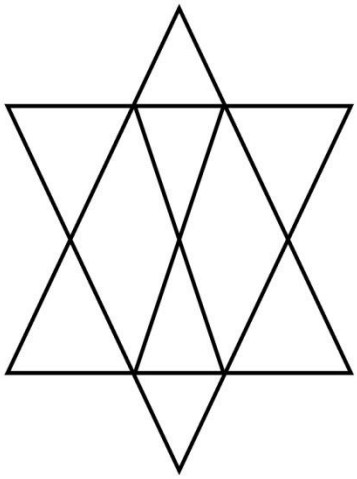
Q 91.B passed the newspaper to whom ?

a) A b) C c) D d) E
Ans-b

Q 92. Who read the news paper last ?

a) A b) B c) C d) D
Ans-d

Q 93. Determine the number of pentagons in the following figure ?



a) 5 b) 9 c) 8 d) 10

Ans-d

Q 94. If B is the product of 2 different composite numbers.Then what is B ?

a) 10 b) 32 c) 6 d) 8

Ans-b

Q 95. Read the two statements and find out the correct conclusion.
Statement 1 : All Reds are Greens.
Statement 2 : All Greens are Blue

Which is the correct conclusion :

a) No reds are blue
b) All reds are blue
c) Some reds are blue
d) All blues are reds

Ans-b

INFORMATION FOR Q 96 & 97
Consider the words and their codes given in the table below and answer the following 2 questions.

JOIN	**GPHN**
GET	**JFV**
EAT	**FAV**
GREAT	**JRFAV**
FOUL	**EPQL**

Q 96. How many alphabets have been retained as codes ?

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

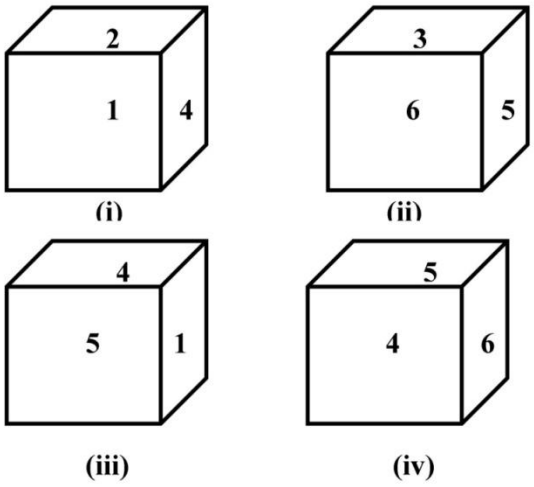
Ans-c

Q 97. How will you code FIGURE ?

a) EHJQRF b) FDELVF c) FIJPRA d) FHJQAR

Ans-a

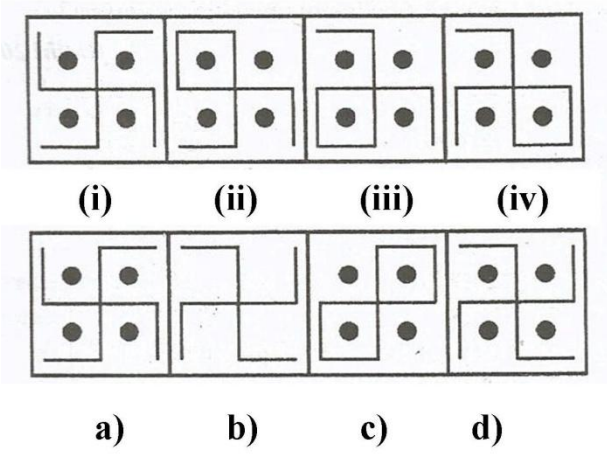
Q 98. Observe the dice given below and find out which number is opposite 3 ?



a) 1 b) 2 **c) 4** d) 6

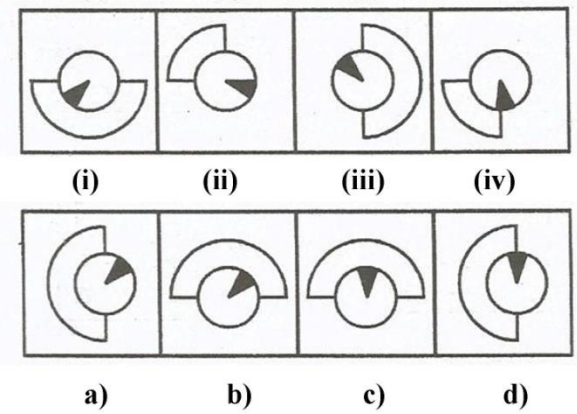
Ans-c

Q 99. Study the picture below from (i) to (iv) and find out which figure out of the four options a,b,c and d will come next in the series.



Answer - d

Q 100 . Study the picture below from (i) to (iv) and find out which figure out of the four options a,b,c and d will come next in the series.



Answer - b