NATIONAL TALENT SEARCH EXAMINATION (NTSE-2017-18) STAGE -1

STATE : KARNATAKA PAPER : SAT

Date: 05/11/2017

Max. Marks: 100 **SOLUTIONS** **Time allowed: 90 mins**

1. When vector $\vec{A}$ is multiplied by a scalar number-2, then

(1) The magnitude of vector will be doubled and the direction will be same

(2) The magnitude of vector will be doubled and the direction will be opposite

(3) The magnitude and direction of vector remains same

(4) The magnitude of vector will be halved and direction is reversed

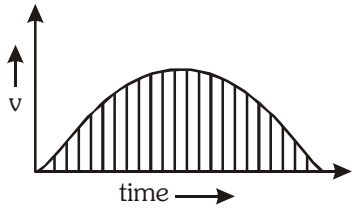
Ans. (2)

Sol. $\vec{B} = -2\vec{A}$

$\Rightarrow |\vec{B}| = 2|\vec{A}|$

So magnitude of the resultant vector will be doubled and the direction will be opposite (-ve sign shows the opposite direction).

2. The figures shows velocity-time graph of one dimensional motion of an object. The shaded area represents



(1) Momentum (2) Acceleration (3) Distance travelled (4) Speed

Ans. (3)

Sol. In one - dimensional motion displacement magnitude and distance travelled will be equal, if body is moving in one direction (v should have one sign) according to graph. So area under v-t graph shows displacement or distance travelled.

3. Two bodies of masses m and 4m are moving with equal linear momentum. The ratio of their kinetic energy is

(1) 1 : 8 (2) 4 : 1 (3) 1 : 1 (4) 1 : 2

Ans. (2)

Sol. $m_1 = m,\ m_2 = 4m$

$p_1 = p_2 = p$

$$\frac{k_1}{k_2} = \frac{\frac{p_1^2}{2m_1}}{\frac{p_2^2}{2m_2}} = \frac{m_2}{m_1} = \frac{4m}{m} = \frac{4}{1}$$

$k_1 : k_2 = 4 : 1$

4. In concave mirror the object is placed beyond C. Then the nature and size of the image formed is

(1) Real, erect and diminished

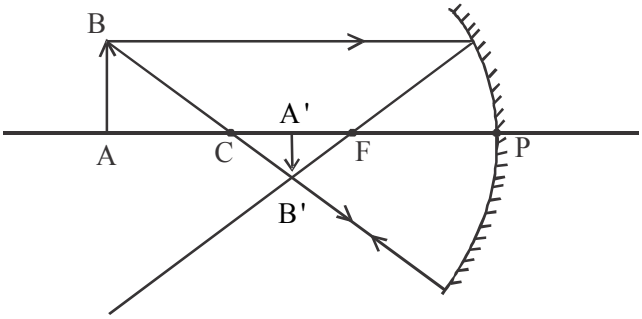
(2) Real, inverted and diminished

(3) Virtual, erect and magnified

(4) Real, inverted and magnified

Ans. (2)

Sol.



Characteristics of image

$\rightarrow$ Real

$\rightarrow$ Inverted

$\rightarrow$ Diministed

5. **Assertion (A) :** The phenomenon of total internal reflection occurs only when the incident light ray travels from denser medium to the rarer medium.

Reason (R) : When the light ray travels from denser medium to rarer medium the refracted ray bends away from the normal.

Considering the above

(1) Both A and R are true and R is the correct explanation to A

(2) Both A and R are true and R is not the correct explanation to A

(3) Both A and R are false

(4) A is false and R is true

Ans. (1)

Sol. When a ray of light travels from denser to rarer the ray bends away from the normal, As angle of incidence increases, then the refracted ray bends more away from normal. For a particular angle of incidence (θ_c) refraction angle will be 90°. If angle (i) is more than θ_c, then reflection occurs which is known as total internal reflection.

6. Two bodies of masses 2 kg and 16 kg are seperated by a distance of 4 m. The gravitational force between these two bodies is ($G = 6.67 \times 10^{-11}\ Nm^2\ kg^{-2}$)

(1) 6.67×10^{-11} N

(2) 13.34×10^{-11} N

(3) 20.01×10^{-11} N

(4) 26.68×10^{-11} N

Ans. (2)

Sol. $m_1 = 2kg,\ m_2 = 16kg,\ r = 4m$

$$F = \frac{Gm_1m_2}{r^2} = \frac{6.67 \times 10^{-11} \times 2 \times 16}{4 \times 4} = 13.34 \times 10^{-11} N$$

7. The ascending order of frequency of the given electromagnetic waves is

(1) IR-rays, Visible-rays, UV-rays, X-rays, Gamma rays (2) IR-rays, UV-rays, Visible-rays, X-rays, Gamma rays

(3) Gamma rays, X-rays, UV-rays, Visible rays, IR-rays (4) Gamma rays, X-rays, Visible rays, UV-rays, IR-rays

Ans. (1)

Sol. Order of ascending frequency

I R - rays < visible rays < uv - rays < x.rays < Gamma Rays

8. To prepare a compound microscope the type of lenses used are

(1) Eye lens is convex lens of comparatively lower focal length and object lens is convex lens of comparatively higher focal length

(2) Eye lens is concave lens of comparatively lower focal length and object lens is concave lens of comparatively higher focal length

(3) Eye lens is convex lens of comparatively higher focal length and object lens is convex lens of comparatively lower focal length

(4) Eye lens is concave lens of comparatively higher focal length and object lens is concave lens of comparatively lower focal length

Ans. (3)

Sol. In compound microscope, Both lens should be convex and $f_e > f_0$

$\Rightarrow$ focal length of *eye* lens > focal length of objective lens

9. **Assertion (A) :** Due to variation of pressure speed of sound does not change.

Reason (R) : The variation of pressure is proportional to variation of density.

Consider the above

(1) Both A and R are correct R is the correct explanation to A.

(2) A is correct and R is the wrong explanation to A.

(3) Both A and R are wrong.

(4) A is wrong and R is correct.

Ans. (1)

Sol. If pressure of air increases, then density will also increases. According to concept

$$\upsilon = \sqrt{\frac{\gamma P}{\rho}} \quad \& \quad P \propto \rho$$

Then velocity of sound will **not** change.

10. When 1 mg of matter is converted into energy, the amount of energy released is

(1) 90 J (2) 9×10^5 J (3) $9 + 10^3$ J (4) 9×10^{10} J

Ans. (4)

Sol. $E = mc^2$, $m = 1$ mg

$= 1 \times 10^{-6}$ kg

$= 1 \times 10^{-6} \times 3 \times 10^8 \times 3 \times 10^8$

$E = 9 \times 10^{10}$ J

11. If the temperature of sun in doubled, the energy received by the earth increases by

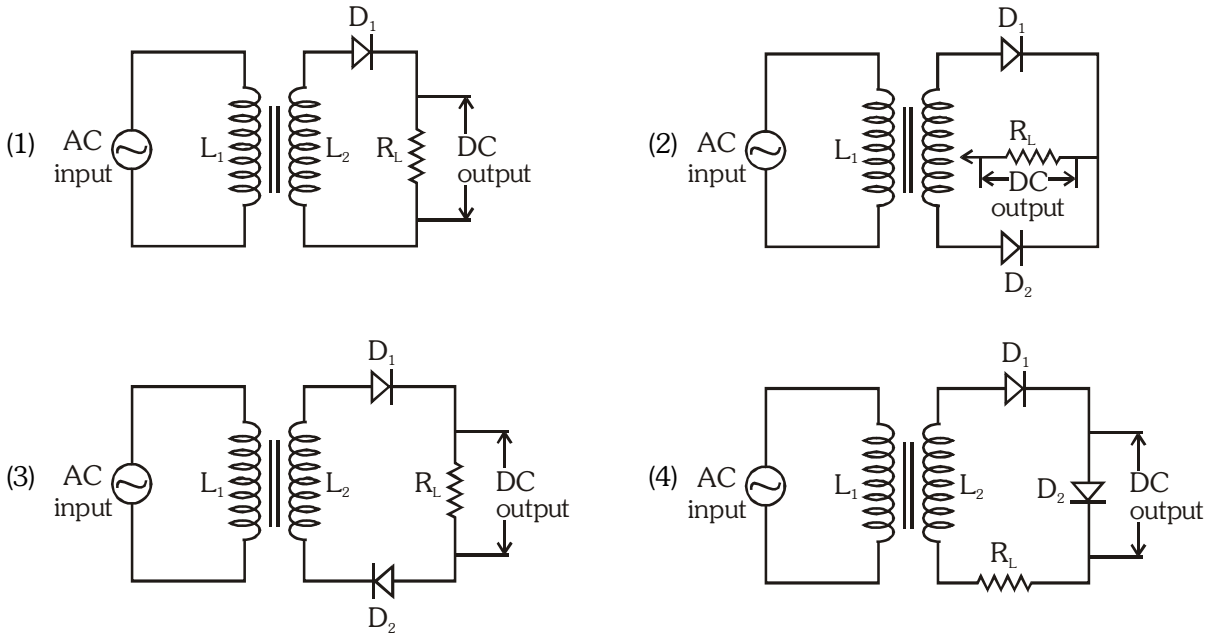
(1) 2 times (2) 8 times (3) 16 times (4) 32 times

Ans. (3)

Sol. $E = \sigma T^4 \quad \Rightarrow \frac{E_1}{E_2} = \frac{T^4}{(2T)^4}$

$E_2 = 16E$

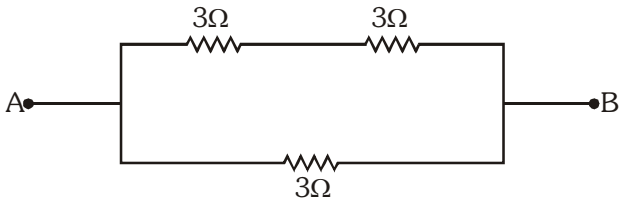
12. The circuit diagram which shows the conversion of both the half cycles of AC into DC is (D_1 and D_2 are diodes, $R_L \rightarrow$ load resistance)



Ans. (2)

Sol. Conceptual.

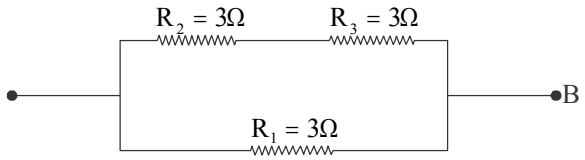
13. In the given circuit the effective resistance between A and B is



(1) 9 Ω (2) 6 Ω (3) 1.5 Ω (4) 2 Ω

Ans. (4)

Sol.



$$\frac{1}{R_{eg}} = \frac{1}{R} + \frac{1}{R_2 + R_3}$$

$$= \frac{1}{3} + \frac{1}{3+3} = \frac{1}{3} + \frac{1}{6} \quad \Rightarrow R_{eg.} = 2\Omega$$

14. **Assertion (A) :** 'Ge' is a better semiconductor than 'Si' but 'Si' is widely used than 'Ge'.

Reason (R) : Structure of 'Si' crystals cannot be damaged as easy as that of 'Ge' at higher temperature.

(1) A and R are false (2) A is false and R is true

(3) A and R are true (4) A is true and R is false

Ans. (3)

Sol. A and R are true

15. The atoms having the bigger size among each of the following pair are

(i) Mg (At. No. 12) or Cl (At. No. 17)

(ii) Na (At. No. 11) or K (At. No. 19)

(1) Mg and K (2) Mg and Na (3) Cl and Na (4) Cl and K

Ans. (1)

Sol. (i) Mg & Cl

Both belong to 3rd period. In a period when we move from left to right in the periodic table, the size go on decreasing because of increase in effective nuclear charge. So, size of Mg > Cl

(ii) Na & K

Na belongs to 3rd period , K belongs to 4th period. As we go down the group, the size increases because of the addition of new shell. So, size of K > Na

16. The highly significant isomers among the following compounds are

A. Methane B. Propane C. Butane D. Hexane

(1) A and B (2) A and D (3) B and C (4) C and D

Ans. (4)

Sol. Methane & propane have no isomers, whereas butane has 2 isomers and hexane has 5 isomers.

Butane:

(i) $CH_3-CH_2-CH_2-CH_3$ n-butane

(ii) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$ iso-butane

Hexane :

(i) $CH_3-CH_2-CH_2-CH_2-CH_2-CH_3$

(ii) $CH_3-CH_2-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$

(iii) $CH_3-H_2C-\underset{\displaystyle CH_3}{\underset{|}{HC}}-CH_2-CH_3$

(iv) $H_3C-\underset{\displaystyle CH_3}{\underset{|}{C}}-CH_2-CH_3$

(v) $H_3C-\underset{\displaystyle CH_3}{\underset{|}{HC}}-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$

17. When the universal indicator solution is added to three unknown colourless solutions P, Q and R they change to Blue, Violet and Orange colours respectively. The increasing order of the pH values of these solutions are

(1) Q > R > P (2) R > Q > P (3) Q > P > R (4) P > Q > R

Ans. (3)

Sol. Given P ⟶ Blue Q ⟶ Violet R ⟶ Orange

colour shown by universal indicator solution

Orange ⟶ pH : 3, Blue ⟶ pH : 11, Violet → pH : 13

So, Q > P > R, 13 > 11> 3

18. Only selected steps of silicon preparation are jumbled below after inserting few irrelevant steps. The option with correct order of only right steps is

a. Heat the fire clay crucible

b. Mixture of silica and magnesium powders are taken in the fire clay crucible

c. Water is added to the crucible

d. Crystal form of silicon is obtained

e. Hydrofluoric acid is used

f. Amorphous form of silicon is obtained

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

Ans. (4)

Sol. b a e f

19. An element reacts with water to form a solution which turns phenolphthalein solution pink is

(1) S (2) Ca (3) C (4) Ag

Ans. (2)

Sol. $2Ca + 2H_2O \rightarrow 2Ca(OH)_2$ calcium hydroxide basic in nature.

In an acid, the phenolphthalein is colourless and in a base it truns to pink colour.

The solution is basic in nature, so it truns phenolphthalein indicator solution from colourless to pink.

20. The equation $Mg(s) + CuO(s) \longrightarrow MgO(s) + Cu(s)$ represents

a. decomposition reaction b. displacement reaction

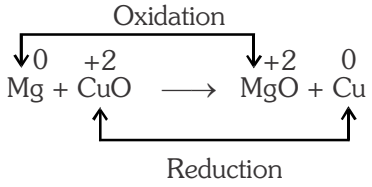
c. combination reaction d. double displacement reaction

e. redox reaction

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

Ans. (3)

Sol.



Both oxidation & reduction reactions are taking place simultaneously, so it is a redox reaction.

Magnesium being the more reactive element than copper, displaces copper from its oxide.

21. Select the correct option that confirms the chemicals taken in the test tubes A and B on the basis of the following statements related to its properties.

Statement (A) : Chemicals of 'A' gives burning taste and 'B' has the smell of vinegar.

Statement (B) : Chemicals of 'A' turns blue litmus paper to red and 'B' gives brisk effervescence with sodium hydrogen carbonate.

(1) A has ethanol and B does not have ethanoic acid (2) A does not have ethanol and B has ethanoic acid

(3) A has ethanol and B has ethanoic acid (4) A has ethanoic acid and B has ethanol

Ans. (2)

Sol. $CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O + CO_2\uparrow$

22. The solution to be mixed with lead nitrate to obtain yellow precipitate is

(1) Potassium iodide (2) Potassium sulphide (3) Potassium nitride (4) Potassium chloride

Ans. (1)

Sol. $Pb(NO_3)_2 + 2KI \rightarrow PbI_2\downarrow + 2KNO_3$

(Yellow precipitate)

23. An element 'X' forms two oxides 'XO' and 'XO_2'. The oxide 'XO' is neutral but 'XO_2' is acidic in nature. The element 'X' is

(1) Sulphur (2) Calcium (3) Hydrogen (4) Carbon

Ans. (4)

Sol. $2C + O_2 \rightarrow 2CO$ This will not change the color of both red & blue litmus paper

So it is neutral in nature

$C + O_2 \rightarrow CO_2$ upon reactions with water forms an acid

$CO_2 + H_2O \rightarrow H_2CO_3$

carbonic acid

24. The type of the bond in the compound XY where X and Y belongs to 1^{st} and 17^{th} groups of the periodic table respectively is

(1) Hydrogen bond (2) Ionic bond (3) Polar bond (4) Covalent bond

Ans. (2)

Sol. Ex : $2Na + Cl_2 \rightarrow 2NaCl$ The bond formed between electropositive & electronegative element is an ionic bond.

25. The organic compounds, whose both melting and boiling points are either positive or negative values only

a. Methane b. Trichloromethane c. Ethanol d. Ethanoic acid

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

Ans. (3)

Sol.

	M. P.	B. P.	
(a) Methane :	–182.5℃	–161.49℃	Both negative
(b) Tricholoromethane :	–63.5℃	61.15℃	
(c) Ethanol :	–114.14℃	78.1℃	
(d) Ethanoic acid :	16.6℃	118℃	Both positive

26. The characteristics and its trends of certain range of elements in a periodic table are matched. The correct option is

a. Electro negative character from 'Na' to 'Al' i. Decreases

b. Non metallic character from F to I ii. Remains constant

c. Number of valence electrons from Be to Ca iii. Increases

(1) a – ii, b – i, c – iii (2) a – iii, b – ii, c – i (3) a – ii, b – iii, c – i (4) a – iii, b – i, c – ii

Ans. (4)

Sol. a – iii, b – i, c – ii

27. Match Column - I with Column - II and identify the correct answer

	Column I		**Column II**
(A)	Virus	(i)	Ringworm
(B)	Bacteria	(ii)	Filariasis
(C)	Protozoa	(iii)	Tetanus
(D)	Nematoda	(iv)	Sleeping sickness
		(v)	Polio

(1) A - ii, B - v, C - i, D - iii (2) A - iii, B - iv, C - v, D - i

(3) A - v, B - iii, C - iv, D - ii (4) A - iii, B - i, C - v, D - iii

Ans. (3)

Sol. Virus - Polio
Bacteria - Tetanus
Protozoa - sleeping sickness
Nematoda - Filariasis

28. If the sebaceous glands are not functioning then
(1) the body will not be able to regulate the body temperature
(2) the skin will turn darker with more melanin
(3) the hair will fail to grow
(4) the skin will turn dry and rough

Ans. (4)

Sol. Sebaceous glands secrete oil. Therefore if sebaceous glands are not functioning properly then the skin will turn dry and rough.

29. The joint between humerus and ulna that moves in one plane only.
(1) Gliding joint (2) Hinge joint (3) Pivot joint (4) Ball and socket joint

Ans. (2)

Sol. The joint between humerus and ulna that moves in one plane only is hinge joint.

30. Read the following statements and select the correct option
A. It is a colourless, highly acidic liquid
B. It contains an enzyme called pepsin
C. It kills any germs which may have entered along with the blood
D. It converts protein into peptides
(1) Pancreatic juice (2) Bile juice (3) Gastric juice (4) Saliva

Ans. (3)

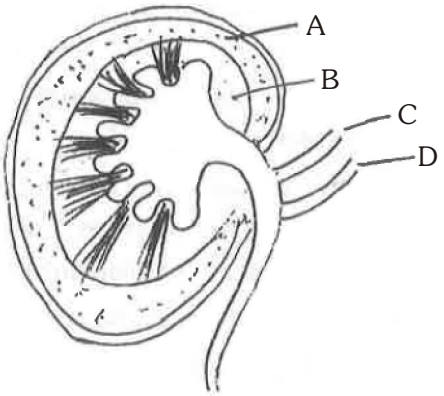
Sol. Gastric juice is highly acidic, contains pepsin, convert proteins into peptides and kill germs.

31. Assertion (A) : Colour blindness is more common in males than in females.
Reason (R) : Colour blindness defect is due to dominant genes which occur in the 'Y' chromosomes.
Select the correct option from the given alternatives.
(1) 'A' is true and 'R' is false
(2) 'A' is false and 'R' is true
(3) Both 'A' and 'R' are true and 'R' explains 'A'
(4) Both 'A' and 'R' are true but 'R' does not explain 'A'

Ans. (1)

Sol. Colour blindness is an X - linked disease common in males than females.
It is X - linked recessive disorder.

32. Study the labelled diagram below and select the correct option.



(1) A. Medulla B. Cortex C. Renal artery D. Renal vein

(2) A. Cortex B. Medulla C. Renal vein D. Renal artery

(3) A. Cortex B. Medulla C. Renal artery D. Renal vein

(4) A. Medulla B. Cortex C. Renal vein D. Renal artery

Ans. (3)

Sol. A - Cortex

B - Medulla

C - Renal artery

D - Renal vein

33. Read the following statements and select the correct option.

A. Oxytocin causes constriction of uterus muscles during child birth

B. Insulin stimulates deposition of extra glucose of the blood as glycogen in liver and muscles.

(1) 'A' is false 'B' is true (2) 'A' is true 'B' is false

(3) Both 'A' and 'B' are true (4) Both 'A' and 'B' are false

Ans. (3)

Sol. Both the statements are true

34. A plant that shows viviparous germination.

(1) Green pea (2) Rhizophora (3) Bean (4) Green gram

Ans. (2)

Sol. In mangrooves, viviparous germination occur. Therefore, Rhizophora is the answer.

35. Identify the correct statements about photosynthesis.

A. Mesophyll cells in a leaf are the principal centre of photosynthesis.

B. Splitting of water (H_2O) molecules into hydrogen and oxygen ions in the presence of light is called polymerisation.

C. Conversion of glucose into starch is called photolysis.

D. The electrons are used in converting ADP into energy rich compound ATP by adding one phosphate group. Pi is called photophosphorylation.

(1) 'A' and 'D' only (2) 'A' and 'C only (3) 'B' and 'C' only (4) 'C' and 'D' only

Ans. (1)

Sol. Statements A and D are correct

36. If the common salt is sprinkled on lawn grass, it is killed at the spot. This is due to

(1) Plasmolysis 2) Adhesion 3) Capillary action 4) Imbibition

Ans. (1)

Sol. Plasmolysis takes place in the cells of grass.

37. Read the following statements and select the correct option.

A. Auxins help to prevent fruit and leaf drop at early stages

B. Abscisic acid promotes seed germination

(1) 'A' is false and 'B' is true (2) 'A is true and 'B' is false

(3) Both 'A' and 'B' are true (4) Both 'A' and 'B' are false

Ans. (2)

Sol. Abscisic acid prevents seed germination.

38. Cretinism and myxedema are due to

(1) Hypersecretion of growth hormone (2) Hyposecretion of growth hormone

(3) Hypersecretion of thyroxin (4) Hyposecretion of thyroxin

Ans. (4)

Sol. Cretinism and myxedema both are due to hypothyroidism.

39. Rahul's friends are suffering from some diseases. Ritika is suffering from rickets, Satish has haemophilia and Soumya has H_1N_1. Then who can communicate disease to Rahul ?

(1) Ritika and Soumya only (2) Satish and Soumya only

(3) Soumya only (4) Ritika only

Ans. (3)

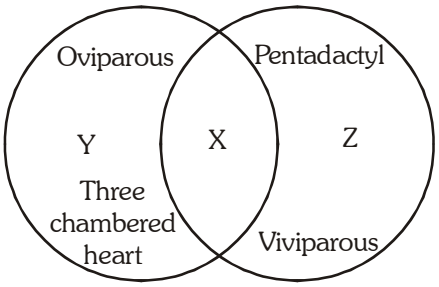
Sol. Rickets - Deficiency disease

Haemophilia - Genetic disorder

Both are non communicable diseases.

H_1N_1 - Influenza A - Communicable disease (viral disease)

40. Refer to the given Venn diagram below and select the correct option regarding 'X', 'Y' and 'Z'.



(1) 'Y' can be lizard, 'Z' can be tiger and there is no such organism as 'X'

(2) 'X' can be bat and 'Z' can be ostrich

(3) 'Y' can be snake and 'Z' can be emu

(4) There is no such organism as 'Z'

Ans. (1)

Sol. Ostrich and Emu is oviparous. No organism can be 'X' as an organism cannot be both oviparous and viviparous.

41. Bhagath Singh, Jathindas, Batukeshwar and other founded a Revolutionary Association called

(1) Hindusthan Army for Independence (2) Hindusthan Socialist Republic Army

(3) Hindusthan Socialist Revolutionary Army (4) Hindusthan Kissan Movement Sabha

Ans. (2)

Sol. Hindusthan Socialist Republic Army

It was a revolutionary organisation, also known as Hindusthan Socialist Republican Association, was established in 1928 at Feroz Shah Kotla, New Delhi by Chandrashekar Azad, Bhagat Singn, Sukhder Thapar and others.

42. Choose the group of correct statements related to II Carnatic War

a. Battle between Nasir Jung and Muzaffar

b. Britishers helped Anwaruddin

c. French helped Chanda Saheb under the leadership of Dupleix.

d. Britishers defeated Nasir Jung in a battle

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

Ans. (1)

Sol. a, b, c

II Carnatic war was fought between Nasir Jung and Muzaffar Jung for the throne of Hyderabad Nizam Anwaruddin was helped by the Britishers and Chanda Saheb by the French under the leadership of Dupleix

Option - d is wrong because, Britishers supported Nasir Jung

43. The idea of Indian National Army (INA) was conceived by

(1) Subhas Chandra Bose (2) Ross Behari Bose (3) Mohan Singh (4) Aravind Ghosh

Ans. (3)

Sol. The army was first formed in 1942 under Mohan Singh. It collapsed in December the same year. Later it was revived under the leadership of Subhas Chandra Bose in 1943

44. Choose the correct of the incidents of Indian freedom movement in a chronological order:

a. Poona Agreement
b. Direct Action Day
c. August Offer
d. Establishment of Forward Block Party

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

Ans. (1)

Sol. a,d,c,b

a. Poona Agreement - 24 . Sep. 1932
b. Direct Action Day - 16. Aug. 1946
c. August Offer - 1940
d. Establishment of Forward Block Party - 22.June.1939

When arranged in analogical order, we get the

answer a, b, c, d

45. Choose the correct group of areas in which Britishers introduced the Ryotwari system.

a. Madras
b. Bengal
c. Sindh
d. Assam

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

Ans. (4)

Sol. Ryotwari system was introduced in Madras, Mumbai, Sindh, Bihar and Assam

In Bengal, Zamindari system was introduced

46. Identify the correct statements related to French Revolution.

a. Priests and rich class people are exempted from paying taxes and led luxurious life.
b. Agricultural and industrial developments were stumbled.
c. Count Cavour made a secret pact with France
d. Louis XVI of Bourbon dynasty led a luxurious and extravagant life

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

Ans. (4)

Sol. b, is wrong as Count Cavour made a secret pact with France was not a reason for the French Revolution

47. Choose the group of nations which belong to Triple Alliance during First World War

a. Germany b. Russia c. Austria d. Italy

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

Ans. (3)

Sol. b, Russia, was not a part of Triple Alliance during First World War. Russia was a part of Triple Entente Pact

48. The principle based on which the insurer is liable only for those losses which have been insured against is

(1) Principle of indemnity (2) Principle of contributions

(3) Principle of loss minimization (4) Principle of proximate cause

Ans. (1)

Sol. Principle of indemnity states that the insurer agree to pay only for the losses incurred by the insurer. No extra amount is paid

49. Match the items in List-A Entrepreneurs with List-B Entrepreneurship

List - A	List - B
a. Naresh Goyal	I. Infosys
b. Kiran Mazumdar Shah	II. Reliance
c. Narayan Murthy	III. Balaji Telefilms
d. Dhirubai Ambani	IV. Biocan
	V. Jet Airways

	a	b	c	d
(1)	V	IV	I	II
(2)	IV	V	I	II
(3)	III	V	I	II
(4)	V	III	IV	II

Ans. (1)

Sol. a - v, b - iv, c - i, d - ii

a. Naresh Goyal - V. Jet Airways

b. Kiran Mazumdar Shan - Biocan

c. Narayan Murthy - Infosys

d. Dirubai Ambani - Reliance

50. Metternich remarked " When France Sneezes, the rest of Europe catches cold". Identify the most appropriate justification for this statement.

(1) French revolution sparked nationalism

(2) French revolution inspired world nations

(3) The development in France ignited uprising in Belgium and breaking away from UK

(4) France became the leader of Europe

Ans. (2)

Sol. French revolution inspired world nations

Haiti and Latin American were inspired by the call for modification of society . It infuenced the middle East

51. The Kannada speaking region which came under the rule of Madras province in 19th century is

(1) Raichur (2) Bellari (3) Bijapur (4) Gulbarga

Ans. (2)

Sol. Bellari and South Canara came under Madras province. Other places mentioned among the options were either under Hyderabad, Karnataka or Mumbai

52. Match personals in List - A with appropriate positions in List- B

List -A	List - B
a. Shaikh Abdula	I. State Reorganisation Commission
b. Fazal Ali	II. Chief of Razakars
c. Sardar Vallabhbhai Patel	III. King of Jammu and Kashmir
d. Qasim Razvi	IV. First Home Minister of India
e. Raja Harisingh	V. Founder of National Conference

	a	b	c	d	e
(1)	I	V	IV	III	II
(2)	V	I	IV	III	II
(3)	V	I	II	IV	III
(4)	V	I	IV	II	III

Ans. (4)

Sol. a - v , b - i , c - iv , d - ii, e - iiii

a. Shaik Abdulla - Founder of National Conference

b. Fazal Ali - State Reorganisation Commission

c. Sardar Vallabhbhai patel - First Home Minister of India

d. Qasim Razvi - Chief of Razakars

e. Raja Harisingh - King of Jammu and Kashmir

53. Identify the group of Financial Institutions with gives loan to small scale industries.

(1) IDBI, IFCI, SFC, SIDBI
(2) RBI, NABARD, IFCI, IDBI
(3) NABARD, IDBI, RBI, SFC
(4) SIDBI, RBI, NABARD, IDBI

Ans. (1)

Sol. IDBI, IFCI, SFC, SIDBI

Among the given options, only the financial institutions mentioned in the 1st option gives loans to small scale industries.

54. Identify the correct group of Nationalised Banks

(1) Canara Bank, State Bank of India, Vijaya Bank, Dena Bank, IDBI Bank
(2) IDBI Bank, ICICI Bank, Karnataka Bank, Dena Bank, Canara Bank
(3) IDBI Bank, Vijaya Bank, ICICI Bank, Karnataka Bank, Canara Bank
(4) Vijaya Bank, Canara Bank, HDFC Bank, ICICI Bank, Dena Bank

Ans. (1)

Sol. Canara Bank, State Bank of India, Vijaya Bank, Dena Bank, IDBI Bank. Banks mentioned in the 1st option only are Nationalised Bank

55. The correct statement that is related to French East India Company is that it was,

(1) Private company
(2) Private Company controlled by the French Government
(3) Officially a State owned company
(4) Controlled by the French Merchant

Ans. (3)

Sol. French East India Company was an offically state owned company and not a private one as mentioned

56. The correct decreasing order of the neighbouring countries based on the length of the border that India shares is

(1) China, Bangladesh, Nepal, Pakistan
(2) Bangladesh, Pakistan, China, Nepal
(3) China, Bangladesh, Pakistan, Nepal
(4) Bangladesh, China, Pakistan, Nepal

Ans. (4)

Sol. Decreasing order of the neighbouring countries based on the length of the border that India shares

Bangladesh, China, Pakistan, Nepal

Bangladesh - 4096

China - 3917

Pakistan - 3310

Nepal - 1752

57. Choose the right arrangement of mountain ranges of India from South to North.

(1) Western Ghats, Vindhya Ranges, Satpura Hills, Aravali Hills

(2) Western Ghats, Aravali Hills, Satpura, Hills, Vindhya Ranges

(3) Western Ghats, Satpura Hills, Vindhya Ranges, Aravali Hills

(4) Vindhya Ranges, Western Ghats, Aravali Hills, Satpura Hills

Ans. (3)

Sol. SOUTH TO NORTH

Western Ghats, Satpura Hills, Vindhaya Hills (Ranges), Aravali Hills

58. Match column 'A' with Column 'B' and choose correct answer.

	Column - A	Column - B
a.	Kaziranga National Park	i. Assam
b.	Sundarbans	ii. West Bengal
c.	Gir National park	iii. Gujarat
d.	Tandova National park	iv. Maharashtra

	a	b	c	d
(1)	i	ii	iii	iv
(2)	i	iii	ii	iv
(3)	i	iv	iii	ii
(4)	iv	ii	i	iii

Ans. (1)

Sol. (a) KAZIRANGA NATIONALPARK (i) ASSAM

(b) SUNDARBANS (ii) WEST BENGAL

(c) GIR NATIONAL PARK (iii) GUJARAT

(d) TANDOVA NATIONAL PARK (iv) MAHARASHTA NATIONAL PARK

59. Assertion (A) : Increase in population, urbanisation, Industrialisation lead to the increased use for fossil fuels.

Reason (R) : Over use of conventional energy resources has resulted in the phenomenon of green house effect.

Select the correct option from the given alternatives.

(1) A is true, R is false

(2) A is false, R is true

(3) Both A and R are true, but R is not correct explanation of A

(4) Both A and R are true and R is the correct explanation of A

Ans. (4)

Sol. Both A and R are true and R is the correct explanation of A. (state books - part - II page no - 49)

60. Choose the group of statements which are correct with respect to " Golden Quadrilateral and Corridor Project".

a. This project covers National Highways with the length of 15,000 kms.

b. The project was started in the year 2001

c. Total cost of the proposed project was RS. 54,000 crores

d. This is the largest project taken up and no country in the world has taken up such project

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

Ans. (4)

Sol. (b) is wrong :- The project was started in 1999.

61. Assertion (A) : Majority of paper Industries are found in West Bengal.
Reason (R) : News print paper is being imported from Norway, Sweden, Canada and the U.S.A.
Select correct option from the given alternatives.
(1) A is true, R is false
(2) A is false, R is true
(3) Both A and R are true, but R is not correct explanation of A
(4) Both A and R are true but R is the correct explanation of A

Ans. (3)

Sol. Both A and R are true, but R is not the correct explanation of A

62. The total population of an area divided by its geographical area gives
(1) Population Index (2) Distribution of Population
(3) Population Density (4) Population growth rate

Ans. (3)

Sol. The total population of an area divided by its geographical area gives population density.

63. Match Column 'A' with Column 'B' and choose correct answer.

Column -A	Column - B
a. Rawat Bata	i. Thermal Electricity
b. Barauni	ii. Wind Energy
c. Nagarcoil	iii. Atomic Energy
d. Baramar	iv. Solar Energy

	a	b	c	d
(1)	iii	i	ii	iv
(2)	i	iii	ii	iv
(3)	iii	i	iv	ii
(4)	iv	iii	ii	i

Ans. (1)

Sol. RAWATBHATA - ATOMIC ENERGY
BARAUNI - THERMAL ELECTRICITY
NAGARCOIL - WIND ENERGY
BARMAR - SOLAR ENERGY

64. Section 25 of Indian Constitution provides following right to citizens of India
(1) Guarantees educational facilities to all
(2) Guarantees reservation in political field to scheduled castes and tribes.
(3) Guarantees reservation in the employment sector to scheduled castes and tribes
(4) Guarantees free entry to all people to social and religious places

Ans. (4)

Sol. Section 25 of Indian constitution provides following right to citizens of india: (4) Guarantes free entry to all people to social and religious places.

65. The main cause for Land degradation in Punjab, Haryana and Western part of Uttar Pradesh
(1) Intensive Agriculture (2) Over Irrigation (3) Deforestation (4) Mining

Ans. (2)

Sol. Over irrigation is the main cause for Land degradation in Punjab, Haryana and Western part of Uttar Pradesh.

66. Match Column 'A' with Column 'B' and choose correct answer.

Column -A	Column - B
a. group of people pelting stones	i. Movement
b. people assembled near a theatre to buy tickets	ii. Campaign
c. A group protesting against a project in a peaceful way	iii. Riot
d. A group of people involved in bringing awareness	iv. Mob

	a	b	c	d
(1)	iii	iv	i	ii
(2)	i	ii	iii	iv
(3)	iii	i	iv	ii
(4)	iv	ii	i	iii

Ans. (1)

Sol.

Column A	Column B
a. Group of people pelting stones.	- RIOT
b. People assembled near a theatre to buy tickets	- Mob
c. A group protestion against a project in a peaceful way	- MOVEMENT
d. A group of people involved in bringing awareness	- CAMPAIGN

67. Choose the group of correct answer with respect to the statements about South West Monsoon.

a. Trade winds transform as South West Monsoon after they cross Equator

b. These enter India in two branches

c. Most of the country's regions receive rain during South West Monsoon except Tamil Nadu

d. The western region of the Western Ghats is called rain- shadow region

(1) b and c only (2) a, b and c (3) b , c and d (4) a, b and d

Ans. (2)

Sol. Statement (d) is wrong:-

The correct will be the eastern region of the Western Ghats is called Rain shadow region.

68. Match Column 'A' with Column 'B' and choose correct answer.

Column -A	Column - B
a. India	i. Thane
b. Bangladesh	ii. Giri
c. Mayamar	iii. Mujan
d. Oman	iv. Jal

	a	b	c	d
(1)	iv	ii	i	iii
(2)	ii	iii	i	iv
(3)	ii	iii	iv	i
(4)	iv	iii	ii	i

Ans. (1)

Sol. (a) India - Jal

(b) Bangladesh - Giri

(c) Myanamar - Thane

(d) Oman - Mujan

69. Match the following and choose correct answer.

Animals / Birds	Category of existence Species
a. Indian Rhino	i. Rare species
b. Hornbill	ii. Extinct species
c. Asiatic cheetah	iii. Vulnerable species
d. Gangtic Dolphin	iv. Endangered species

	a	b	c	d
(1)	iv	ii	i	iii
(2)	iv	i	ii	iii
(3)	iii	ii	iv	i
(4)	iii	ii	i	iv

Ans. (3)

Sol. Animal /Birds — Category of Existence Species

(a) Indian Rhino - Vulnerable species

(b) Hornbill - Extinct species

(c) Asiatic cheetah - Endangered species

(d) Gangtic cheetah - Rare species

70. Arrange the area covered by types of Soil in India, in increasing order

(1) Laterite Soil, Red Soil, Black Soil, Alluvial Soil

(2) Laterite Soil, Black Soil, Red Soil, Alluvial Soil

(3) Alluvial Soil, Black Soil, Red Soil, Laterite Soil

(4) Alluvial Soil, Red Soil, Black Soil Laterite Soil

Ans. (1)

Sol. Laterite Soil, Red Soil, Black Soil, Alluvial Soil

ALLUVIAL SOIL - 7.7 msq kms

BLACK SOIL - 5.46 msq kms

RED SOIL - 5.1 msq kms

LATERITE SOIL - 2.48 Lack kms

71. Match List 01 of Heads / Ministers of Executive of Indian Government with List 02 of their functions and select the correct answer using the codes given below

List 01 (Heads of Executive of Indian Government)	List 02 (Functions)
A. President	i. Chairperson of the NITI Ayoga
B. Vice President	ii. Appointment of Chief Minister to States
C. Prime Minister	iii. Appointment of Governors of State
D. Finance Minister	iv. Presentation of Union Budget
	v. Act as Ex-Officio Chairperson of Rajya Sabha

Codes

(1)	A- i,	B -v,	C - iv,	D - ii
(2)	A - ii,	B -iii,	C - iv,	D - i
(3)	A - iii,	B -v,	C - i,	D - iv
(4)	A - iv,	B -ii,	C - iii,	D - i

Ans. (3)

Sol. (A) President - Appointment of Governors of State.

(B) Vice President - Act as Ex-officio chairperson of Rajya Sabha.

(C) Prime Minister - Chairperson of the NITI Ayoga.

(D) Finance Minister - Presentation of Union Budget.

72. List- A is the list of Regional Parties, List - B is their existence in the State and List - C is their symbol.

List A (Regional Parties)	List -B (State their existence)	List - C (Symbol)
A. Shivasena	E. Tamil Nadu	I. Arrow
B. AIADMK	F. Maharashtra	J. Two leaves
C Peoples Democratic Party	G. Bihar	K. Ink pot and pen
D. JD (U)	H. Jammu and Kashmir	L. Bow and arrow

The correct matched set related to the above table is

(1) AFL, BEJ, CHK, DGI (2) AFK, BGI, CEL, DHJ (3) AEI, BGK, CHJ, DFL (4) AHI, BGJ, CFL, DEK

Ans. (1)

Sol.

List - A	List - B	List - C
(A) Shivasena	(F) Maharashtra	(L) Bow and Arrow
(B) AIADMK	(E) Tamil Nadu	(J) Two leaves
(C) People Democratic Party	(H) Jammu & Kashmir	(K) Ink pot and pen
(D) JD(U)	(G) Bihar	(I) Arrow

73. First Indian Woman president is codes as (P), Prime Minister as (Q), Governor as (R) and Chief Minister as (S) and their names are given below.

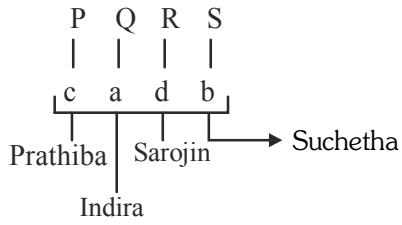
a. Indira Gandhi b. Suchetha Kripalani c. Prathiba Patil d. Sarojini Naidu

Which one of the following choices represents PQRS order ?

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

Ans. (4)

Sol.



74. Regional Co-operation Organisations of different nations are given below

i. SAARC

ii. ASEAN

iii. European Union

iv. African Unity

Indentify the correct choice of these organisations in the chronological order of establishment.

(1) i, iii, iv, ii

(2) iv, ii, i iii

(3) iii, i, ii, iv

(4) ii, iv, iii, i

Ans. (2)

Sol. SAARC - 1985

ASEAN - 1967

EUROPEAN UNION - 1992

AFRICAN UNITY - 1963

So, AFRICAN UNITY - ASEAN - SAARC - EUROPEAN UNION

75. Read the following statement and select the correction option

Assertion (A) : The Governor of a State cannot be dismissed by the Chief Minister.

Reason (R) : The Governor of a State is not elected.

(1) Both 'A' and 'R' are true and 'R' is the correct explanation of 'A'

(2) Both 'A' and 'R' are true and 'R' is not the correct explanation of 'A'

(3) 'A' is true but 'R' is false

(4) 'R' is true but 'A' is false

Ans. (2)

Sol. Both statements 'A' and 'R' are true and R is not the correct explantion of 'A'.

76. Which of the following statement/statements about Anti Defection Law is/are correct ?

A. The Constitution Act of 1985 is popularly known as the Anti Defection Law.

B. Independently elected member of Parliament or a State Legislature will not be disqualified if he/she join any political party after elections.

Choices :

(1) Only A is correct

(2) Only B is correct

(3) Both A and B are correct

(4) Both A and B are incorrect

Ans. (1)

Sol. Independently elected member of parliament or a state legislature will be disqualified if he/she join any political party after elections.

77. Calculate the Male Literacy Rate from given data and choose the correct answer from the given choices

Gender	Total Persons	Literate Persons	
Male	1350	981	
Female	785	435	
Total	2135	1416	

(1) 78.5% (2) 66.3% (3) 55.4% (4) 72.6%

Ans. (4)

Sol. $\left\{\frac{\text{Literate person}}{\text{Total person}} \times 100\right\} = 72.6\%$

78. The following are the major changes that occurred in agriculture as a result of Green Revolution in India.

a. Use of high yield variety seeds in wheat grains only

b. The poor and marginal small farmers avail the benefits of improved technology.

c. Construction of granaries, cold storages warehouses to store the surplus produce.

d. The improved technology of Green Revolution was restricted and practiced in Northern States of India i.e. Punjab, Haryana, Rajasthan States.

Which of the above signifies post Harvest Technology of Green Revolution?

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

Ans. (2)

Sol. (b) and (c) are signified.

79. Whom would you consider as unemployed related to the following situations?

A. A farmer is a farm produces 100 kg paddy in one acre of land during every season. In addition one year his adult son Raju joined him in farming. But output remained the same.

B. Raghu has income by his huge property to lead comfort life. So he does not work.

(1) Raju is unemployed

(2) Raghu is unemployed

(3) Both Raju and Rahgu are unemployed

(4) Both Raju and Raghu are not unemployed.

Ans. (1)

Sol. Raju is unemployed

Output remained the same disguished unemployment

80. Indicators of development are given below.

a. National income.

b. Per capita income

c. Life expectancy

d. Educational achievement.

e. Rate of women's job participation

f. Standard of living

Which of the above indicators are measured in Human Development Index?

(1) a, b, c (2) c, d, f (3) a, b, e (4) d, e, f

Ans. (2)

Sol. (c) Life expectancy, (d) Educational achievement, (f) Standard of living.

81. The area of two concentric circles are 1386 cm^2 and 962.5 cm^2. The width of the ring is

(1) 4.2cm (2)3.8cm (3) 3.5 cm (4) 2.8 cm

Ans. (3)

Sol. $\pi R^2 = 1386$

$R^2 = \frac{1386 \times 7}{22} = 441;\ R = 21$

$\pi r^2 = 962.5$

$r = 17.5$

width of ring = $R - r = 3.5$ cm

82. On increasing the radius of the base and height of a cone each by 20%, then the percentage Increase In the volume will be

(1) 20% (2) 40.8% (3) 60% (4) 72.8%

Ans. (4)

Sol. $v = \frac{1}{3}\pi r^2 h$

$v' = \frac{1}{3}\pi(1.2r)^2(1.2h)$

$v' = \frac{1}{3}\pi(1.44)r^2(1.2)h$

$v' = (1.728)v$

so increase is 72.8 %

83. If –4 is a root of the quadratic equation $x^2 + px - 4 = 0$ and the equation $x^2 + px + m = 0$ has equal roots, then the value of "m" is

(1) –4 (2) $\frac{25}{4}$ (3) +4 (4) $\frac{-25}{4}$

Ans. (NA)

Sol. $x^2 + px - 4 = 0$

$16 - 4p - 4 = 0$

$12 - 4p = 0$

$p = 3$

$x^2 + px + m = 0$

Equation has equal roots $\Rightarrow b^2 - 4ac = 0$

$9 - 4m = 0$

$m = \frac{9}{4}$

84. Statement-I: If $\sqrt{5+\sqrt{24}} = \sqrt{x} + \sqrt{y}$ then x + y = 5 and xy = 24.

Statement - II: The square root of $\left(5 - \sqrt{24}\right)$ is $\left(\sqrt{3} - \sqrt{2}\right)$.

(1) Both statement I and II are wrong

(2) Statement I is wrong, but statement II is right

(3) Both statement I and II are right

(4) Statement I is right, but statement II is wrong

Ans. (2)

Sol. $\sqrt{5+\sqrt{24}} = \sqrt{x} + \sqrt{y}$

$5 + \sqrt{24} = x + y + 2\sqrt{xy}$

$x + y = 5, xy \neq 24$

$\sqrt{5+\sqrt{24}} = \sqrt{\left(\sqrt{3}\right)^2 + \left(\sqrt{2}\right)^2 + 2\times\sqrt{3}\times\sqrt{2}}$

$= \sqrt{\left(\sqrt{3}+\sqrt{2}\right)^2} = \sqrt{3} + \sqrt{2}$

x = 3, y = 2 $\Rightarrow$ xy = 6, x + y = 5

Similarly $\sqrt{5-\sqrt{24}} = \sqrt{3} - \sqrt{2}$

Thus, statement I is wrong, but statement II is correct

85. The value of $\cos^2 5° + \cos^2 10° + \cos^2 15° + \ldots + \cos^2 85° + \cos^2 90°$ is

(1) $9\frac{1}{2}$ (2) 9 (3) $8\frac{1}{2}$ (4) 8

Ans. (3)

Sol. $\cos^2 5° + \cos^2 10° + \cos^2 15° + \ldots + \cos^2 85° + \cos^2 90°$

$= (\cos^2 5° + \cos^2 85°) + (\cos^2 10° + \cos^2 80°) + (\cos^2 15° + \cos^2 75°) + (\cos^2 20° + \cos^2 70°) + (\cos^2 25° + \cos^2 65°)$
$+ (\cos^2 30° + \cos^2 60°) + (\cos^2 35° + \cos^2 55°) + (\cos^2 40° + \cos^2 50°) + \cos^2 45° + 0$

$= 8 \times 1 + \frac{1}{2} = 8\frac{1}{2}$

$\left(\because \cos^2 A + \cos^2 B = 1, \text{if } A + B = 90°\right)$

86. If (x + a) is the factor of the polynomials $(x^2 + px + q)$ and $(x^2 + mx + n)$ then the value of 'a' is

(1) $\frac{n-q}{m-p}$ (2) $\frac{m-p}{n-q}$ (3) $\frac{q-n}{m-p}$ (4) $\frac{m-p}{q-n}$

Ans. (1)

Sol. $x + a = 0 \Rightarrow x = -a$

$x^2 + px + q = 0$

$$\begin{array}{cccccc} x^2 & + & px & + & q & = & 0 \\ x^2 & + & mx & + & n & = & 0 \\ (-) & (-) & & (-) & (-) & & \\ \hline (p-m)x & + & q & - & n & = & 0 \end{array}$$

$(p - m)(-a) + q - n = 0$

$\Rightarrow a = \frac{n-q}{m-p}$

87. The lowest common multiple of two numbers is 14 times their greatest common divisor. The sum of LCM and GCD is 600. If one number is 80 then other number is

(1) 600 (2) 520 (3) 280 (4) 40

Ans. (3)

Sol. Let GCD = x, then LCM = 14 x

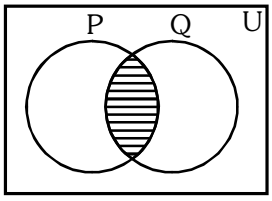
$14x + x = 600 \Rightarrow x = 40$

Let other number = y

$y \times 80 = 40 \times 14 \times 40$

$\Rightarrow y = 280$

88. The shaded portion in the given Venn diagram represents



(1) $P' \cup Q'$ (2) $P' \cap Q'$ (3) $(P' \cap Q')'$ (4) $(P' \cup Q')'$

Ans. (4)

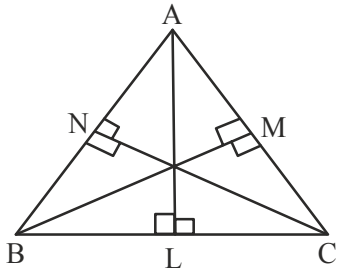
Sol. By observations.

89. In ΔABC, the altitudes AL, BM and CN are intersect at O'. The value of $AN \times BL \times CM$ is same as

(1) $BN \times LC \times AM$ (2) $AL \times CN \times BM$ (3) $OL \times OM \times ON$ (4) $OC \times OB \times OA$

Ans. (1)

Sol.



Let AB = c, BC = a, AC = b

$$AN \times BL \times CM = b\cos A \times c\cos B \times a\cos C$$
$$= abc \cos A \cos B \cos C$$

$$BN \times LC \times AM = a\cos B \times b\cos C \times a\cos A$$
$$= abc \cos A \cos B \cos C$$

$$\Rightarrow AN \times BL \times CM = BN \times LC \times AM$$

90. If the letters of the word "FATE" are arranged as in a dictionary without repetation, then the rank of the arrangement of "FAET" is

(1) 12 (2) 13 (3) 14 (4) 15

Ans. (2)

Sol. "F A E T"

Arrange in order

A E F T

so before 'F', A & E is there.

so A _ _ _ _ = 3! = 6

E _ _ _ _ = 3! = 6

6 + 6 = 12 letters are there before

'F A E T'

so rank is 13.

91. There are 12 points in a plane of which 4 are collinear. The number of straight lines and triangles can be formed from these points are respectively

(1) 60 and 220 (2) 66 and 220 (3) 65 and 216 (4) 61 and 216

Ans. (4)

Sol. The number of triangle can be formed by 12 points : ${}^{12}C_3$

Similarly, the number of triangle can be formed by 4 points when points are not collinear = ${}^{4}C_3$

$\therefore$ Rejoined no. of triangle can be

formed $= {}^{12}C_3 - {}^{4}C_3$

$$= \frac{12!}{9!3!} - \frac{4!}{3!\times 1!}$$

$$= \frac{12^{2} \times 11 \times 10}{6} - 4$$

$= 220 - 4$

$= 216$

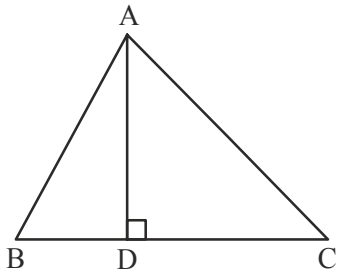
Total number of straight lines = 61

92. In ΔABC, AC = BC and $AD \perp BC$. The value of $AD^2 - BD^2$ is

(1) $2BD \times CD$ (2) $2\ AC \times CD$ (3) 2(BD + CD) (4) 2 (AC + CD)

Ans. (1)

Sol.



By Acute angled theorem

$AC^2 = AB^2 + BC^2 - 2BD.BC$

$AC = BC(\text{given})$

$\therefore AB^2 = 2BD.BC$

Now, $AB^2 - BD^2 = AD^2$

$AB^2 - 2BD^2 = AD^2 - BD^2$

$2BD.BC - 2BD^2 = AD^2 - BD^2$

$2BD(BC - BD) = AD^2 - BD^2$

$2BD.DC = AD^2 - BD^2$

93. A box contains some black balls and 30 white balls. If the probability of drawing a black ball is two fifths of a white ball, then the number of black balls in the box is

(1) 6 (2) 12 (3) 18 (4) 30

Ans. (2)

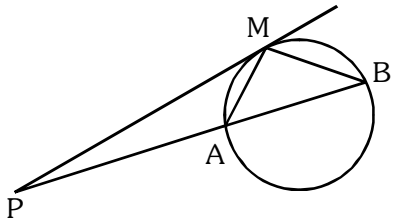
Sol. Let Blacks balls be x.

$P(\text{Black Ball}) = \frac{2}{5}P(\text{White Ball})$

so, $x = \frac{2}{5}(30)$

$\therefore x = 12$

94.



In the given figure, PM is a tangent to the circle and PA = AM then,

A. ΔPMB is isosceles

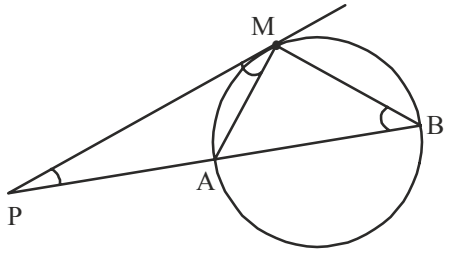
B. $PA \times PB = MB^2$

(1) A is true, but B is false (2) B is true, but A is false

(3) Both A and B are false (4) Both A and B are true

Ans. (4)

Sol.



PA = AM (given)

$\therefore \angle APM = \angle PMA$ (Isosceles Δ property)

Also, $\angle PMA = \angle MBA$ (Alternate segment theorem)

$\therefore \Delta PMB$ is also Isosceles.

Now, $PM^2 = PA \times PB$

so, $MB^2 = PA \times PB$

which means both 'A' & 'B' statement are true.

95. The correct relation is

	A	**B**
i.	a, b, c are in G.P.	a. $2b = a + c$
ii.	a, b, c are in A.P.	b. $a + c = \frac{2ac}{b}$
iii.	a, b, c are in H.P.	c. $b^{1/2} = ca$
		d. $b = (ca)^{1/2}$

(1) i – c, ii – b, iii – a

(2) i – c, ii – a, iii – d

(3) i – d, ii – a, iii – b

(4) i – d, ii – b, iii – c

Ans. (3)

Sol. If a, b, c are in A.P then $2b = a + c$.

If a, b, c are in G. P then $b^2 = ac$, i.e., $b = \sqrt{ac}$

If a, b, are in H. P then $b = \frac{2ac}{a+c}$, i.e., $a + c = \frac{2ac}{b}$

96. The Standard Deviation (S.D.) and mean of two groups A and B are given below.

Group	Standard Deviation	Mean
A	3	70
B	4.2	60

The true statement among the following is

I. A is more consistent than B

II. B is more consistent than A

III. A is more efficient than B

IV. B is more efficient than A

(1) Only I and III are true (2) Only I and IV are true (3) Only II and III are true (4) Only II and IV are true

Ans. (1)

Sol. Coefficient of variation of Group (A) $= \frac{3}{70} \times 100 = 4.28$

Coefficient of variation of Group (B) $= \frac{4.2}{60} \times 100 = 7$

$\because$ lower the C.V, higher will be the consistency

$\therefore$ A is more cosistent.

97. The angle of elevation of the top of a tower from two points at a distance of 'a' and 'b' (a > b) from its foot and in the same straight line from it are 30° and 60°. The height of the tower is

(1) $a\sqrt{3}$ (2) $\frac{b}{\sqrt{3}}$ (3) $\sqrt{ab}$ (4) $\frac{1}{\sqrt{ab}}$

Ans. (3)

Sol. In ΔABC

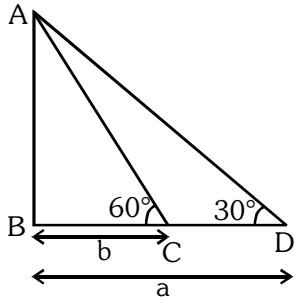
$\frac{h}{b} = \tan 60°$

$h = b\sqrt{3}$ ..... (i)

In ΔABD

$\frac{h}{a} = \tan 30°$

$h = \frac{a}{\sqrt{3}}$ ..... (ii)



Multiply (i) with (ii) equation, we get

$h^2 = ab$

$h = \sqrt{ab}$

98. The condition for points (a, 0), (0, b) and (1,1) lie on straight line will be

(1) ab = 1 (2) $\frac{a+b}{ab} = 1$ (3) a – b = 1 (4) $\frac{ab}{a-b} = 1$

Ans. (2)

Sol. $\text{Area} = \frac{1}{2}\left|x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\right|$

$0 = \frac{1}{2}\left|a(b-1) + 0(1-0) + 1(0-b)\right|$

0 = a(b – 1) – b

0 = ab – a – b

a + b = ab

$\frac{a+b}{ab} = 1$

99. The ratio of income of two persons is 11 :7 and the ratio of their expenditures is 9:5. If each of them manage to save ₹400 per month then sum of their monthly income is

(1) ₹3,600 (2) ₹3,200 (3) ₹2,800 (4) ₹1,700

Ans. (1)

Sol. Let their incomes are 11x and 7x.

Their expenditures are 9y and 5y.

A. T. Q

$[11x - 9y = 400] \times 5$

$[7x - 5y = 400] \times 9$

$$55x - \cancel{45y} = 2000$$
$$\underset{(-)}{63x} - \underset{(+)}{\cancel{45y}} = \underset{(-)}{3600}$$
$$-8x = -1600$$

$x = 200$

$\therefore$ Incomes are 2200 & 1400.

Total = 3600 Rs.

100. If $y = a + a^2 + a^3 + \ldots \infty$ where $|a| < 1$ then, the value of 'a' is

(1) $\frac{y}{1+y}$ (2) $\frac{y}{1-y}$ (3) $\frac{1+y}{y}$ (4) $\frac{1-y}{y}$

Ans. (1)

Sol. First Term = a

Common ratio = a

$S_\infty = \frac{a}{1-r}$

$\therefore y = \frac{a}{1-a}$

$y(1 - a) = a$

$y - ay = a$

$y = a(y + 1)$

$a = \frac{y}{y+1}$