Date: 12/11/2017

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

1. Twinkling stars are seen due to

(1) irregular emission of light from stars.

(2) weather changes.

(3) stars are far away

(4) refractive index of air in the given region goes on changing and randomly.

Ans. (4)

Sol. Refractive index of air varies with charge in layer.

2. Government of India celebrates 28 February as 'National Science Day' in the memory of .

(1) Dr. Hargovind Khurana   (2) Dr. C.V. Raman

(3) Dr. Vikram Sarabhai   (4) Dr. A.P.J. Abdul Kalam

Ans. (2)

Sol. Dr. C.V. Raman

3. $F = G\dfrac{m_1 \times m_2}{R^2}$ is the formula to prove _____ .

(1) Newton's First law of ¡notion   (2) Newton's Second law of motion

(3) Newton's Third law of motion   (4) Newton's Law of Gravitation

Ans. (4)

Sol. Newton's law of Gravitation $\to$ $F = G\dfrac{m_1 \cdot m_2}{R^2}$

4. Calculate pressure exerted by a screw on the wooden plank if area of contact of the screw is 0.5 mm^2 and its weight is 50 N.

(1) 100×10^6 N/m   (2) 50×10^6 N/m

(3) 100×10^6 N   (4) 50×10^6 N

Ans. (1)

Sol. F = 50N, area = 0.5 mm^2 = 0.5×10^{-6} m^2

$$P = \frac{F}{a} = \frac{50N}{0.5 \times 10^{-6}\, m^2}$$
$$= 100 \times 10^6\, \frac{N}{m^2}$$

5. The distance of distinct vision is _____ cm.

(1) 20   (2) 25   (3) 30   (4) 35

Ans. (2)

Sol. Minimum distance of vision = 25 cm

6. Observe the column I, II and III, match them and select the correct answer from given options.

I		II		III
A. Resistors in series	(a)	Required to move a unit positive charge from one point to another point.	(i)	$Q = \frac{Rl}{A}$
B. Potential difference	(b)	Used to increase effective resistance in a circuit.	(ii)	$I = \frac{Q}{t}$
C. Electric current	(c)	Net charge flowing through any cross section of a conductor in the given time.	(iii)	$R(s) = R_1+R_2+R_3...R(n)$
D. Resistivity	(d)	Depends on the material of the conductor	(iv)	$V = \frac{W}{Q}$

(1) A – b – iii   B – a – iv   C – c – ii   D – d – i

(2) A – c – iv   B – b – iii   C – d – i   D – a – ii

(3) A – d – ii   B – b – i   C – a – iii   D – c – iv

(4) A – a – i   B – b – iii   C – d – iv   D – c – ii

Ans. (1)

7. MRI stands for _____ ____

(1) Managing Response Index   (2) Magnetic Resonance Index

(3) Magnetic Resonance Imaging   (4) Managing Response Imaging

Ans. (3)

Sol. Magnetic Resonance Imaging

8. Which of the followings is not property of magnetic lines of force.

(1) The tangent at any point on the magnetic lines of pole gives the direction of the magnetic field at that point.

(2) No two magnetic lines of pole can intersect each other.

(3) Magnetic lines of force are crowded where the magnetic field is strong and far from each other where field is weak.

(4) They are closed continuous curves. They start from south pole and end on north pole.

Ans. (4)

9. Select the incorrect statement stated below related to concave mirror.

(1) Outer surface is coated with opaque substance.

(2) Inner surface is polished and thus reflective.

(3) It is called as converging mirror.

(4) It is used to observe the phenomenon of refraction.

Ans. (4)

10. Observe the diagram of 'Electric DC generator, and select the correct pairing of labelling.
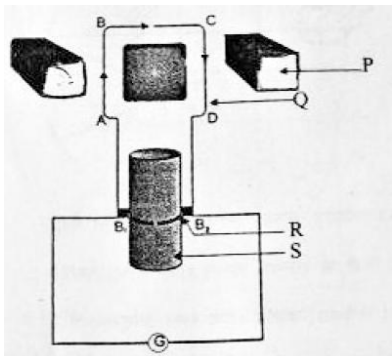
(1) P- Strong magnet, Q-Armeature, R- Splitring, S-Axle

(2) P-Iron core, Q-Armeature, R-Splitring, S-Axle

(3) P-Strong magnet, Q-Iron core, R-Axle, S-Wire

(4) P-Iron core, Q-Ax)e, R-Splitring, S-Strong magnet

Ans. (1)

11. A current of 0.4A is flowing through a bulb for 3 minutes. Find the charge that is flowing through the circuit.

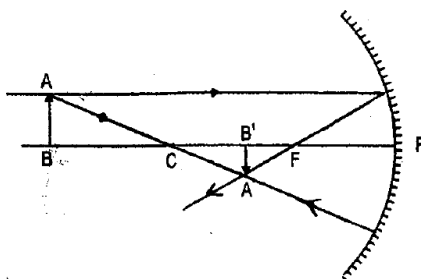   (1) 12C.   (2) 36 C.   (3) 72 C.   (4) 450 C.

Ans. (3)

Sol. Given : I = 0.4 Amp

    t = 3 min = 180 sec

$$I = \frac{q}{t} \Rightarrow q = I.t = 0.4 \times 180 = 72C$$

12. Observe the adjacent ray diagram and select the correct option of position, nature and size of image.

(1) Beyond C, Real and inverted, Enlarged

(2) Between C and F, Real and inverted, Diministed

(3) Beyond C, Real and inverted, Enlarged

(4) Between C and F, Virtual and Erect, Diminished

Ans. (2)

13. Observe the circuit diagram and select incorrect option given below in answers.
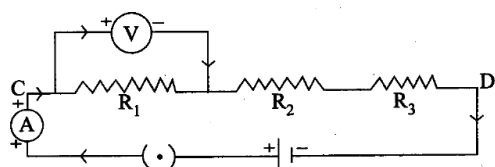
(1) Electric circuit is open

(2) Resistors R_1, R_2 and R_3 are connected in series.

(3) Ammeter 'A' is connected in series.

(4) Voltmeter 'V' is connected in parallel.

Ans. (1)

14. Which of the following Element loses and electron most easily.

    (1) Na   (2) Mg   (3) K   (4) Ca

Ans. (3)

Sol. The atomic size of potassium is largest among Na, Mg and Ca due to which it has lower ionisation potential as compared to Na, Mg and Ca. hence, it can lose electron most easily as compared to Na, Mg and Ca.

15. Which of the following species does not have electrons equal to 18.

    (1) K^+ (2) Cl^- (3) Ca^{2+} (4) K

Ans. (4)

Sol. Atomic number of K = 19

so   number of p = 19

number of e = 19

while number of e's in K^+ = 18 (due to donation of 1 e')

Atomic number of Cl = 17

so   number of p = 17

number of e = 17

while number e's in Cl^- = 18 (due to acceptance of 1e')

Atomic number of Ca = 20

so   number of p = 20

number of e = 20

while number e's in Ca^{2+} = 18 (due to lose of 2e's)

So K(19) does not have 18 e's

16. Which of the following is a double displacement reaction.

(1) $NH_3 + HCl \longrightarrow NH_4Cl$

(2) $CuSO_4(aq) + Fe(s) \longrightarrow FCSO_4 + Cu$

(3) $Na_2SO_4 + BaCl_2 \longrightarrow BaSO_4 + 2NaCl$

(4) $CaCO_3(s) \xrightarrow{\Delta} CaO_s + CO_2(g)$

Ans. (3)

Sol. In double displacement reaction - AB + CD $\rightarrow$ AD + CB

In option (3) $Na_2SO_4 + BaCl_2 \longrightarrow BaSO_4 + 2NaCl$

(above reaction is double displacement reaction because sodium displaces barium and forms sodium chlorides and again Barium combine with sulphate ion to form Barium sulphate)

$AB + CD \longrightarrow AD + BC$

17. The colour of anhydrous copper sulphate is _____ .

(1) Blue   (2) White   (3) Pink   (4) Green

Ans. (2)

Sol. Anhydrous $CuSO_4$ is a white coloured solid while hydrated $CuSO_4$ [$CuSO_4.SH_2O$] is a blue colour crystalline solid.

18. Ajay has a stung by red ant, it causes itching & irritation. The sting consist of which of the following acid.

(1) Acetic acid   (2) Butyric acid   (3) Carbonic acid   (4)Formic acid

Ans. (4)

Sol. In ant sting formic acid present formic acid (- HCOOH)

19. Which of the following compound is alkaline in aqueous medium.

(1) Na_2CO_3 (2) $NaCl$ (3) H_2CO_3 (4) $CuSO_4$

Ans. (1)

Sol. When Na_2CO_3 (sodium carbonate) dissolves into water then it forms alkaline aqueous solution due to formation of NaOH which is strong alkali.

20. Which of the following compound conduct electricity in aqueous solution which is a covalent compound.

(1) Calcium Chloride   (2) Hydrogen Chloride

(3) Magnesium Oxide   (4) Lithium Fluoride

Ans. (2)

Sol. Calcium chloride ($CaCl_2$), Magnesium oxide (MGO), and lithium chloride (LiCl), are ionic compound. While HCl, hydrogen chloride is only polar covalent compound, which conducts electricity in aqueous solution.

21. Which of the following metal does not react with dilute HCl.

    (1) Copper   (2) Aluminium   (3) Iron   (4) Zinc

Ans. (1)

Sol. Cu is placed below then hydrogen. In reactivity series, therefore Cu can not replaced hydrogen from dilute HCl.

22. Select a pari of homologous from the following.

    (1) C_3H_6 and C_4H_{10} (2) CH_3COOH and C_2H_5COOH

    (3) C_4H_8 and C_3H_4 (4) $(CH_3)_2CO$ and C_3H_7CHO

Ans. (2)

Sol. Homologous series represent compounds of particular one family, hence CH_3COOH (acetic acid ethanoic acid) and

    C_2H_5COOH (Propanoic acid) belongs to acid family and bears general formula $\left(C_nH_{2n+1}COOH\right)$

23. According to IUPAC rule, which of the following compound is prop –1–ene.

    (1) $CH_3 - CH_2 - CH_3$ (2) $CH_3 - CH = CH_2$

    (3) $CH_3 - CH = CH - CH_3$ (4) $CH_3 - C \equiv CH$

Ans. (2)

Sol. $CH_3 - CH = CH_2$ (Alkene with 3-carbons)

    3   2   1

    IUPAC name - prop -1-ene

24. Stainless steel alloy is a mixture of

    (1) Fe + C + Cr + Ni   (2) Ni + C + Cr + A1

    (3) Fe + Cu + AI + C   (4) Fe + Zn + C + Ni

Ans. (1)

Sol. Stainless steel is an alloy of Iron it is a homogeneous mixture of Fe, C, Cr and Ni.

25. Which of the following elements will form an acidic oxide.

    (1) An element with atomic number 7

    (2) An element with atomic number 3

    (3)An element with atomic number 12

    (4)An element with atomic number 19

Ans. (1)

Sol. Non metal from acidic oxide, so element with atomic number 7 is a non metal, which is Nitrogen, while other given

    option are having atomic number of metals. [At. No $= 3 \rightarrow Li$, At. No $= 12 \rightarrow Mg$, At. No $= 19 \rightarrow K$]

26. Which of the general formule represents the alkyl group.

    (1) C_nH_{2n} (2) C_nH_{2n+1} (3) C_nH_{2n+2} (4) C_nH_{2n-1}

Ans. (2)

Sol. Alkyl group is formed when one hydrogen is removed from alkane.

    Alkane $= 1H \xrightarrow{\hspace{1cm}}$ Alkyl group

    General formula of alkane $= C_nH_{2n+2}$

    $C_nH_{2n+2} - 1H \xrightarrow{\hspace{1cm}} C_nH_{2n+1}$ alkyl group

27. Raw material required for photosynthesis is ………... And water.

    (1) Chloroplast   (2) Sunlight   (3) Nitrogen   (4) Carbondioxide

Ans. (4)

Sol. Carbon dioxide and water are required for photosynthesis

28. Find the odd man.

(1) Uterus   (2) Ovary   (3) Vagina   (4) Testis

Ans. (4)

Sol. Testis is part of male reproductive system, while the rest are of female reproductive system.

29. The prescribed limit of sound in decibles in silent zone during daytime is.

(1) 50   (2) 60   (3) 70   (4) 40

Ans. (1)

Sol. The sound limit is set at 50dB for silent zones

30. A green house gas N_2O remains for how many years in the atmosphere ?

(1) 100   (2) 114   (3) 104   (4) 109

Ans. (2)

Sol. N_2O remains for about 114 years in atmosphere

31. In human being blood goes through the heart .... times during each cycle.

(1) one   (2) three   (3) two   (4) four

Ans. (3)

Sol. Because humans have double circuit circulation in which blood passes twice through heart during one cycle

32. Response to stimulus of touch is called……………..

(1) Tropic movement   (2) Photo-tropic movement

(3) Hydro-tropic movement   (4) Seismonastic movement

Ans. (4)

Sol. Seismonastic movement occurs in response to stimulus of touch

33. Find the odd man.

(1) Fragmentation   (2) Regeneration   (3) Budding in Yeast   (4) Budding in Hydra

Ans. (2)

Sol. Because the rest all give rise to new individuals whereas regeneration just reforms lost body part.

34. The total no. of pairs of chromosomes in human beings are

(1) 22   (2) 23   (3) 46   (4) 44

Ans. (2)

Sol. In humans, 2n = 46 = 23 pairs.

35. Match the column

Column A	Column B
(i) Darwin	(a) heritability of acquired characteristics
(ii) Lamarck	(b) inheritance
(iii) Mendel	(c) natural selection

(1) (i) – (c) ; (ii) – (a) ; (iii) – (b)

(2) (i) – (b) ; (ii) – (c) ; (iii) – (a)

(3) (i) – (b) ; (ii) – (a) ; (iii) – (c)

(4) (i) – (a) ; (ii) – (c) ; (iii) – (b)

Ans. (1)

Sol. Darwin introduced 'theory of natural selection', lamarck put forward "Inheritance of acquired characters and Mendel proved theory of inheritance.

36. Which plant does not belong to group Thallophyta

    (1) Ulothrix   (2) Spirogyra   (3) Chara   (4) Funaria

Ans. (4)

Sol. Funaria is a bryophyte.

37. The excretory product in crystalline form of the plants..................... Causes itching

    (1) Phyroid   (2) Raphyids   (3) Graphyid   (4) Cyanide

Ans. (2)

Sol. Rahides are solid plant excretory product that cause itching

38. From different area of the brain which is vision area ?
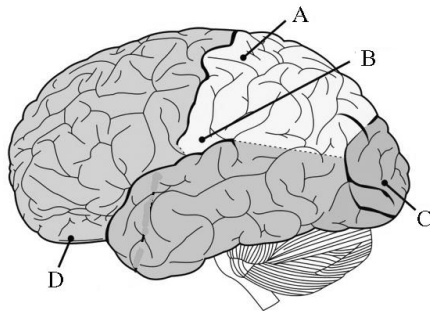
    (1) A   (2) B   (3) C   (4) D

Ans. (3)

Sol. C represents occipital lobe which is responsible for vision.

39. In female reproductive system ovaries secrete…………... harmone.

    (1) testesteron   (2) estrogen   (3) auxin   (4) thyroxine

Ans. (2)

Sol. Estrogen is secreted by ovary

40. Find the odd man.

    (1) Adiantum   (2) Equisetum   (3) Selaginella   (4) Riccia

Ans. (4)

Sol. Only Riccia is bryophyte while other are pteridophytes.

41. Select the correct chronological order from the given.

    (i)   America declared war against Germany

    (ii) Austria declared war against Serbia

    (iii) Assassination of Austrian Prince Francis Ferdinand

    (iv) Italy entered into war from England and Frances side

    (1) (ii), (iii), (1), (iv)   (2) (iii), (ii), (iv), (i)   (3) (iv), (i), (iii), (ii)   (4) (i), (iv), (iii), (ii)

Ans. (2)

Sol. (iii) Assassination of Austrian prince francis ferdinand – 28 June 1914

    (ii) Austria declared war against serbia – 28 July 1914

    (iv) Italy entered into war from England & France side

    (i) America declared war against germany

42. Who took lead and sacrificed the cold war?

    (1) Nikita Kruschev   (2) Eisenhower   (3) Truman   (4) Gorbochev

Ans. (4)

Sol. Gorbochev took the lead & Sacrificed the cold war.

43. First colony established by England in America is _____ .
    (1) Mary land   (2) Virginia   (3) New york   (4) New Jersey
Ans. (2)
Sol. First colony established by England in America was Virginia
44. In which continent did the first internatinal trade revolution take place ?
    (1) America   (2) Africa   (3) Europe   (4) Asia
Ans. (3)
Sol. The first international trade revolution took place in Europe.
45. Which one of the following options is applicable to the 'Nanking Treaty' ?
    (1) Won the Hong Kong island
    (2) The business fo opium was granted
    (3) Christion missionaries got permission to spread their religion in Chine
    (4) A group of six ports was opened for the foreign traders
Ans. (1)
Sol. England won Hong-Kong Island in Nanking treaty
46. Identify the icorrect pair of the follwoing.
    (1) Assembly – To observe the administration of UNO
    (2) Security Council – Permission to new membership
    (3) Economic and social committee – To protect human rights and fundamental rights
    (4) Secretariat – To interpret internaional law
Ans. (4)
Sol. International court of Justice undertakes the effort to interpret international law.
47. Find the correct option of the constructive effect of imperalism.
    (1) Destruction of village autonomy
    (2) Decline of values
    (3) Rise of new leadership
    (4) Suppression of under developed nations.
Ans. (3)
Sol. Rise of new leadership is a constructive effect of imperialism
48. Which policy of Lenin was opposed by the extremist communist leaders ?
    (1) Give land to landless farmers
    (2) Allow private industry business to a limited extend
    (3) To provide workers with basic needs instead of wages
    (4) Domination of the working class in the government
Ans. (2)
Sol. Lenin was opposed by the extremist communist leaders to allow private industry business to a limited extend
49. In which of following place parallel government was not established ?
    (1) Meerut   (2) Poornia   (3) Baliya   (4) Midnapur
Ans. (1)
Sol. Parallel government was not established in Meerut
50. Out of follwoing which issue was solved peacefully by the United Nations ?
    (1) The attack of Italy on Ethiopia   (2) Hitler's attack on Austria
    (3) Japan's attack on Manchuria   (4) Italy's attack on Kaifu Island
Ans. (1 or 4)
Sol. Italy's attack on Kaifu Island – this issue was solved peacefully by the United Nations

51. 'People's Party' was established by_____

(1) Sultan Majid   (2) Kamal Pasha   (3) General Tojo   (4) Emperor Genro

Ans. (2)

Sol. 'People's Party' was established by Kamal Pasha

52. Which one of the following is not an 'Input Devices' of a computer?

(1) Key Board   (2) Mouse   (3) Monitor   (4) Scanner

Ans. (3)

Sol. Monitor is an output device.

53. The discovery of the fact that 'the universe is not a divine creation' was made to the world by _____ .

(1) Newton   (2) Holdmant   (3) Copernicus   (4) Galileo

Ans. (1)

Sol. The discovery of the fact that 'the universe is not a divine creation' was made to the world by Newton

54. Which king motivated the navigators in Europe?

(1) Nicholas   (2) Pancharn George   (3) William   (4) Henry

Ans. (4)

Sol. Henry was the king who motivated the navigators in Europe.

55. Which Asian country was involved in Africa's imperialistic policy ?

(1) Thailand   (2) Iraq   (3) Arab   (4) Iran

Ans. (3)

Sol. Arab was involved in Africa's imperialistic policy

56. In the given diagram which alphabet indicates the rain shadow area.
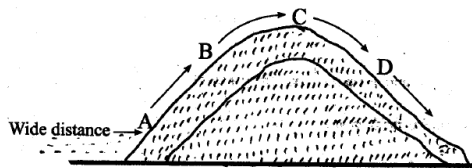
(1) A   (B) B   (3) C   (D) D

Ans. (4)

Sol. Alphabet D indicates the rain shadow area.

57. _____ is a weight loosing raw material.

(1) Sugar cane   (2) Cotton   (2) Wool   (4) Silk

Ans. (1)

Sol. Sugar cane is a weight loosing raw material

58. Which physical division is shown ?
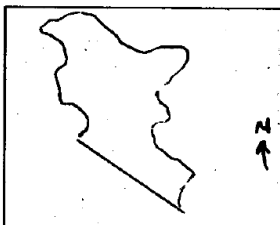
(1) Southern plateau region   (2) Western plain region

(3) Northern mountainous region   (4) Eastern coastal plain

Ans. (3)

Sol. Northern mountain region is being shown on the provided physical division

59. How many state capitals are connected by the Golden Quadrilateral other than Delhi?

(1) Five   (2) Seven   (3) Six   (4) Eight

Ans. (3)

Sol. Six state capitals are connected by the Golden Quadrilateral other than Delhi

60. Areawise which is the largest division of India?

(1) North Indian plain region   (2) The Indian plateau region

(3) Northern mountainous region   (4) Ghat coastal plain region and island

Ans. (2)

Sol. 53% is size of indian plateau region

61. Asia's biggest Agricultural University is at

(1) Hissar   (2) Ambala   (3) Ludhiana   (4) Amritsar

Ans. (1)

Sol. Chaudhary charan singh university, locatal at Hissar, is the biggest Agricultural University of Asia.

62. In the given map which alphabet represents the Godavari delta ?
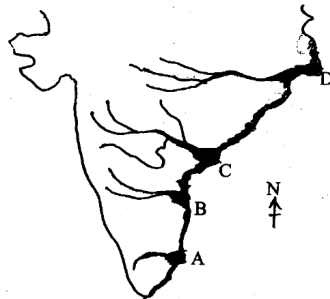
(1) A   (2) B   (3) C   (4) D

Ans. (4)

Sol. Marking 'D' is Godavari delta.

63. Which of the following feature is not formed by the rivers of Ganga Plain?

(1) Meanders   (2) Ox-bow lakes   (3) Natural levees   (4) 'V' shaped valley

Ans. (4 or BONUS)

Sol. "V shaped valleys" aren't formed in middle Ganga region.In upper course where valley is formed,it isn't called Ganga but known as two separate rivers Bhagirathi and Alaknanda.

64. Which of the following is not the sub division of Deccan plateau?

(1) Satpura – Mahadeo – Maikal ranges   (2) Maharashtra plateau

(3) Malwa plateau   (4) Karnataka plateau

Ans. (3)

Sol. Malwa plaleu is located at central highlands

65. Which of the following has wrong co-relation ?

	Type of Vehicle	Degree	Percentage
A	Public Transport	58	17.1
B	Professional vehicle	14	3.8
C	Three wheelers	14	3.8
D	Two wheelers	274	76.1

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

Ans. (1)

Sol. $\dfrac{Data}{total} \times 360$

66. Which of the following is not the subdivision of Central Highlands?

(1) Malwa plateau
(2) Chota nagpur plateau
(3) The Vindhya ranges
(4) Dandakarnaya

Ans. (4)

Sol. Dandakaranya is a part of Deccan plateau.

67. Find the correct pair.

(1) North Mountainous region   Chinar
(2) Rajasthan Plain   Dhak
(3) Deccan Plateau   Khipbush
(4) Punjab Haryana plain   Sandlwood

Ans. (1)

Sol. Chinar is coniferous tree found in northern mountains region.

68. Find the incorrect pair.

    State   Coastal area
(1) Karnataka   Kalangut
(2) Kerala   Kovalam
(3) Maharashtra   Guhagar
(4) Goa   Kolwa

Ans. (1)

Sol. Kalangut is in Goa

69. Proper sequence of peaks in the eastern ghats from South to North

(1) Nimgiri, Mahendragiri, Nallamala, Palkonda
(2) Palkonda, Nallamala, Mahendragiri, Nimgiri
(3) Nallamala, Palkonda, Mahendragiri, Nimgiri
(4) Nimgiri, Mahendragiri, Pulkonda, Nallamala

Ans. (2)

Sol. Palkonda, Nallamala, Mahendragiri, Nimgiri is the correct order.

70. In the middle ganga plain silk sarees are manufactured at _____.

(1) Gorakhpur   (2) Samastipur   (3) Mirzapur   (4) Bhagalpur

Ans. (4)

Sol. Silk sarees are manufacturad at Bhagalpur.

71. Who creates government and decides the powers of the regional level government ?

(1) Legislature   (2) Judiciary   (3) Executive   (4) Constitutions

Ans. (4)

Sol. Constitutions creates government and decides the powers of the regional level government

72. Kanshi Ram is 1984 founder _____ party.

(1) Samajwadi party
(2) Bahujan Vikas party
(3) Bahujan Samaj party
(4) Bharip Bahujan Maha Sangh

Ans. (3)

Sol. Kanshi Ram is 1984 founded Bahujan Samaj party.

73. In which country's electoral system does the vote of an indigenous person have more value than that of an Indian persons?

(1) Fiji   (2) Estonia   (3) Mexico   (4) Finland

Ans. (1)

Sol. In Fijian the electoral system does the vote of an indigenous person have more value than that of an Indian persons

74. Due to the efforts of Eminent Social activists Anna Hazare, which right has been passed by the Indian Government?

(1) Right to Relaxation   (2) Labour Rights

(3) Right to information   (4) Human Rights

Ans. (3)

Sol. Due to the efforts of Eminent Social activists Anna Hazare, right to information has been passed by the Indian Government

75. Which one of the following is the first political work of the citizen ?

(1) to bring about people together   (2) to caste a vote

(3) to be present at meeting conducted   (4) to comment on the government

Ans. (2)

Sol. Casting vote is the first political work of the citizen.

76. Which of the following is not part of the consumer's Redressal Agencies?

(1) The Taluka Forum   (2) The District Forum

(3) The State commision   (4) The National Commission

Ans. (1)

Sol. Taluka forum is not part of the consumer's Redressal Agencies

77. Who will be benefited during Inflation ?

(1) Debtors   (2) A person with steady Income

(3) A person infesting in equitites   (4) Creditors

Ans. (1)

Sol. Due to Inflation Debter will be required to returen less parchasing power.

78. Monetary measures to control inflation is _____.

(1) Reduction in Public expenditure   (2) Increase in cash reserve ratio

(3) Increase in taxes   (4) Surplus budget

Ans. (2)

Sol. Increase in CRR is a quantitative measure of money supply.

79. Which of the following is extremely necessary for men ?

(1) Car   (2) Health   (3) Fan   (4) Furniture

Ans. (2)

Sol. Health is extremely necessary.

80. Identify the statement which relates to 'optimum population'?

(1) Available resoures are not used enough

(2) Creates stress in available resources

(3) Population is not enough to consume resources completely

(4) Indicates ideal size of population of a country

Ans. (4)

Sol. Optinum population indicates the ideal size of popution.

81. How many numbers between 10 to 300. When divided by 4, leave remainder 3 ?

    (1) 71   (2) 72   (3) 73   (4) 74

Ans. (3)

Sol. The numbers would form on A.P. with first term (a) and last term ℓ as 11 and 299 respectively

$$\ell = a + (n-1)d$$

$$299 = 11 + (n-1) \times 4$$

$$\frac{299 - 11}{4} = (n-1)$$

$$\frac{288}{4} = (n-1)$$

$$\Rightarrow 72 = n-1 \qquad\qquad \Rightarrow n = 73$$

82. Which of the following are the roots of the quadratic equation $x^2 + 2\sqrt{2}x - 6 = 0$?

    (1) $-3\sqrt{2}, \sqrt{2}$ (2) $3\sqrt{2}, -2\sqrt{2}$ (3) 3, 2   (4) $3, 2\sqrt{2}$

Ans. (1)

Sol. let the roots be α, β

$$x^2 + 2\sqrt{2}x - 6 = 0$$

$$\alpha + \beta = -2\sqrt{2} \quad [\text{sum of roots} = -\frac{b}{a}]$$

$$\alpha\beta = -6 \ [\text{Product of roots} = \frac{c}{a}]$$

out of these given option only option (1) satisfies these two conditions

<div align="center">OR</div>

By method of factorisation

$$x^2 + 3\sqrt{2}x - \sqrt{2}x - 6 = 0$$

$$x(x + 3\sqrt{2}) - \sqrt{2}(x + 3\sqrt{2}) = 0$$

$$(x - \sqrt{2})(x + 3\sqrt{2}) = 0$$

83. The expenditure incurred on different items in a family is shown in the adjacent pie diagram. If the amount of house rent is Rs.10,000 then find the amount incurred on education.
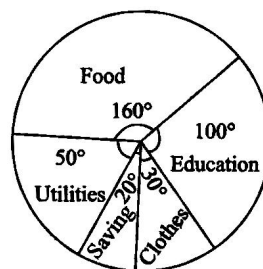
    (1) Rs.20,000   (2) Rs.32,000   (3) Rs.72,000   (4) Rs.30,000

Ans. Information provided is insuffcient

Sol. BONUS

84. A train travels some distance at a constant speed. If the speed of the train would have required 2 hours less. But if the speed of the train would have decreased by 5km then to cover then same distance it would have required 1 hour more. Find the distance covered by the train.

    (1) 120 km   (2) 240 km   (3) 360 km   (4) 400 km

Ans. (3)

Sol. Let

distance $\rightarrow$ x

speed $\rightarrow$ y

original time $= \dfrac{x}{y}$

$\dfrac{x}{y} - \dfrac{x}{y+15} = 2$ ..(1)

$\dfrac{x}{y-5} - \dfrac{x}{y} = 1$ ..(2)

From equation ..(1)

$x\left[\dfrac{y+15-y}{y(y+15)}\right] = 2$ ..(3)

From equation ..(2)

$x\left[\dfrac{y-y+5}{y(y-5)}\right] = 1$ ..(4)

dividing ..(3) by ..(4)

$\dfrac{\dfrac{x(15)}{y(y+15)}}{\dfrac{5x}{y(y-5)}} = 2$

$\dfrac{3y-15}{y+15} = 2$

$\Rightarrow \; 3y - 15 = 2y + 30$

$y = 45$ Substituting y in equation ..(3)

$x = \dfrac{2(45 \times 60)}{15} = 360 \text{ Km}$

distance $= 360 \text{ Km}$

85. $\left(\sqrt[3]{3} + \sqrt[3]{2}\right)\left(\sqrt[3]{9} - \sqrt[3]{6}\right) = ?$

    (1) 5   (2) $\sqrt[9]{5}$ (3) $\sqrt[6]{5}$ (4) $\sqrt[3]{5}$

Ans. (1)

Sol. $\left(\sqrt[3]{3} + \sqrt[3]{2}\right)\left(\sqrt[3]{9} + \sqrt[3]{4} - \sqrt[3]{6}\right)$

    let $a = \sqrt[2]{3}$, $b = \sqrt[3]{2}$
    The given expression reduces to the form

    $(a+b)\left(a^2 - ab + b^2\right) = a^3 + b^3 = \left(\sqrt[3]{3}\right)^3 + \left(\sqrt[3]{2}\right)^3 = 3 + 2 = 5$

86. The number obtained by adding 12 to a natural number is 160 times of the multiplicative inverse of the natural number. Find the number.

    (1) 20   (2) 16   (3) 12   (4) 8

Ans. (4)

Sol. let the number be x

    $x + 12 = \dfrac{160}{x}$

    $x^2 + 12x = 160$

    $\Rightarrow \quad x^2 + 12x - 160 = 0$

             $x^2 + 20x - 8x - 160 = 0$

             $x(x+20) - 8(x+20) = 0$

             $(x-8)(x+20) = 0$

    $\Rightarrow \quad x = 8 \text{ or } x = -20$ [Rejected ; As it is not a natural number]

             So required natural number is 8

87. There are 50 cards maked with the numbers 1 to 50. One card is drawn at random. What is the probability that number on the card is a prime number ?

(1) $\dfrac{3}{10}$ (2) $\dfrac{1}{5}$ (3) $\dfrac{1}{4}$ (4) $\dfrac{2}{15}$

Ans. (1)

Sol. Let A = event of getting prime number

$n(A) = 15$ A = {2,3,5,7,11,13,17,19,23,29,31,37,41,43,47}

$n(s) = 50$

$P(A) = \dfrac{n(A)}{n(s)} = \dfrac{15}{50} = \dfrac{3}{10}$

88. If the polynomial $x^3 + 2x^2 - \alpha x - 12$ is divided by $(x - 4)$ the remainder is 52. Find the value of 'α'.

(1) $\dfrac{11}{2}$ (2) -5 (3) 8   (4) -8

Ans. (3)

Sol. by remainder theorem

Remainder when P(x) is divided by $x - \alpha$ is given by $P(\alpha)$

$P(x) = x^2 + 2x^2 - \alpha x - 12$

Remainder = P(4)

$P(4) = 4^3 + 2(4)^2 - \alpha A - 12$

given P(4) = 52

$64 + 32 - 4\alpha - 12 = 52$

$4\alpha = 32$

$\alpha = 8$

89. When two simultaneously equation are solved by Cramer's Rule.

We get x = 9 and D = 4 ; If $Dx = \begin{bmatrix} 7 & m \\ 5 & 8 \end{bmatrix}$ then find the value of m.

(1) -4 (2) 4   (3) -9 (4) 9

Ans. (2)

Sol. by cramer's rule

$x = \dfrac{D_x}{D}$ $D_x = \begin{vmatrix} 7 & m \\ 5 & 8 \end{vmatrix} = 56 - 5m$

$9 = \dfrac{56 - 5m}{4}$

$5m = 20$

$m = 4$

90. Following table gives the number of trees planted by the students in a school on 'Environment Day, Observe the table and find mode of the trees planted by the students.

Number of plants	0-10	10-20	20-30	30-40	40-50	50-60
Number of students	30	42	50	80	50	40

(1) 80   (2) 50   (3) 45   (4) 35

Ans. (4)

Sol. $\text{mode} = \ell + \left(\dfrac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$

where ℓ = lower limit of modal class

     f_1 = frequency of modal class

     f_0 = frequency of class preceding the modal class

f_2 = frequency of class succeeding the modal class

h = size of class interval

modal class = 30 – 40

$\ell = 30$; $f_1 = 80$; $f_0 = 50$; $f_2 = 50$; h = 10

$$mode = 30 + \left(\frac{80 - 50}{2 \times 80 - 50 - 50} \right) \times 10$$

$$= 30 + \left(\frac{30}{60} \right) \times 10 = 30 + 5 = 35$$

91. $\dfrac{\cos^2 30° + \cos 30° \sin 30° + \sin^2 30°}{\cos^3 30° - \sin^3 30°} = ?$

(1) 1   (2) $\sqrt{3} + 1$ (3) $\sqrt{3} - 1$ (4) $\dfrac{1}{\sqrt{3} - 1}$

Ans. (2)

Sol. $\dfrac{\cos^2 30 + \cos 30 . \sin 30 + \sin^2 30}{\cos^3 30 - \sin^3 30}$

As $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

$\dfrac{\cos^2 30 + \cos 30 . \sin 30 + \sin^2 30}{(\cos 30 - \sin 30)(\cos^3 30 + \cos 30 . \sin 30 + \sin^2 30)} = \dfrac{1}{\cos 30 - \sin 30}$

$= \dfrac{1}{\dfrac{\sqrt{3}}{2} - \dfrac{1}{2}}$

$= \dfrac{2}{\sqrt{3} - 1} \times \dfrac{\sqrt{3} + 1}{\sqrt{3} + 1} = \left(\sqrt{3} + 1 \right)$

92. If $\tan \theta = -1$ then find the value of $\dfrac{\sec \theta + \csc \theta}{\cos \theta - \sin \theta}$

(1) 0   (2) 1   (3) $-\sqrt{2}$ (4) $\sqrt{2}$

Ans. (1)

Sol. $\tan \theta = -1$ $\therefore \dfrac{\sin \theta}{\cos \theta} = -1$

$\therefore \dfrac{\sec \theta + \csc \theta}{\cos \theta - \sin \theta}$

$= \dfrac{\dfrac{1}{\cos \theta} + \dfrac{1}{\sin \theta}}{\cos \theta - \sin \theta} = \dfrac{\dfrac{\sin \theta + \cos \theta}{\sin \theta . \cos \theta}}{\cos \theta - \sin \theta}$ [as $\sin \theta = -\cos \theta$]

$= \dfrac{-\cos \theta + \cos \theta}{\sin \theta \times \cos \theta \times (\cos \theta - \sin \theta)}$

$= \dfrac{0}{\sin \theta \times \cos \theta (\cos \theta - \sin \theta)} = 0$

93. Line PQ || line AB. The slope of line AB is $\dfrac{1}{2}$. y–intercept of line PQ is 3. Find x-intercept

(1) 3   (2) –2   (3) –6   (4) 6

Ans. (3)

Sol. Slope of line AB = slope of line $PQ = \dfrac{1}{2}$ [as PQ || AB]

given, y intercept of line PQ = 3

equation of line PQ (slope intercept form)

$\therefore$ y = mx + C

where m = slope of line, C = y intercept

$y = \dfrac{1}{2}x + 3$

2y = x + 6

x − 2y = −6

For x-intercept, Put y = 0

$\therefore$ x − 0 = −6 $\quad\therefore$ x = −6

94. Find the ratio of the volume to total surface area of a sphere of radius $\sqrt{7}$cm .

(1) $\dfrac{\sqrt{7}}{3}$ (2) $\dfrac{7}{3}$ (3) $\dfrac{7\sqrt{7}}{3}$ (4) $\dfrac{\sqrt{7}}{\sqrt{3}}$

Ans. (1)

Sol. $\dfrac{\text{volume}}{\text{T.S.A}} = \dfrac{\dfrac{4}{3}\pi r^3}{4\pi r^2} = \dfrac{1}{3} \times r = \dfrac{\sqrt{7}}{3}$

95. The diameter of the base of a cylindrical metal block is 6.6 cm and its height is 0.4m. How many discs of diameter 2.2 cm and height 0.2 cm can be cut from this metal block?

(1) 180 (2) 600 (3) 1200 (4) 1800

Ans. (4)

Sol. Number of discs $= \dfrac{\text{Volume of cylindrical metal}}{\text{Volume of disc}}$

$= \dfrac{\pi R_1^2 h_1}{\pi R_2^2 h_2}$

$= \dfrac{3.3 \times 3.3 \times 0.4 \times 10}{1.1 \times 1.1 \times 0.2 \times 10} = 1800$

96. In the adjacent figure $PM \perp QS$. $RN \perp QS$. Diagonals QS and PR intersect at 'O' $A(\Delta PMO); A(\Delta RNO) = 1 : 4$ then find.
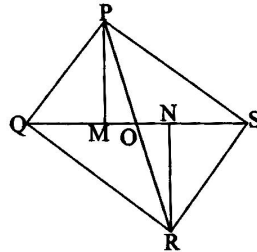
(1) $\dfrac{1}{16}$ (2) $\dfrac{1}{8}$ (3) $\dfrac{1}{4}$ (4) $\dfrac{1}{2}$

Ans. (4)

Sol. In ΔPMO & ΔRNO

(i) $\angle POM = \angle RON$ ... [Comman angle]

(ii) $\angle POM = \angle RON = 90°$ .. [Each of 90°]

$\Delta PMO \sim \Delta RNO$ ... [By A.A. Test]

$\therefore \dfrac{PM}{RN} = \dfrac{MO}{NO}$ ... (c.s.s.t)

$\dfrac{A(\Delta PMO)}{A(\Delta RNO)} = \dfrac{1}{4}$ $\qquad \dfrac{\dfrac{1}{2} \times MO \times PM}{\dfrac{1}{2} \times RN \times NO} = \dfrac{1}{4}$

$$\frac{PM}{RN} \times \frac{PM}{RN} = \frac{1}{4}$$

$$\therefore \frac{PM}{RN} = \frac{1}{2}$$

$$\therefore \frac{A(\Delta PQS)}{A(\Delta RQS)} = \frac{\frac{1}{2} \times b_1 \times h_1}{\frac{1}{2} \times b_2 \times h_2} \quad [b_1 = b_2 = QS]$$

$$= \frac{h_1}{h_2} = \frac{PM}{RN} = \frac{1}{2}$$

97. The longest side of a triangle is 20 cm and other side is 10 cm. The area of the triangle is 80 mc^2. Find the length of the remaining side of the triangle.

(1) $2\sqrt{65}$ (2) $5\sqrt{10}$ (3) $10\sqrt{3}$ (4) 15

Ans. (1)

Sol. By heron's formula

$$Area = \sqrt{s(s-a)(s-b)(s-c)}$$

let a = 10cm, b = 20 cm and c = x

$$80 = \frac{1}{4}\sqrt{(30+x)(x+1)(x-10)(30-x)}$$

$$320 = \sqrt{(900-x^2)(x^2-100)}$$

squaring both sides

$$102400 = (900-x^2)(x^2-100)$$

from the options, possible values of x $\Rightarrow$ $\left(\sqrt{260}, \sqrt{250}, \sqrt{300}, \sqrt{225}\right)$

substtituting first value of x, Therefore case (I)

Case I :

Assume $x = \sqrt{250}$

$$102400 = (900-250)(250-100)$$

$$102400 = 650 \times 150$$

since this cannot be true so case (I) is false, $x \neq \sqrt{250}$

Case II :

Assume $x = 2\sqrt{65} = \sqrt{260}$

$$102400 = (900-260)(260-100)$$

$$102400 = 640 \times 160$$

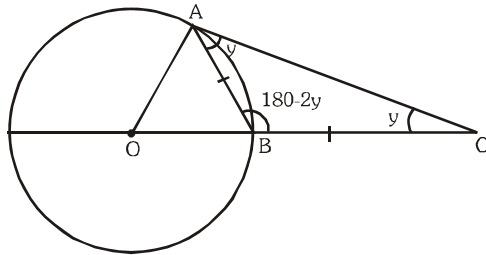Since this relationship is true, $x = 2\sqrt{65}$

hence answer is (I)

98. In the adjoining figure 'O' is the centre of the circle AB = BC $m\angle AOD = x$ and $m\angle ACD = y$ then find $\frac{x}{y}$
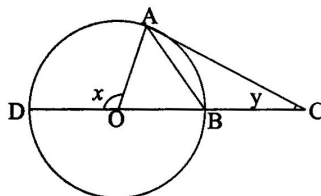
(1) $\frac{1}{2}$ (2) 2   (3) 4   (4) $\frac{1}{4}$

Ans. (3)

Sol.

Given O - center

AB = BC

$m\angle AOD = x$; $m\angle ACB = y$

to find $\dfrac{x}{y}$

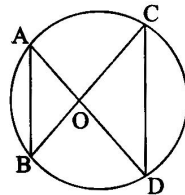|	
$\angle BAC = y$	[isosceles traingel]
$\angle ABC = 180 - 2y$	[by angle sum property]
$\angle ABO = 2y$	(linear pair)
$\angle OAB = 2y$	(isosceles triangle)
$\angle AOB = 180 - 4y$	
$x + 180 - 4y = 180$	(liner pair)
$x = 4y$	

$\dfrac{x}{y} = 4$

99. In the adjoining figure of AB = 16 and CD = 40 then find the ratio of $A(\triangle OCD) : A(\triangle OAB)$

(1) $\dfrac{5}{2}$ (2) $\dfrac{2}{9}$ (3) $\dfrac{25}{4}$ (4) $\dfrac{4}{25}$
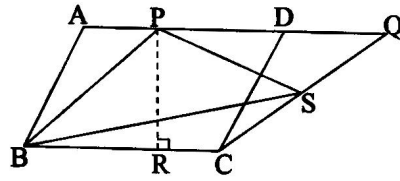
Ans. (3)

Sol.
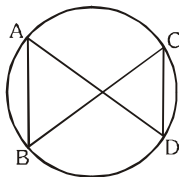
Given AB = 16, CD = 40

To find $\dfrac{Ar(OCD)}{Ar(OAB)}$

$\triangle ADO$ and $\triangle CDO$ are similar (power of point theorem)

Scale factor $= \dfrac{CD}{AB} = \dfrac{40}{16} = \dfrac{5}{2} = f_5$

$\dfrac{Ar(OCD)}{Ar(OAB)} = f_5^2 = \dfrac{25}{4}$

100. In the adjoining figure $\square$ABCD and $\square$PBCQ are parallelogram BC $= 12$ cm PR $= 8$ cm. Find $A\left(\Delta PSB\right)$
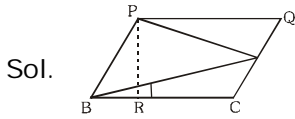

(1) 96cm^2 (2) 72cm^2 (3) 48cm^2 (4) 36cm^2

Ans. (3)

Sol.

Given BC = 12 cm

PR = 8 cm

Area of PQBC = 12×8 cm^2 = 96cm^2

Theorem ; If in a parallelogram, ABCD a triangle ABC is inscribed such that E is point on the side CD of

the parallelogram, Ar(ABE) $= \dfrac{1}{2} \times$ Ar$\left(ABCD\right)$

Area (PBS) $= \dfrac{1}{2}$ Area$\left(PQBC\right) = \dfrac{1}{2} \times 96$ cm^2 = 48 cm^2