

Date: 08/11/2015

Max. Marks: 100

SOLUTIONS

Time allowed: 90 mins

1. A planet had density P , radius R and acceleration due to gravity as g . If the radius of the planet were doubled, keeping the density same, the acceleration due to gravity at the surface will be :

- (1) $4g$ (2) $2g$ (3) g (4) $g/2$

Ans. (2)

Sol. Given, planet's density = P

Planet's radius = R

acceleration due to gravity = g

Let mass of planet = M and volume = $\frac{4}{3}\pi R^3$,

$$P = \frac{M}{\frac{4}{3}\pi R^3}, g = \frac{GM}{R^2} = \frac{G \times P \times \frac{4}{3}\pi R^3}{R^2} = G \times P \times \frac{4}{3}\pi R \dots (1)$$

$$g' = \frac{G \times P \times \frac{4}{3}\pi \times 8R^3}{4R^2} = 2 \left(G \times P \times \frac{4}{3}\pi R \right) \dots (2)$$

From equation (1) & (2)

$$g' = 2g$$

2. If the length of a simple pendulum is increased to 4 times its value, its time period will be

- (1) halved (2) doubled (3) becomes $\sqrt{2}$ time (4) reduces by $\sqrt{2}$

Ans. (2)

Sol. Time period of simple pendulum

$$T = 2\pi \sqrt{\frac{l}{g}} \dots (1)$$

$$\text{If 'l' is increased by 4 times } T' = 2\pi \sqrt{\frac{4l}{g}} = 2 \times 2\pi \sqrt{\frac{l}{g}} \dots (2)$$

From (1) & (2) $T' = 2T$

3. At the top of its path a projectile has

- (1) no acceleration
 (2) acceleration in the upward direction
 (3) acceleration in the downward direction
 (4) acceleration in the horizontal direction

Ans. (3)

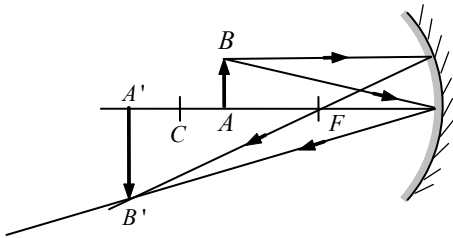
Sol. When object is in projectile motion, acceleration due to gravity act in downward direction at every point of motion.

4. A real and enlarged image can be formed by using a

- (1) convex mirror (2) plane mirror
(3) concave mirror (4) either convex or a plane mirror

Ans. (3)

Sol. In concave mirror when object placed between C&F then real and enlarged image is formed (beyond C).

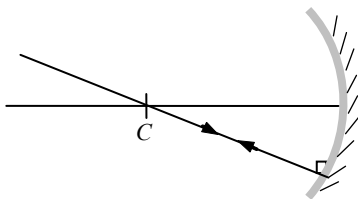


5. For an incident ray directed towards centre of curvature of a spherical mirror the reflected ray

- (1) retraces its path (2) passes through focus
(3) passes through the pole (4) becomes parallel to the principal axis

Ans. (1)

Sol. When ray directed toward centre of curvature of a spherical mirror it retraces its same path because angle of incidence in that case is zero degree so angle of reflection is also zero.



6. A stone is dropped into a well 44.1 m deep. The sound of splash is heard 0.13 seconds after the stone hits the water. What should be the velocity of sound in air?

- (1) 319 m/s (2) 339 m/s (3) 359 m/s (4) 369 m/s

Ans. (2)

Sol. Well height = 44.1 m, time taken after sound of splash heard = 0.13s

$$S = ut + \frac{1}{2}at^2, a = 0$$

$$44.1 = u \times 0.13, u = 339 \text{ m/s}$$

7. Out of two bulbs 50W - 220 V and 100W-220V, which one will glow brighter if

- (a) connected in series (b) when connected in parallel
(1) (a) 50 W (b) 100 W (2) (a) 100 W (b) 100 W
(3) (a) 100 W (b) 50 W (4) none of the above

Ans. (1)

Sol. In series, $P \propto V \propto R \propto \frac{1}{W}$ ($I = \text{constant}$)

In series grouping of bulb, bulb of greater rated power dissipates less power and glows dimmer and vice-versa.

In parallel $P \propto I \propto \frac{I}{R} \propto W$ ($V = \text{constant}$)

In parallel grouping of bulbs, the bulb of greater rated power, dissipates more power. Thus It glows brighter and vice-versa.

8. Energy released per fission of a ${}_{92}\text{U}^{238}$ nucleus is nearly equal to

(1) 931 MeV

(2) 1000 MeV

(3) 8 MeV

(d) 800 MeV

Ans. (1)

Sol. Energy released during fission of ${}_{92}\text{U}^{238}$ is approximately equal to 931.5 MeV. So, the energy released is equal to 931 MeV.

9. How many planets are there in our solar system

(1) 5

(2) 7

(3) 9

(4) 8

Ans. (4)

Sol. Total No. of planets in solar system = 8, Because Pluto is now considered as a dwarf planet and a part of Kuiper belt.

10. In house electrical circuits the fuse wire for safety should be of

(1) High resistance - high melting point

(2) Low resistance - high melting point

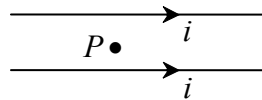
(3) Low resistance - low melting point

(4) High resistance - low melting point

Ans. (4)

Sol. The fuse wire should have 'high resistance and low melting, so that it can easily break the circuit if overrated current pass through that circuit.

11. Two wires each carrying current i are shown. The magnetic field at P (midway between the wires) is described by which statement?



(1) Magnetic fields are in opposite direction and net field is equal to zero.

(2) Magnetic fields due to two wires are in the same direction

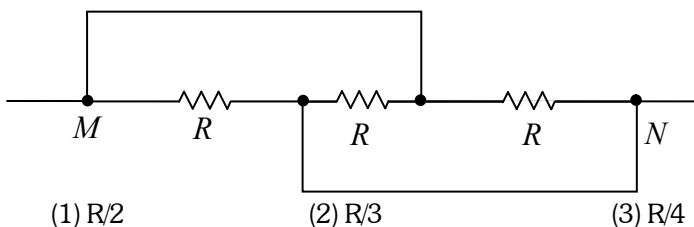
(3) Magnetic fields are in opposite direction but net field is not zero

(4) magnetic fields are in the same direction and equal to two times the field due to one wire.

Ans. (1)

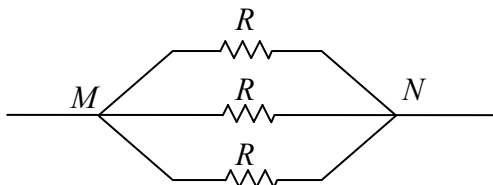
Sol. If both conductors carry current in the same direction then the magnetic field due to upward conductor at a distance $\frac{d}{2}$ ($d = \text{distance between two conductor}$) is equal and in opposite direction to the magnetic field at the same distance due to downward conductor. Hence the net magnetic field at a point exactly half-way between two conductor is zero

12. What is the equivalent resistance of the following arrangement between M and N



Ans. (2)

Sol. In the given circuit on solving, the circuit would appear as

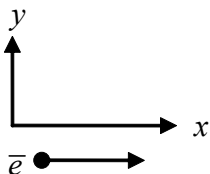


Since all are in parallel, Therefore the equivalent resistance would be

$$\frac{1}{R_{eq}} = \frac{1}{R} + \frac{1}{R} + \frac{1}{R}, \quad \frac{1}{R_{eq}} = \frac{1+1+1}{R}$$

$$R_{eq} = \frac{R}{3}$$

13. An electron moving with uniform velocity in x direction enters



a region of uniform magnetic field along y direction. Which of the following quantities is (are) non-zero and remain constant?

- | | |
|--------------------------------------|---|
| (I) Speed of the electron | (II) Momentum of the electron (magnitude) |
| (III) Kinetic energy of the electron | (IV) Force of the electron (magnitude) |
| (1) only I and II | (2) only III and IV |
| (3) All four | (4) only II and IV |

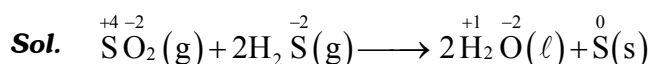
Ans. (3)

Sol. As the charge particle enters perpendicular to the magnetic field the force will act perpendicular to the velocity. Thus the particle starts moving in the circular path. As force and displacement are perpendicular to the work done will be zero and kinetic energy will not change. But as it moves to the circular path direction of momentum will change but magnitude is unchanged. Hence speed and force also not changed.

14. In the reaction, $\text{SO}_2(\text{g}) + 2\text{H}_2\text{S}(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{L}) + \text{S}(\text{s})$ the reducing agent is

- (1) SO_2 (2) H_2O (3) H_2S (4) S

Ans. (3)



oxidation state of sulphur in H_2S is increases, hence oxidation of H_2S takes place, it is R.A

15. Methane on combustion gives

- (1) CO_2 (2) H_2O
(3) both CO_2 and H_2O (4) Neither CO_2 nor H_2O

Ans. (3)

Sol. Combustion of methane gives CO_2 & H_2O

16. Which of the following is not an example of single displacement reaction?

- (1) $\text{CuO} + \text{H}_2 \rightarrow \text{H}_2\text{O} + \text{Cu}$ (2) $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
(3) $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$ (4) $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$

Ans. (3)

Sol. It is not single displacement reaction

17. 10 ml of a solution of NaOH is found to be completely neutralised by 8 ml of a given solution of HCl. If we take 20 ml of the same solution of NaOH, the amount of HCl solution (the same solution as before) required to neutralise it will be

- (1) 4 ml (2) 8 ml (3) 12 ml (4) 16 ml

Ans. (4)

Sol. 10 ml NaOH is neutralised by 8ml of HCl

$$\therefore 20 \text{ ml NaOH is neutralised by } \frac{8}{10} \times 20 = 16 \text{ ml}$$

18. A milkman added a small pinch of baking soda to fresh milk which had pH close to 6. As a result, pH of the medium

- (1) became close to 2 (2) became close to 4
(3) did not undergo any change (4) became close to 8

Ans. (4)

Sol. Baking soda is added to become basic and pH increases to 8.

19. Which of the following salts does not contain any water of crystallisation?

- (1) blue vitriol (2) washing soda (3) baking soda (4) gypsum

Ans. (3)

Sol. Baking soda does not contain any water of crystallisation

20. Which of the following methods is suitable for preventing an iron frying pan from rusting?

- (1) Applying greases (2) Applying paints
(3) Applying a coating of zinc (4) All of the above

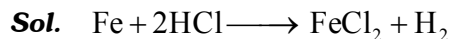
Ans. (3)

Sol. Iron is prevented by different method but from frying pan, it is prevented by coating of Zn.

21. When iron filings are heated in a steam of dry hydrogne chloride, the compound formed is FeCl_x where x is

- (1) 1 (2) 2 (3) 3 (4) 4

Ans.(2)



22. Rusting of Iron takes place in

- (1) ordinary water (2) distilled water
(3) both ordinary and distilled water (4) none of the above

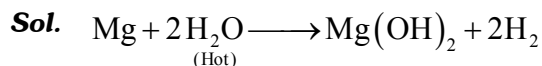
Ans. (3)

Sol. Rusting of Iron takes place in ordinary as well as distilled water, (distill water contains oxygen dissolved in it)

23. Mg dissolved in hot water to form

- (1) MgO (2) $\text{Mg}(\text{OH})_2$ (3) MgOH (4) $\text{MgOMg}(\text{OH})_2$

Ans.(2)



In steam water Mg form MgO

24. While cooking, if the bottom of the vessel is getting blackened on the outside, it means that

- (1) The food is not cooked completely (2) The fuel is not burning completely
(3) The fuel is wet (4) The fuel is burning completely

Ans. (2)

Sol. In case of incomplete combustion, fuel does not burn completely which casue blackened the bottom of the vessel.

25. Identify the functional group presnet in the following compound $\text{CH}_3 - \underset{\text{Br}}{\text{CH}} - \text{CH}_2 - \overset{\text{O}}{\parallel} \text{C} - \text{OH}$

- (1) Aldehyde (2) Bromine
(3) Carboxyl (4) both bromine and carboxyl group

Ans.(4)

Sol. In given compound $\text{CH}_3 - \underset{\text{Br}}{\text{CH}} - \text{CH}_2 - \overset{\text{O}}{\parallel} \text{C} - \text{OH}$, functional groups are - Br, and - COOH .

26. Identify the wrong sequence of the element in a group

- (1) Ca, Sr, Ba (2) Cu, Au, Ag (3) N,P,As (4) Cl, br, I

Ans. (2)

Sol. The correct order is Cu, Ag, Au hence Cu, Au, Ag is wrong.

27. Increase in the height of the plant is due to

- (1) Auxins (2) Cytokinins (3) Gibberellins (4) Ethylene

Ans. (1)

Sol. Auxin helps in apical shoot development, giving a young tree a more upright form.

28. A sexual reproduction takes place through budding in

- (1) Amoeba (2) Cytokinins (3) Gibberellins (4) Ethylene

Ans. (2)

Sol. A sexual mode of reproduction

29. Ginger is

- (1) Root (2) Stem (3) Fruit (4) None of these

Ans.(2)

Sol. Ginger is rhizome, modified plant stem.

30. The liver stores food in the form of

- (1) Glucose (2) Glycogen (3) Albumen (4) ATP

Ans.(2)

Sol. B cells of pancreas release insulin which lowers the blood glucose by prompting liver to take glucose from blood and store it as glycogen by the help of glycogen synthase

31. During photosynthesis, the oxygen gas comes from

- (1) CO₂ (2) Water
(3) Both CO₂ and water (4) Oxygen via air

Ans. (2)

Sol. Reason : The visible wavelength of light trapped by PSI and PS II leads to the breakdown of H₂O into H⁺, O₂ and electrons. The O₂ produced will be released outside the thylakoid lumen.

32. This is an artificial ecosystem

- (1) Pond (2) Crop field (3) Lake (4) Forest

Ans.(2)

Sol. Pond, lake and forest are natural ecosystem.

33. Which of the following is a plant hormone?

- (1) Insulin (2) Cytokinin (3) Thyroxine (4) Oestrogen

Ans.(2)

Sol. Reason : Insulin, Thyroxine and oestrogen are animal hormones, cytokines help in root development.

34. The centre of sense of smell in brain is

- (1) Midbrain (2) Olfactory lobes (3) Cerebellum (4) Cerebrum

Ans. (2)

Sol. Olfactory lobes regulate the emotional behaviour and sense of smell in brain.

35. The component of blood responsible for transporting O₂ is

- (1) RBC (2) WBC (3) Platelets (4) All of these

Ans. (1)

Sol. The component of blood responsible for transporting O₂ is RBC, as it contains haemoglobin which has 97% affinity towards O₂.

36. Concentration of urine depends on the presence of

- (1) Thyroxin (2) Vasopressin (3) ADH (4) Melatonin

Ans. (3)

Sol. Reason : Antidiuretic hormone (ADH) increases absorption of water in DCT and collecting duct and there by maintains concentration of urine.

37. Antioxidatn vitamin is

- (1) 'A' (2) 'E' (3) 'C' (4) All of these

Ans. (3)

Sol. Reason : Vitamin 'C' (Ascorbic acid) is a redox catalyst which can reduce and there by neutralize reactive oxygen species such as hydrogen peroxide (H_2O_2)

38. Sardar Sarovar Dam built on river

- (1) Sutlej (2) Ganga (3) Kaveri (4) Narmada

Ans.(4)

Sol. Reason : Sardar sarovar dam built on river Narmada

39. Where is the cradle of human evolution?

- (1) Asia (2) America (3) Australia (4) Africa

Ans.(4)

Sol. Reason: The fossils formed in Africa was the oldest one

40. Which of the the brain is considered seat of intelligence and memory

- (1) Cerebrum (2) Cerebellum (3) Medulla (4) All of these

Ans.(1)

41. If α, β be the zeros of the polynomial $2x^2 + 5x + k$ such that $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, then $K = ?$

- (1) 3 (2) -3 (3) -2 (4) 2

Sol. $2x^2 + 5x + K$

α, β are the zeros. So, $\alpha + \beta = -\frac{5}{2}$, $\alpha\beta = \frac{K}{2}$

$$\therefore \alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4} \Rightarrow \alpha^2 + \beta^2 + 2\alpha\beta - \alpha\beta = \frac{21}{4}$$

$$\Rightarrow (\alpha + \beta)^2 - \alpha\beta = \frac{21}{4} \Rightarrow \left(-\frac{5}{2}\right)^2 - \frac{K}{2} = \frac{21}{4}$$

$$\Rightarrow \frac{25}{4} - \frac{21}{4} = \frac{K}{2} \Rightarrow \frac{4}{4} = \frac{K}{2} \Rightarrow K = 2$$

option (4) is correct

42. The sum of three consecutive terms of an AP is 21 and the sum of the squares of these terms is 165. The middle term of the three terms is :

- (1) 10 (2) 4 (3) 6 (4) 7

Sol. Let, three terms of an AP be $a - d, a, a + d$

$$\therefore \text{sum, } (a - d) + (a) + (a + d) = 21 \Rightarrow 3a = 21 \Rightarrow a = 7$$

Middle term $a = 7$

option (4) is correct

43. If the sum of the first " p " terms of an AP is the same as the sum of its first " q " terms (where $p \neq q$) then sum of $(p + q)$ th terms is :

$(1) 1$

$(2) 0$

$(3) p+q-1$

$(4) p+q+1$

Sol. $S_p = \frac{p}{2}[a+(p-1)d]$

$$S_q = \frac{q}{2}[a+(q-1)d]; \quad p \neq a$$

$$\because S_p = S_q \quad \Rightarrow \frac{p}{2}[a+(p-1)d] = \frac{q}{2}[a+(q-1)d]$$

$$\Rightarrow ap + p^2d - pd = aq + q^2d - qd$$

$$\Rightarrow a(p-q) + d(p^2 - q^2) - d(p-q) = 0 \quad \dots(1)$$

$$S_{p+q} = \frac{(p+q)}{2}[a+(p+q-1)d] \quad \dots(2)$$

By equation (1)

$$\Rightarrow a(p-q) + d(p-q)(p+q) - d(p-q) = 0$$

$$\because p \neq q \quad \Rightarrow a + d(p+q) - d = 0 \quad \Rightarrow a + (p+q-1)d = 0$$

\(\therefore\) By equation (2)

$$\Rightarrow S_{p+q} = 0$$

option (2) is correct

44. If $x^2 - 3x + 1 = 0$, then the value of $x^5 + \frac{1}{x^5}$?

$(1) 87$

$(2) 123$

$(3) 135$

$(4) 201$

Sol. $x^2 - 3x + 1 = 0$ divided by x

$$x - 3 + \frac{1}{x} = 0 \quad \Rightarrow \quad x + \frac{1}{x} = 3 \quad \dots(1)$$

By squaring $x^2 + \frac{1}{x^2} + 2 = 9$

$$\Rightarrow x^2 + \frac{1}{x^2} = 7 \quad \dots(2)$$

By cubing of equation (1), $x^3 + \frac{1}{x^3} + 3\left(x + \frac{1}{x}\right) = 27$

$$\Rightarrow x^3 + \frac{1}{x^3} = 27 - 3(3) \quad \Rightarrow \quad x^3 + \frac{1}{x^3} = 18 \quad \dots(3)$$

By equation (2) & (3), $\left(x^5 + \frac{1}{x^5}\right) + \left(x + \frac{1}{x}\right) = 7 \times 18$

$$\therefore x^5 + \frac{1}{x^5} = 126 - 3 = 123$$

option (2) is correct

45. If $\frac{xy}{x+y} = a$, $\frac{yz}{x+z} = b$ and $\frac{yz}{y+z} = c$. Where a, b, c are non-zero numbers, then the value of x ?

(1) $\frac{2abc}{ab+ac-bc}$

(2) $\frac{2ab}{ac+bc-ab}$

(3) $\frac{abc}{ab+bc+ac}$

(4) $\frac{2abc}{ab+bc-ac}$

Sol. $\frac{x+y}{xy} = \frac{1}{a}$

$$\Rightarrow \frac{1}{y} + \frac{1}{x} = \frac{1}{a} \quad \dots(1)$$

$$\frac{x+z}{xz} = \frac{1}{b}$$

$$\Rightarrow \frac{1}{z} + \frac{1}{x} = \frac{1}{b} \quad \dots(2)$$

$$\frac{y+z}{yz} = \frac{1}{c}$$

$$\Rightarrow \frac{1}{z} + \frac{1}{y} = \frac{1}{c} \quad \dots(4)$$

Equation (1), (2) & (3), $2\left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z}\right) = \left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$

$$\Rightarrow \frac{2}{x} + 2\left[\frac{y+z}{yx}\right] = \frac{1}{a} + \frac{1}{b} + \frac{1}{c} \Rightarrow \frac{2}{x} = \left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right) - 2\left(\frac{1}{c}\right) = \frac{1}{a} + \frac{1}{b} - \frac{1}{c}$$

$$\Rightarrow \frac{2}{x} = \frac{bc+ac-ab}{abc} \quad \therefore x = \frac{2abc}{bc+ac-ab}$$

option (2) is correct

46. If $\tan \theta + \cot \theta = 2$, then the value of $\tan^{23} \theta + \cot^{23} \theta = \dots\dots$

(1) 23

(2) 4

(3) 1

(4) 2

Sol. $\tan \theta + \cot \theta = 2$

$$\tan \theta + \frac{1}{\tan \theta} = 2, \text{ let } \tan \theta = x \Rightarrow x + \frac{1}{x} = 2 \Rightarrow x^2 - 2x + 1 = 0$$

$$\Rightarrow (x-1)^2 = 0 \Rightarrow x = 1 \quad \therefore \tan \theta = 1 \Rightarrow \cot \theta = 1$$

$$\therefore \tan^{23} \theta + \cot^{23} \theta = 1^{23} + 1^{23} = 2$$

option (4) is correct

47. The value of $\frac{1}{1+\cot^2 \alpha} + \frac{1}{1+\tan^2 \alpha}$ is :

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

Sol. $\frac{1}{1 + \cot^2 \alpha} + \frac{1}{1 + \tan^2 \alpha} \Rightarrow \frac{1}{1 + \frac{1}{\tan^2 \alpha}} + \frac{1}{1 + \tan^2 \alpha}$

$\Rightarrow \frac{\tan^2 \alpha}{1 + \tan^2 \alpha} + \frac{1}{1 + \tan^2 \alpha} \Rightarrow \frac{\tan^2 \alpha + 1}{1 + \tan^2 \alpha} = 1$

option (1) is correct

48. If $\cos 43^\circ = \frac{x}{\sqrt{x^2 + y^2}}$, then the value of $\tan 47^\circ$:

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

Sol. $\cos 43^\circ = \frac{x}{\sqrt{x^2 + y^2}} \Rightarrow \sin 43^\circ = \frac{\sqrt{x^2 + y^2 - x^2}}{\sqrt{x^2 + y^2}} = \frac{y}{\sqrt{x^2 + y^2}}$

$\therefore \tan 47^\circ = \tan(90 - 43) = \cot 43^\circ$

$\therefore \cot 43^\circ = \frac{\cos 43^\circ}{\sin 43^\circ} = \frac{x}{\sqrt{x^2 + y^2}} \times \frac{\sqrt{x^2 + y^2}}{y} = \frac{x}{y}$

option (1) is correct

49. If $\sin 7x = \cos 11x$, then the value of $\tan 9x + \cot 9x$:

- (1) 4 (2) 2 (3) 1 (4) 3

Sol. $\sin 7x = \cos 11x$,

$\cos(90 - 7x) = \cos 11x$ ($\because \cos(90 - \theta) = \sin \theta$)

or $90 - 7x = 11x \Rightarrow 90 = 18x \Rightarrow x = 5^\circ$

Now, $\tan 9x + \cot 9x = \tan 45^\circ + \cot 45^\circ = 1 + 1 = 2$

option (2) is correct

50. If $\cos(\alpha + \beta) = 0$, then $\sin(\alpha - \beta) = ?$

- (1) $\cos 2\beta$ (2) $\cos \beta$ (3) $\sin \alpha$ (4) $\sin 2\alpha$

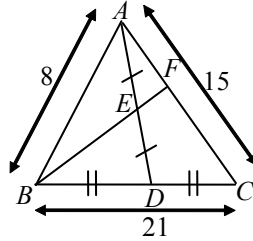
Sol. $\cos(\alpha + \beta) = 0 \Rightarrow \cos(\alpha + \beta) = \cos \frac{\pi}{2}$

$\therefore \alpha + \beta = \frac{\pi}{2}$ or $\alpha + \beta = 90^\circ \Rightarrow \alpha = 90 - \beta$

Now, $\sin(\alpha - \beta) = \sin(90 - \beta - \beta) = \sin(90 - 2\beta) = \cos 2\beta$

option (1) is correct

- 51.** In $\triangle ABC$, AD is median and E is the mid-point of AD . If BE is extended, it meets AC in F . $AB = 8$ cm, $BC = 21$ cm and $AC = 15$ cm, then $AF = ?$



- (1) 7 cm (2) 3 cm (3) 12 cm (4) 5 cm

Sol. Draw $DG \parallel BF$. Now, $\triangle ADG$, E is mid-point and $EF \parallel DG$, so by converse of mid-point theorem.

F is mid-point of AG . So, $AF = FG$ (1)

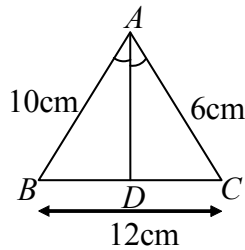
Also, in $\triangle BFC$, D is mid-point, $DG \parallel BF$

So, by converse of mid-point theorem, G is mid-point of FC

$\therefore FG = GC$ (2)

By, (1) & (2), $AF = FG = GC \quad \therefore AF = \frac{1}{3} AC = \frac{1}{3} \times 15 = 5$ cm option (4) is correct

- 52.** In the given figure, AD is the bisector of $\angle BAC$. If $AB = 10$ cm, $AC = 6$ cm and $BC = 12$ cm, find BD :



- (1) 4.5 cm (2) 9 cm (3) 7.5 cm (4) 3 cm

Sol. $\frac{BD}{DC} = \frac{10}{6}$. Let $\frac{BD}{DC} = \frac{x}{y}$

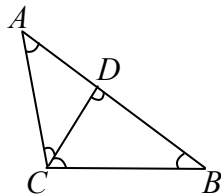
$\Rightarrow \frac{x}{y} = \frac{5}{3} \Rightarrow y = \frac{3x}{5}, \quad BD + DC = 12$

So, $x + \frac{3x}{5} = 12 \Rightarrow x \left[\frac{5+3}{5} \right] = 12 \Rightarrow x = \frac{12 \times 5}{8}$

$$\Rightarrow x = \frac{15}{2} \quad \Rightarrow x = 7.5 \text{ cm.}$$

option (3) is correct

53. In the given figure, $\angle ACB = 90^\circ$ and $CD \perp AB$, then :



(1) $CD^2 = BD \cdot AD$ (2) $BC^2 = AD \cdot BD$ (3) $AC^2 = AD \cdot BC$ (4) $AD^2 = CD \cdot BD$

Sol. In $\triangle BCD \sim \triangle ACD$ (by AA similarity)

$$\therefore \frac{CD}{BD} = \frac{AC}{BC} = \frac{AD}{CD} \quad \therefore CD^2 = BD \times AD$$

option (1) is correct

54. $\triangle ABC$ is a right triangle in which $\angle C = 90^\circ$ and $CD \perp AB$. If $BC = a$, $AC = b$, $AB = c$ and $CD = p$, then

(1) $p^2 = a^2 + b^2$ (2) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$ (3) $\frac{1}{c^2} = \frac{1}{a^2} + \frac{1}{b^2}$ (4) none of these

Sol. $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

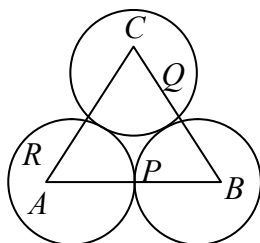
Area ($\triangle ABC$) = area ($\triangle ABC$)

$$\Rightarrow \frac{1}{2} \times a \times b = \frac{1}{2} \times p \times c \quad \Rightarrow \frac{1}{p} = \frac{c}{ab} \quad \Rightarrow \frac{1}{p^2} = \frac{a^2 + b^2}{a^2 b^2} \quad (\because a^2 + b^2 = c^2)$$

$$\Rightarrow \frac{1}{p^2} = \frac{a^2}{a^2 b^2} + \frac{b^2}{a^2 b^2} \quad \Rightarrow \frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$$

option (2) is correct

55. In the given figure, three circles with centres A, B, C respectively touch each other externally. If $AB = 5$ cm, $BC = 7$ cm and $CA = 6$ cm, then the radius of the circle with centre A is :



(1) 1.5 cm (2) 2 cm (3) 2.5 cm (4) 3 cm

Sol. $AB = R_1 + R_3 = 5$ (1)

$BC = R_2 + R_3 = 7$ (2)

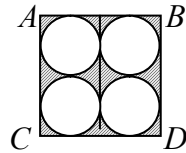
$AC = R_1 + R_2 = 6$ (3)

By, adding equation (1), (2) & (3), $(R_1 + R_2 + R_3) = 18$

$\Rightarrow R_1 + R_2 + R_3 = 9 \quad \Rightarrow R_1 + 7 = 9$

$\therefore R_1 = 2$ cm option (2) is correct

56. In the given figure $ABCD$ is a square of side 14 cm. Find the area of the shaded region.



- (1) 56 cm^2 (2) 48 cm^2 (3) 42 cm^2 (4) 44 cm^2

Sol. Required shaded region, area of $(ABCD)$ – area of 4 small circles

$$= 14 \times 14 - 4 \times \pi r^2 = 14 \times 14 - 4 \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2}$$

$= 196 - 154 = 42 \text{ cm}^2$ option (3) is correct

57. A metallic spherical shell of internal and external diameters 4 cm and 8 cm respectively, is melted and recast into the form of a cone of base diameter 8 cm. The height of the cone is :

- (1) 12 cm (2) 14 cm (3) 15 cm (4) 18 cm

Sol. Volume (spherical shell) = volume (cone)

$$\Rightarrow \frac{4}{3} \pi (R^3 - r^3) = \frac{1}{3} \pi r_1^2 h \quad \Rightarrow 4(4^3 - 2^3) = 4 \times 4 \times h$$

$\Rightarrow 4(64 - 8) = 4 \times 4 \times h \quad \Rightarrow 56 = 4h$

$\Rightarrow h = \frac{56}{4} = 14 \text{ cm}$ option (2) is correct

58. In what ratio is the line segment joining the points $A(-2, -3)$ and $B(3, 7)$ divided by the y -axis.

- (1) 3 : 2 (2) 2 : 3 (3) 1 : 5 (4) 2 : 5

Sol. Let y -axis divide AB in the ratio $k : 1$.

So, by section formula, co-ordinate of p is $\left(\frac{3k - 2}{k + 1}, \frac{7k - 3}{k + 1} \right)$

As, y -axis have, 0 is x -coordinate.

$$\therefore \frac{3k-2}{k+1} = 0 \Rightarrow \frac{2}{3} : 1 \Rightarrow 2 : 3 \quad \text{option (2) is correct}$$

59. Two coins are tossed simultaneously. What is the probability of getting at least one head.

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

Sol. $S = \{HH, HT, TH, TT\}$

Event for atleast one head = $\{HH, HT, TH\}$

$$\therefore P(\text{getting atleast one head}) = \frac{3}{4} \quad \text{option (3) is correct}$$

60. The relation between mean, mode and median is :

- (1) Mode = $3 \times \text{Mean} - 2 \times \text{Median}$ (2) Mode = $3 \times \text{Median} - 2 \times \text{Mean}$
 (3) Mean = $3 \times \text{Median} - 2 \times \text{Mode}$ (3) Median = $3 \times \text{Mean} - 2 \times \text{Mode}$

Sol. Mode = $3 \times \text{Median} - 2 \times \text{Mean}$ option (2) is correct

61. Who was the Governor General of India in 1857?

- (1) Wellesley (2) Dalhousie (3) Canning (4) Minto

Ans. (3)

Sol. Selected by lord Palmerston to succeed lord Dalhousie .

62. Who was the First Indian Woman President in the Indian National Congress?

- (1) Mrs. Annie Besant (2) Sucheta Kripalani
 (3) Sarojini Naidu (4) Indira Gandhi

Ans. (3)

Sol. In 1925 she presided over Kanpur session

63. Who penned the following lines?

‘Sarfaroshi ki tamanna ab hamare dil me hai, Dekhana hai zor kitna baju-e quatil me hai.

- (1) Bismil (2) Raj Guru (3) Bhagat Singh (4) Azad

Ans. (1)

Sol. He wrote this patriotic song in Urdu at Patna 1921.

64. The state of Awadh was annexed into British dominion in the year

- (1) 1855 (2) 1854 (3) 1856 (4) 1853

Ans. (3)

Sol. Wazidali Shah was the ruler and it was annexed under the pretext of doctrine of lapse .

65. In which of the following countries was “Gadar party” established?

- (1) U.S.A. (2) Germany (3) Spain (4) France

Ans. (1)

Sol. Main member was LalaHardayal , it had its branch at Canada also

66. Chauri Chaura is situated in the District of

- (1) Deoria (2) Gorakhpur (3) Maharajganj (4)

Kushinagar

Ans. (2)

Sol. A place in united province where non-cooperation movement turned violent

67. The British Parliament passed the Regulating Act to improve the administration of the East India Company in the year

- (1) 1773 (2) 1775 (3) 1853 (4) 1855

Ans. (1)

Sol. The **Regulating Act of 1773** was an Act of the Parliament of Great Britain intended to overhaul the management of the East India Company's rule in India.

68. The First English factory in India was established at

- (1) Bombay (2) Hooghly (3) Surat (4) Calcutta

Ans. (2)

Sol. The first English factory was set up on the banks of river Hooghly in 1651.

69. The Asiatic Society of Bengal was founded by

- (1) Raja Ram Mohan Roy (2) Sir William Jones
(3) W. W. Hunter (4) William Bentinck

Ans. (2)

Sol. **The Asiatic Society** was founded by Sir William Jones on 15 January 1784

70. The founder of the autonomous kingdom of Avadh was

- (1) Ahmad Shah Abdali (2) Safdarjung
(3) Saadat Khan Burhan Ul-Mulk (4) Zulfiqur Khan

Ans. (3)

71. The permanent Settlement of 1793 vested the ownership of land in :

- (1) Individual peasants (2) Zamindars
(3) Village communities (4) State

Ans. (2)

Sol. The **Permanent Settlement** — also known as the **Permanent Settlement of Bengal** — was an agreement between the East India Company and Bengali landlords to fix revenues to be raised from land.

72. The year of Great Divide in Indian Demographic history is

- (1) 1921 (2) 1947 (3) 1951 (4) 1982

Ans. (1)

Sol. The year 1921 is taken as the demographic divide for the reason that before this year, the population was not stable, sometimes it increased and at other times it decreased.

73. Who is the first woman Prime Minister of India?

- (1) Meira Kumar (2) Sonia Gandhi (3) Indira Gandhi (4) Annie Besant

Ans. (3)

74. Lenin was born in the year

- (1) 1870 (2) 1880 (3) 1885 (4) 1890

Ans. (1)

Sol. Alias Lenin was a Russian communist revolutionary, politician, and political theorist

75. The My Lai massacre occurred in

(1) 1964

(2) 1966

(3) 1968

(4) 1970

Ans. (3)

Sol. The **My Lai Massacre**, the Vietnam War mass killing of 347 and 504 unarmed civilians in South Vietnam on March 16, 1968.

76. Assertion(A) : Cotton textile industry is decentralised in India

Reason (R) : Cotton textile industry is immesnsely by market.

Select the correct option from the given alternatives

(1) Both (A) and (R) are true, and (R) explains (A)

(2) Both (A) and (R) are trure but (R) does not explain (A)

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

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

Ans. (1)

77. Assertion (A) : Public transport is given preference over private vehicles in large urban cities

Reason (R) : Large number of private vehicles in urban area cause trffic congestion and pollution.

Select the correct option from the given alternatives

(1) Both (A) and (R) are true, and (R) explains (A)

(2) Both (A) and (R) are trure but (R) does not explain (A)

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

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

Ans. (2)

78. Assertion (A) : india is rich in biodiversity

Reason (R) : It is situtated in tropical area

Select the correct option from the given alternatives

(1) Both (A) and (R) are true, and (R) explains (A)

(2) Both (A) and (R) are trure but (R) does not explain (A)

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

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

Ans. (1)

79. Assertion (A) : Oil refineries in India area mostly along the sea coast

Reason (R): The climate along the sea coast is very congenial

Select the correct option from the given alternatives

(1) Both (A) and (R) are true, and (R) explains (A)

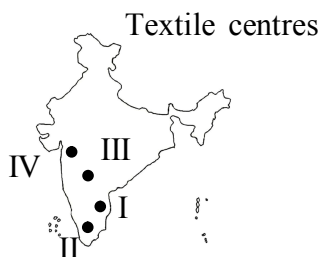
(2) Both (A) and (R) are trure but (R) does not explain (A)

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

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

Ans. (2)

80. Match the textile centres indicated on the map of India (I,II,III & IV) with their representative names



- (A) Chennai (B) Solapur (C) Coimbatore (D) Mumbai
 (1) I C II B III A IV D (2) II C I A IV D III B (3) III D IIC I A IV B (4) IV C IIIA IIB ID

Ans. (2)

81. In south India, which soil is extensively found

- (1) Laterite (2) Red soil (3) Black cotton soil (4) Alluvial soil

Ans. (2)

82. Which of the following is an example of non-metallic mineral

- (1) Gold (2) Bauxite (3) Graphite (4) Tin

Ans. (3)

83. Which chemical is affecting fertility in frog community

- (1) Benign (2) Urea (3) Andrin (4) Phosphorus

Ans. (NA)

84. Which is the first expressway of India

- (1) Delhi - Kolkata (2) Mumbai-Pune (3) Pune-Chennai (4) Delhi-Mumbai

Ans. (2)

Sol. The **Mumbai Pune Expressway**, (officially known as the **Yashwantrao Chavan Mumbai Pune Expressway**) is India's first six-lane concrete, high-speed, access controlled toll expressway

85. Over exploitation of underground water has led to increase in concentration of Fluoride in which state?

- (1) Bihar (2) Jharkhand (3) Assam (4) Sikkim

Ans. (2)

86. Capital of Lakshadweep is

- (1) Kavaratti (2) Daman (3) Silvassa (4) Port Blair

Ans. (1)

87. Production of wheat is highest in the state of

- (1) Punjab (2) Haryana (3) Uttar Pradesh (4) Madhya Pradesh

Ans. (3)

88. Which mine is found in Khetri?

- (1) Copper Mines (2) Lignite Mines (3) Bauxite Mines (4) Iron Ore Mines

Ans. (1)

89. What is the longitudinal extent of India?

- (1) 60° 10' East to 96° 27' East (2) 67° 05' East to 96° 22' East
 (3) 69° 05' East to 98° 22' East (4) 68° 08' East to 97° 25' East

Ans. (4)

90. Which of the following is the youngest structure of India?

- (1) Greater Himalayas (2) Shiwalik Range
 (3) Middle Himalayas (4) peninsular India

Ans. (2)

91. Panchayati Raj System is based on

- (1) Centralisation of power
 (2) Decentralisation of power
 (3) Co-operation with people and administrator
 (4) All of the above

Ans. (2)

Sol. The **Panchayati Raj** in India generally refers to the system introduced by constitutional amendment in 1992 .

- 92.** A member of Rajya Sabha is elected
(1) For six year (2) For five year (3) For four year (4) No definite period

Ans. (1)

- 93.** Who appoints the Chief Election Commissioner of India?
(1) Prime Minister (2) President
(3) parliament (4) Chairman of Lok Sabha

Ans. (2)

- 94.** In India the maximum number of Lok Sabha and Rajya Sabha members may be
(1) 500 and 250 (2) 525 and 238
(3) 537 and 275 (4) 552 and 250

Ans. (4)

Sol. The maximum strength of the House envisaged by the Constitution of India is 552, The **Rajya Sabha** or **Council of States** is the upper house of the Parliament of India. Membership of Rajya Sabha is limited by the Constitution to a maximum of 250 members .

- 95.** The time period of Dr. A.P.J Abdul Kalam as a President of India is
(1) 25 July 2000 to 25 July 2005 (2) 25 July 2001 to 25 July 2006
(3) 25 July 2002 to 25 July 2007 (4) 25 July 2003 to 25 July 2008

Ans. (3)

Sol. 11th president of india .

- 96.** The most appropriate measure of a country's economic growth is
(1) Gross Domestic Product (2) Net Domestic Product
(3) Net National Product (4) Per Capita Product

Ans. (1)

Sol. GDP (gross domestic products)

- 97.** Finance is distributed between the centre and states on the recommendations of which of the following?
(1) Planning commission (2) Public Accounts Committee
(3) Finance Commission (4) National Development Council

Ans. (3)

Sol. Distribution of net proceeds of taxes between Centre and the States, to be divided as per their respective contributions to the taxes.

- 98.** The first Agricultural University of the country is
(1) J.N.K.V., Jabalpur (2) G.B.P.A.U, Panth Nagar
(3) P.A.U., Ludhiana (4) R.A.U., Bikaner

Ans. (2)

Sol. Govindballabh pant agricultural university .

- 99.** Who amongst the following is the current president of the World Bank
(1) Jim Yong Kim (2) Lewis Preston (3) Barber Conable (4) None of these

Ans. (1)

Sol. from 2012 till date .

- 100.** When was the National Development Council formed?
(1) 26th January, 1950 (2) 15th March, 1950
(3) 6th August, 1951 (4) 6th August, 1952

Ans. (4)