Resonance®
Educating for better tomorrow
Pre-foundation Career Care Programmes (PCCP) Division

NTSE PATTERN TEST -1

CLASS –X

SCHOLASTIC APTITUDE TEST (SAT)

Time : 120 Min. **Date : 12-06-2018** **Max. Marks : 100**

GENERAL INSTRUCTIONS

1. The booklet given in the examination hall is the Question Paper.
2. A student has to write his/her answers in the OMR sheet by darkening the appropriate bubble with the help of HB Pencil as the correct answer(s) of the question attempted.
3. ***The question paper contains 100 questions, 40 Questions from Science (1-40) [Physics-1-13, Chemistry-14-26, Biology-27-40]20 Questions from Mathematics (41-60), 40 Question from Social Science (61-100), each carries one mark.***
4. Blank papers, clip boards, log tables, slide rule, calculators, mobile or any other electronic gadgets in any form is not allowed.
5. Write your **Name** & **Roll No.** in the space provided in the bottom of this booklet.
6. *There is **no negative marking**. Do not spend too much time on a particular question.*
7. Before answering the paper, fill up the required details in the blank space provided in the answer sheet.
8. In case of any dispute, the answer sheet available with the institute shall be final.

NAME OF THE CANDIDATE : .....ROLL NO. : .....

I have read all the instructions and shall abide by them

- -

Signature of the Candidate

I have verified the identity, name and roll number of the candidate.

- -

Signature of the Invigilator

DO NOT BREAK THE SEALS WITHOUT BEING INSTRUCTED TO DO SO BY THE

PCCP Head Office :

Address : Plot No. A-51 [A], IPIA, Near Resonance CG Tower,

Behind City Mall, Jhalawar Road, Kota (Rajasthan)-324005

Contact. No. : 0744-6635569, Fax : 0744-2427146

Website : **www.pccp.resonance.ac.in** E-mail : **pccp@resonance.ac.in**

SCIENCE

Straight Objective

This section contains 40 questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONLY ONE** is correct.

1. A battery can supply a charge of 2.5×10^3 C. If the current is drawn from the battery at a rate of 12.5 A. Calculate the time in which battery will get discharged ?
(A) 300s (B) 200s (C) 100s (D) None of these

2. A bullet of mass 50 gm is horizontally fired with a velocity 100 ms^{-1} from a gun of mass 10 kg. What will be the recoil velocity of the gun ?
(A) 100 ms^{-1} (B) 500 ms^{-1} (C) 0.5ms^{-1} (D) Zero

3. Electrons are emitted from an electron gun where they are accelerated by a potential difference of 1500 V. The energy imparted to each electron will be :
(A) 3.2×10^{-15} J (B) 2.8×10^{-14} J (C) 2.4×10^{-16} J (D) 2.4×10^{-14} J

4. Two blocks of masses 2 kg and 1 kg are placed on a smooth horizontal table in contact with each other. A horizontal force of 3 newton is applied on the first so that the blocks move with a constant acceleration. The force between the blocks would be :
(A) 3 Newton (B) 1 Newton (C) 2 Newton (D) Zero

5. Substances whose atoms have more free electrons are called :
(A) Electrolytes (B) Insulators (C) Conductors (D) Semi-conductors

6. If the distance between the charges is doubled, the force between them will become :
(A) one - fourth (B) half (C) double (D) four time

7. According to Newton's Second law of Motion–
(A) f = m × v (B) f = m × a (C) f = $\frac{m}{a}$ (D) f = $\frac{m}{v}$

8. The unit of the constant of proportionality used in coulomb's inverse square law is :
(A) N (B) Nm^2C^{-2} (C) Nm^2 (D) none of these.

9. Three charges $4q, Q$ and q are in a straight line in the position of 0, $l/2$ and l respectively. The resultant force on q will be zero, if $Q =$
(A) $-q$ (B) $-2q$ (C) $-\frac{q}{2}$ (D) $4q$

10. A sure test of electrification is :
(A) Attraction (B) Repulsion (C) Friction (D) Induction

11. What is not true for electric charge :
(A) Electric charge is scalar quantity (B) Charge on a body may be + ve or – ve
(C) S.I. unit of charge is coulomb (D) One coulomb is charge of one electron

12. A force is not required to keep a body in a :
(A) Motion with constant velocity (B) Simple harmonic motion
(C) Motion with constant acceleration (D) Uniform circular motion

13. 5 C/s is same as :
(A) 5 A (B) 5 mA (C) 5 joule (D) 5 volt

14. The fifth state of matter is formed by
(A) condensation of water vapours. (B) cooling of gas at super low temperature.
(C) sublimation of substance. (D) evaporation of liquids.

15. According to Dalton's atomic theory, atoms of different elements are -
(A) different (B) identical (C) similar (D) none of these

16. Which reaction is not oxidation reaction ?
(A) $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$ (B) $4Na + O_2 \longrightarrow 2Na_2O$
(C) $2HgO \longrightarrow 2Hg + O_2$ (D) $S + O_2 \longrightarrow SO_2$

17. When CaO is treated with water it evolves heat. It is an example of :
(A) Thermochemical reaction (B) Endothermic reaction
(C) Exothermic reaction (D) All

18. The temperature at which celsius and fahrenheit scales shows the same reading is
(A) 40° K . (B) – 40° C (C) 100° F (D) – 100° C.

19. An atom has a net charge of – 1. It has 18 electrons and 20 neutrons. Its mass number is :
(A) 37 (B) 35 (C) 38 (D) 20

20. A substance which oxidises itself and reduces other is known as
(A) Oxidising agent (B) Reducing agent (C) Both of these (D) None of these

21. Up higher in the mountains, water boils -
(A) at 100ºC (B) below 100ºC (C) above 100ºC (D) above 200ºC

22. Energy of Bohr's orbit -
(A) increases as we move away from the nucleus.
(B) decreases as we move away from the nucleus.
(C) remains the same as we move away from the nucleus.
(D) none of these

23. Rusting of iron is a chemical reaction. The reaction can be termed as -
(A) combination (B) displacement
(C) double decomposition (D) decomposition

24. The equation -
$Cu + xHNO_3 \rightarrow Cu(NO_3)_2 + yNO_2 + 2H_2O$
The values of x and y are -
(A) 4 and 2 (B) 8 and 6 (C) 3 and 5 (D) 7 and 1

25. $Zn + CuSO_4 \longrightarrow ZnSO_4 + Cu$ in this reaction reducing agent is :
(A) Zn (B) $CuSO_4$ (C) Cu (D) $ZnSO_4$

26. Rate of diffusion will be negligble when
(A) oxygen and fluorine are mixed.
(B) water and carbon dixide are mixed.
(C) water and vinegar are mixed.
(D) sodium chloride and ammonium chloride are mixed.

27. Oxygen liberated during photosynthesis come from –
(A) Water (B) Carbon dioxide (C) Glucose (D) Chlorophyll

28. Amarbel (Cuscuta) is an example of –
(A) Autotroph (B) Parasite (C) Saprotroph (D) host

29. Iodine used to detect presence of starch it gives starch –
(A) Red colour (B) Green colour (C) Blue black colour (D) Colourless appearance

30. Amylase enzyme is present in –
(A) Intestine juice (B) Saliva (C) Bile juice (D) All of the above

31. Which of the following enzymes is related with digestion of protein ?
(A) Lipase (B) Pepsin (C) Sucrase (D) Amylase

32. Which part of the human alimentary canal is the site for complete digestion of carbohydrate-
(A) Stomach (B) Small intestine (C) Large intestine (D) Rectum

33. Gastric juice contains –
(A) Pepsin and Trypsin (B) Pepsin and HCl (C) Trypsin and HCl (D) Amylase and Pepsin

34. EMP can produce a total of
(A) 6 ATP (B) 8 ATP (C) 24 ATP (D) 38 ATP

35. The process common to aerobic and anaerobic respiration is –
(A) Oxidation (B) Glycolysis (C) Kreb's cycle (D) ETC

36. The production of alcohol by yeast is called –
(A) frewing (B) Fermentation (C) respiration (D) None of these

37. Kreb's cycle takes place in –
(A) Cytoplasm (B) Mitochondrial matrix
(C) Mitochondrial cristal (D) Outside the cell

38. Cramps are caused by heavy exercise resulting in accumulation of –
(A) Carbon dioxide (B) Lactic acid (C) Ethanol (D) Heat

39. Lowering of diaphragm result in
(A) Inspiration (B) Expiration
(C) It is not related to either (D) Digestion

40. During respiration the substrate is –
(A) Reduced (B) Hydrogenated (C) Carbonated (D) Oxidised

MATHEMATICS

Straight Objective

This section contains 20 questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONLY ONE** is correct.

41. Euclid's division lemma states that for any two positive integers a and b, there exist unique integers q and r such that a = bq + r, where r must satisfy
(A) $1 < r < b$ (B) $0 < r \le b$ (C) $0 \le r < b$ (D) $0 < r < b$

42. How many prime factors are there in prime factorisation of 5005 ?
(A) 2 (B) 4 (C) 6 (D) 7

43. Simplified value of $\left(\frac{64}{125}\right)^{-2/3} + \frac{1}{\left(\frac{256}{625}\right)^{1/4}} + \left(\frac{\sqrt{25}}{\sqrt[3]{64}}\right) =$

(A) $-\frac{65}{16}$. (B) $\frac{56}{16}$ (C) $\frac{65}{16}$ (D) $-\frac{56}{16}$

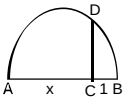
44. Name the polynomial $(x + 2)(x^2 - 2x + 4)$, according to number of term
(A) multinomial (B) trinomial (C) binomial (D) monomial

45. Two numbers are in the ratio of 9 : 5. If their LCM is 900, then HCF is :
(A) 30 (B) 20 (C) 15 (D) 60

46. $\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}} + \frac{1}{\sqrt{4}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{6}} + \frac{1}{\sqrt{6}+\sqrt{7}} + \frac{1}{\sqrt{7}+\sqrt{8}} + \frac{1}{\sqrt{8}+\sqrt{9}} =$.
(A) 9 (B) 2 (C) 3 (D) 4

47. Euclid stated that if equals are subtracted from equals, the remainders are equals in the form of
(A) an axiom (B) a postulate (C) a definition (D) a proof

48. In the given figure AB is diameter and AC = x unit and BC = 1 unit and CD $\perp$ AB then find value of CD.

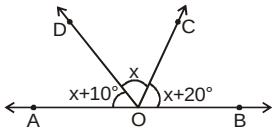


(A) x (B) $\frac{x}{2}$ (C) $\sqrt{x}$ (D) $2\sqrt{x}$

49. If a + b + c = 5 and ab + bc + ca = 10, then prove that $a^3 + b^3 + c^3 - 3abc$ =

(A) – 25 (B) 20 (C) 25 (D) – 20

50. In figure given below, value of x is



(A) 50° (B) 40° (C) 60° (D) 70°

51. The greater between $\sqrt{17}-\sqrt{12}$ and $\sqrt{11}-\sqrt{6}$ is

(A) $\sqrt{17}-\sqrt{12}$ (B) $\sqrt{11}-\sqrt{6}$ (C) Both are equal (D) Cannot compare

52. The polynomials $p(x) = ax^3 + 4x^2 + 3x - 4$ and $q(x) = x^3 - 4x + a$ leave the same remainder when divided by x – 3. Find the remainder when p(x) is divided by (x – 2)

(A) 10 (B) – 8 (C) – 10 (D) 8

53. If $x^3 + ax^2 + bx + 6$ has x – 2 as a factor and leaves a remainder 3 when divided by x – 3, find the values of a and b respectively.

(A) – 3, – 1 (B) 3, – 1 (C) – 1, – 3 (D) – 3, 1

54. The factorization of $(2a - b)^3 + (b - 2c)^3 + 8(c - a)^3$ is

(A) (2a – b) (b – 2c) (c – a) (B) 3(2a – b) (b – 2c) (c – a)

(C) 6(2a –b) (b – 2c) (c – a) (D) 2a × b × 2c

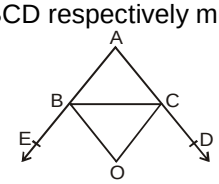
55. The zero of the polynomial p(x) = 2x + 5 is

(A) $\frac{2}{5}$ (B) $\frac{5}{2}$ (C) 0 (D) $-\frac{5}{2}$

56. The angle which is equal to 8 times its complement is

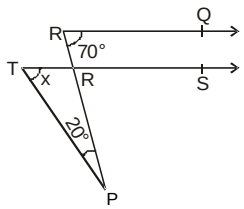
(A) 80° (B) 72° (C) 90° (D) 88°

57. In the figure given below, the sides AB and AC of ΔABC are produced to points E and D respectively. If bisectors BO and CO of $\angle CBE$ and $\angle BCD$ respectively meet at point O, then $\angle BOC$ =.



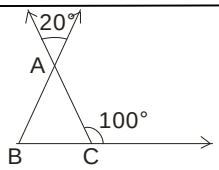
(A) $\frac{1}{2}\angle BAC$. (B) $90° + \frac{1}{2}\angle BAC$. (C) $90° - \frac{1}{2}\angle BAC$. (D) $\angle BAC$.

58. In figure given below, PQ || RS, $\angle QPR = 70°$ and $\angle ROT = 20°$. Find the value of x.



(A) 20° (B) 70° (C) 110° (D) 50°

59. In the figure given below, the measure of $\angle ABC$ is



(A) 80° (B) 20° (C) 100° (D) 60°

60. The sum of two angles of a triangle is 80° and their difference is 20°. Find the ratio of greater angle to smaller angle
(A) 10:3 (B) 10:7 (C) 2:1 (D) 4:1

SOCIAL SCIENCE

Straight Objective

This section contains 40 questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONLY ONE** is correct.

61. Read the following statements carefully.
(a) Food offers many examples of long distance cultural exchange.
(b) It is believed that noodles travelled east from china to become spaghetti.
(c) Arab traders took pasta to fifth century Sicily, an island now in Italy.
(d) Most of our common foods such as potatoes, soya ground nuts, maize, tomatoes, chilies and sweets potatoes were known to our ancestors since starting.
Which of the above statements is/are not true?
(A) a & d (B) b & d (C) a & c (D) Only d

62. Henry Ford developed his new car plant at
(A) Cleveland (B) Las Vegas (C) Detroit (D) Pittsburg

63. The Bretton Woods system was based on the
(A) fixed exchange rate (B) NSY exchange rate.
(C) BSE exchange rate. (D) National Exchange Rate.

64. The technological advancement that led to the availability of meat at affordable cost to poor people in Europe was
(A) Advanced kind of slaughtering knives (B) large iron ships
(C) Steam engines (D) refrigerated ships

65. The contracts signed by the indentured labourers of India promised their return after
(A) 3 years. (B) 5 years. (C) 7 years. (D) 9 years.

66. **Assertion:-** The decline of the old ports of Surat and Hoogly through which local merchant's had operated could be seen. Export from these ports fell dramatically.
Reason: - European companies gained power first securing a variety of concessions from local courts then the monopoly right on trade.
(A) Both (A) & (R) are true & (R) explains (A) (B) Both (A) & (R) are true but (R) does not explain (A)
(C) A is true but (R) is false (D) (A) is false but (R) is true

67. Which of the following groups forms central power during World War I?
(A) Germany, Italy & Japan (B) Germany, Austria – Hungary and ottoman Turkey
(C) Turkey, Germany & Italy (D) Both (B) & (C)

68. J.N. Tata established the first Iron and steel works in India in.
(A) 1910. (B) 1911. (C) 1912 (D) 1913

69. Read the following statements carefully.
(a) The proto – industrial system was thus part of a network off commercial exchanges.
(b) It was controlled by merchants and the goods were produced by a vast number of producers working within their family forms, not in factories.
(c) At each stage of production 20 to 25 workers were employed by each merchant.
Which of the above statements is/are false ?

(A) A & b (B) b & c (C) a & c (D) None of these

70. Which one of the following is the reason due to which company found it difficult to ensure goods supply to Europe in eighteenth century?
(A) The clothes or good were costly
(B) They were in short supply.
(C) Company faced stiff competition from other in markets.
(D) Company official were not efficient.

71. Six joint stock companies were set during 1830s and 1840s by an Indian entrepreneur called.
(A) Jamsetjee Jeejeebhoy (B) Dwarkanath Tagore. (C) Jamsetjee Tata (D) Seth Hukumchand

72. Read the following statements carefully.
(a) In a democracy, the citizens must have freedom to choose among various contenders for power.
(b) In contemporary democracies, this takes the form of competition among different parties. Such competition ensures that power does not remain in one hand.
(c) In the long run, power is shared among different political parties that represent different ideologies and social groups.
(d) In a democracy, this kind of power sharing is meant to give space in the govt. to diverse social growups who otherwise would fee alienated.
Which of the above statements is/are true regarding power sharing among different social groups?
(A) a & d (B) b & c (C) Only c (D) Only d.

73. The term ethnic implies
(A) people living in harmony. (B) a social division based on shared culture.
(C) people fighting for their community (D) people fighting for power.

74. Majoritarianism is a belief that the majority community should be able to rule a country by disregarding the.
(A) Minority community. (B) Ethnic group. (C) Sinhala community. (D) Muslim Community

75. Read the following statements carefully.
(A) The Srilankan Tamils launched parties and struggle for recognition of Sinhalese as an official language.
(B) The Srilankan Tamils demanded for regional autonomy and equality of opportunity in securing education.
(C) By 1960s Several political organsiations were formed demanding an independent Tamil Eelam.
Which of the above statements is/are not true:-
(A) a & b (B) b & c (C) a & c (D) None of these

76. The year in which use of English for official purpose was to come to an end in India -
(A) 1950 (B) 1956 (C) 1965 (D) 1980

77. Apart from the Central and the State government there is the third type of government in Belgium called the
(A) Regional government (B) Ethnic government (C) Community government (D) Federal government.

78. Read the following statements carefully.
(i) This route involves independent states coming together on their own to form a bigger unit.
(ii) These states pool sovereignty and retaining identity to increase their security.
(iii) This type of federation belongs to USA, Switzerland and Australia.
The above description belongs to which kind of system?
(A) Unitary Government (B) Coming together federation
(C) Holding together federation (D) None of these

79. In India, special status is being given to
(A) Assam. (B) Bihar. (C) Jammu and Kashmir (D) Mumbai.

80. Which of the following subjects is included in State list?
(A) Railway (B) Law and order
(C) Post and Telegraph (D) Marriage and Divorce

81. (i) It is a declaration signed by world leaders in 1992 at the United Nations conference on Environment and development.
(ii) It aims at achieving global sustainable development.

(iii) It is an agenda to combat environmental damage, poverty, diseases, through global co- operation on common, interests, mutual needs and shared responsibilities.
(iv) The main objective of the agenda 21 is that every local government should draw its own local Agenda 21.
Which of the above options is/are correct regarding the Agnenda-21?
(A) a, b & c (B) b, c & d (C) a, c & d (D) All of these

82. The Human Development Report ranks countries on the following basis:
(A) Income, health and education (B) Income, health and death rate
(C) Income, population and education (D) Infant mortality rate, health and education

83. What is the per capita income level of middle – income countries as per WDR 2012?
(A) US $ 12616 per annum and above (B) US $ 1035 or less
(C) Above US $ 1035 but below US $ 12616 (D) Rs. 35,000 and above

84. Abidjan is located in which country?
(A) Ivory coast (B) Brazil (C) Kenya (D) South Africa

85. Which the following state has low infant mortality rate?
(A) Bihar (B) Kerala (C) Jharkhand (D) Assam

86. Name the brand that is a public enterprise from the following
(A) MTNL (B) Tata Indicom (C) Airtel (D) Hutch

87. Read the following statements carefully.
(A) In India the mammoth task of measuring GDP is undertaken by central government.
(B) This ministry collects information relating to total volume of Goods and services and their price & then estimates GDP.
(C) It collects information from all the states only UTs are not included in it.
Which of the above statements is/are not true?
(A) a & b (B) B & C (C) Only C (D) None of these

88. Government owns most of the assets and provides all services in the
(A) Primary sector (B) Secondary sector (C) Public sector. (D) Private sector

89. What are Intermediate Good?
(A) Goods that are used in production of final goods and services
(B) Goods that are directly exploited from nature
(C) Goods used as input in agriculture
(D) Goods used in manufacturing

90. This soil is the result of interface leaching due to heavy rain. Humus content of the soil is low because most of the micro organism, particularly the decomposers, like bacteria, get destroyed due to high temperature, this soil is mainly found in Karnataka, Kerala, Tamilnadu , Madhya Pradesh and the hilly areas of Odisha and Assam.
The above description belongs to which type of soil?
(A) Red & Yellow soil (B) Laterite soil (C) Arid soil (D) Black soil

91. Match the column – I with Column – II :

Column – I	**Column – II**
(i) Dairy Farming	(a) Secondary sector
(ii) Insurance	(b) Factor of production
(iii) Production	(c) Primary sector
(iv) Land and Capital	(d) Tertiary sector

(A) (i)-a, (ii)-c, (iiii) -d, (iv)- b (B) (i)-b, (ii)-a, (iiii) -c, (iv)- d
(C) (i)-c, (ii)-b, (iiii) -a, (iv)- d (D) (i)-c, (ii)-d, (iiii) -a, (iv)- b

92. What are the dual objectives of the federal system?
(A) To promote unity of the country and to accommodate regional diversity.
(B) To distribute powers and funds to the central government.
(C) To provide facilities and job to the citizens of the country.
(D) To ensure that the power would be transferred from the state to the central government.

93. Match List – I with List – II and select the correct answer using the codes given below it.

List – I	**List-II**
A. Union of India	(i) The Prime minister
B. State	(ii) Sarpanch
C. Municipal corporation	(iii) the Governor
D. Gram Panchayat	(iv) Mayor

(A) A-i, B-iiii, C-iv, D-ii (B) A-i,B-iii, C-ii, D-iv (C) A-ii, B-iv, C-iiii, D-i (D) A-i,B-iv, C-iii, D-ii

94. National forest policy was introduced in.
(A) 1951 (B) 1952 (C) 1953 (D) 1954

95. Village Sukhomajri is located in-

(A) Uttar Pradesh (B) Madhya Pradesh

(C) Maharashtra (D) Andhra Pradesh

96. Which river is famous for gully erosion?

(A) Narmada (B) Chambal (C) Tapi (D) Godavari

97. Which one of the following is the main cause of land degradation in Punjab?

(A) Mining (B) over irrigation (C) Deforestation (D) Overgrazing

98. Which states face deforestation due to mining?

(A) Gujarat, Rajasthan, Madhya Pradesh, Maharashtra

(B) Jharkhand, Chhattisgarh, Madhya Pradesh, and Orissa

(C) Gujarat, Jharkhand, Madhya Pradesh.

(D) Punjab, Haryana, Western U.P.

99. The lower horizons of the soil are occupied by kankar because of increasing _____ content downward.

(A) Potash (B) Fertilizers (C) Calcium (D) Iron

100. Which of the following soil is useful for the cultivation of tea and coffee?

(A) Arid Soil (B) Laterite soil (C) Black soil (D) Red & Yellow soil

NTSE PATTERN TEST-1
(NTSE PATTERN)
TARGET: 2018

DATE : 12-06-2018
CLASS : X [SAT]

HINTS & SOLUTIONS

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	B	C	C	B	C	A	B	B	A	B	D	A	A	B	A
Ques.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	C	C	B	A	B	B	A	A	A	A	D	A	B	C	B
Ques.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	B	B	B	B	B	B	B	B	A	D	C	B	C	C	B
Ques.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	B	A	C	A	A	B	A	A	C	D	A	C	D	A	A
Ques.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	B	C	A	D	B	A	B	C	D	C	B	D	B	A	C
Ques.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans.	C	C	B	C	B	D	A	C	A	B	A	C	C	A	B
Ques.	91	92	93	94	95	96	97	98	99	100					
Ans.	D	A	A	B	B	B	B	B	C	B					

1. Given : Charge, $Q = 2.5 \times 10^3$ C
Current, $I = 12.5$ A

We know, Current = $\frac{\text{Charge}}{\text{Time}}$

Time = $\frac{\text{Charge}}{\text{Current}} = \frac{Q}{I}$

$\Rightarrow$ Time = $\frac{2.5 \times 10^3}{12.5} = 200\text{s}$

2. Recoil velocity

$V = \frac{mv}{M} = \frac{50 \times 10^{-3} \times 10^2}{10} = \frac{1}{2} = 0.5$ m/s

3. Potential difference, V = 1500 V
Charge on electron, $q = 1.6 \times 10^{-19}$ C
Energy imported = $qV = 1.6 \times 10^{-19} \times 1500$
$= 2.4 \times 10^{-16}$ J.

4. Acceleration of the system,

$a = \frac{3}{2+1} = 1$ m/s

For the block of 1 kg, (suppose force between the blocks is F′)
F′ = 1 × a
F′ = 1 × 1 = 1 N

6. The force between two charges

$F \propto \frac{1}{r^2}$ ..... (i)

If r is doubled than new force

$F' \propto \frac{1}{(2r^2)}$ ..... (ii)

From (i) and (ii)

$F' = F/4$

8. According to coulomb's inverse square law, force between two charges placed at a distance r is given by :

$F = \frac{KQ_1Q_2}{r^2} \Rightarrow K = \frac{Fr^2}{Q_1Q_2}$

Here K is constant and its unit will be Nm^2C^{-2}

9. The force between $4q$ and q; $F_1 = \frac{1}{4\pi\varepsilon_0} \cdot \frac{4q \times q}{l^2}$

The force between Q and q; $F_2 = \frac{1}{4\pi\varepsilon_0} \cdot \frac{Q \times q}{(l/2)^2}$

We want $F_1 + F_2 = 0$ or $\frac{4q^2}{l^2} = -\frac{4Qq}{l^2} \Rightarrow Q = -q$

12. When a body moves with constant velocity then acceleration in the body is zero.
$\therefore$ Force is zero. We can say that a force is not required to keep a body in motion with constant velocity.

16. $2HgO \longrightarrow 2Hg + O_2$ involves removal of oxygen. Thus, it is not an oxidation reaction.

17. A reaction in which a single product is formed from two or more reactants is known as a combination reaction.We have two reactants and one product in the above mentioned reaction.

18. When impurity is added to a solvent its boiling point increases. 10% aqueous solution of NaCl is prepared by dissolving 10g NaCl in 90g of water. So, boiling point of 10% aqueous solution of NaCl will be more than 100ºC. (Boiling point of pure water is 100ºC)

19. Mass number = number of protons + no. of neutrons.
= 17 + 20 = 37

20. The decomposition reactions require energy either in the form of heat, light or electricity for breaking down the reactants.
Reactions in which energy is absorbed are known as endothermic reactions.

21. Up higher in mountains, atmospheric pressure decreases. Hence boiling point of water also decreases.

24. The balanced chemical equation is -
$Zn + 2HCl \longrightarrow ZnCl_2 + H_2$

25. $Zn + CuSO_4 \longrightarrow ZnSO_4 + Cu$. In this reaction Zn is losing $2e^-$ to become Zn^{++} these $2e^-$ are being gained by Cu^{++} to become Cu. Thus, $CuSO_4$ is being reduced by Zn. hence, Zn is acting as a reducing agent.

46. Rationlising the denominator of each term on LHS, we have

$$\text{LHS} = \frac{1-\sqrt{2}}{1-2} + \frac{\sqrt{2}-\sqrt{3}}{2-3} + \frac{\sqrt{3}-\sqrt{4}}{3-4} + \frac{\sqrt{4}-\sqrt{5}}{4-5} + \frac{\sqrt{5}-\sqrt{6}}{5-6} + \frac{\sqrt{6}-\sqrt{7}}{6-7} + \frac{\sqrt{7}-\sqrt{8}}{7-8} + \frac{\sqrt{8}-\sqrt{9}}{8-9}$$

$$= -1 + \sqrt{2} - \sqrt{2} + \sqrt{3} - \sqrt{3} + \sqrt{4} - \sqrt{4} + \sqrt{5} - \sqrt{5} + \sqrt{6} - \sqrt{6} + \sqrt{7} - \sqrt{7} + \sqrt{8} - \sqrt{8} + \sqrt{9}$$

$= -1 + \sqrt{9} = -1 + 3 = 2 = \text{R.H.S.}$

49. $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ac)$
$= 5[(a + b + c)^2 - 3(ab + bc + ca)]$
$= 5(25 - 30)$
$= 5 \times (-5) = -25.$

52. $p(3) = 27a + 36 + 9 - 4 = 27a + 41$
$q(3) = 27 - 12 + a = 15 + a$
Since the remainders are the same, therefore
$27a + 41 = 15 + a$
$\Rightarrow$ $26a = -26$
Or $a = -1$
So, $p(x) = (-1)x^3 + 4x^2 + 3x - 4$
So, $p(2) = -8 + 16 + 6 - 4 = 10$.

53. $f(x) = x^3 + ax^2 + bx + 6$
Since $(x - 2)$ is a factor,
So, $f(2) = 8 + 4a + 2b + 6 = 0 \Rightarrow 2a + b + 7 = 0$ ……(i)
Also, when divided by $x - 3$, the remainder is 3.
So, $f(3) = 27 + 9a + 3b + 6 = 3 \Rightarrow 3a + b + 10 = 0$ ……..(ii)
Subtracting (i) and (ii),
$a + 3 = 0 \Rightarrow a = -3$.
So, from (i), $2 \times (-3) + b + 7 = 0 \Rightarrow b = -1$.

57. Since BO is the angle bisector of $\angle CBE$.
So, $\angle CBO = \frac{1}{2} \angle CBE$ ……(i)
Since CO is the angle bisector of $\angle BCD$.
So, $\angle BCO = \frac{1}{2}\angle BCD$ ……(ii)
Also, $\angle ABC + \angle CBE = 180°$ (Linear pair axiom)
So, $\angle CBE = 180° - \angle ABC$ ……(iii)
So, $\angle CBO = \frac{1}{2}(180° - \angle ABC) = 90° - \frac{1}{2} \angle ABC$ ……(iv) [Using (i) and (iii)]
Also, $\angle ACB + \angle BCD = 180°$ (Linear pair axiom)
So, $\angle BCD = (180° - \angle ACB)$ ……..(v)
So, $\angle BCO = \frac{1}{2}$ (180° – ACB) = 90°
In ΔOBC,
$\angle BOC + \angle CBO + \angle BCO = 180°$ (Angle sum property of a triangle)
So, $\angle BOC = 180° - \angle CBO - \angle BCO$
$= 180° - (90° + \frac{1}{2} \angle ABC) - (90° - \frac{1}{2}\angle ACB)$ [Uisng (iv) and (vi)]
$= 180° - 90° + \frac{1}{2} \angle ABC - 90° + \frac{1}{2} \angle ACB$
$= \frac{1}{2} (\angle ABC + \angle ACB)$
$= \frac{1}{2}$ (180° – ∠A + ∠ABC + ∠ACB =180°]
$= 90° - \frac{1}{2} \angle A = 90° - \frac{1}{2} \angle BAC$ Proved.

60. In ΔABC
$\angle A + \angle B = 80°$ ….(i)
$\angle A - \angle B = 20°$ …..(ii)
Solving (i) and (ii), we get
$\angle A = 50°$, $\angle B = 30°$
$\therefore$ $\angle C = 100°$.