SCIENCE & RESEARCH TEST-I

CODE: 2101 PRELIMS

Max. Marks : 75 **Duration : 75 Mins.**

General Instructions :

1. Please find the Answer Sheets (OMR) with in the envelop given to you.
2. Mention your Test Code, Student ID, Name, Class, Section and School Name on the OMR Sheet as per Question Paper and Hall Ticket.
3. This question paper contains 75 Questions, duration is 75 minutes.
4. Do rough work in the empty sheet provided along with this question paper.
5. Answer questions in OMR sheet only.
6. Don't write or tick anything on the question paper.
7. Use only Black or Blue Ball Point Pen or Dark Perncil to answer the question in OMR sheet.
8. Indicate the correct answer by darkening one of the 4 or 5 responses provided.
9. Submit only OMR sheet to the invigilator

1. When viewed vertically a fish appears to be 4 meter below the surface of the lake. If the index of refraction of water is 1.33, then the true depth of the fish is

a) 5.32 metres b) 3.32 metres

c) 4.32 metres d) 6.32 metres

2. An object is placed in front of a concave miror of focal lenth 50.0 cm and a real image is formed 75 cm in front of the mirror. How far is the object from the mirror

a) 25 cm b) 30 cm

c) 150 cm d) -150 cm

3. **What is magnification of an object if it is placed at a distance of 30 cm in front of a concave lens of focal length 60 cm**

   a) 3/2 b) 2/3 c) –2/3 d) –3/2

4. **If the correct camera exposure for a certain scene is $\frac{1}{100}$ of a second when the diaphragm is set at $\frac{f}{3}$ what exposure time is required at $\frac{f}{12}$?**

   a) 0.14 s b) 0.16 s c) 0.18 s d) 0.20 s

5. **Suppose a small angled prism of 6^0 deviates a ray through 3^0, then the refractive index is:**

   a) 0.1 b) 0.5 c) 1.0 d) 1.5

6. **You are under the water in a clear lake looking at the surface and see the image of a fish due to total internal reflection. What is the minimum angle that the light leaving the fish makes with the normal to the surface of the lake?**

   a) 42^0 b) 53^0 c) 49^0 d) 37^0

7. **The following 'precautions' were listed by a student in the experiment on study of 'dependence of current on potential difference':**

   a) Use copper wires as thin as possible for making connections.

   b) All the connections should be kept tight.

   c) The positive and negative terminals of the voltmeter and the ammeter should be correctly connected.

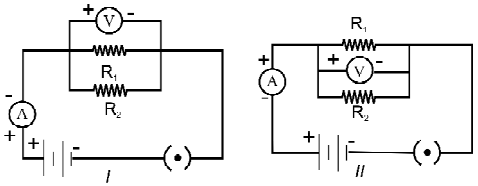
   d) The 'key' in the circuit, once plugged in, should not be taken out till all the observations have completed.

   The 'precautions' that need to be corrected and revised are:

   a) (A), (C) and (E) b) (C) and (E)

   c) (B) and (E) d) (A) and (E)

8. Two students are using the circuits shown here. They are doing the experiment to find the equivalent resistance of a



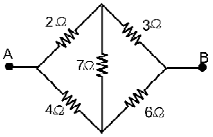
a) Series combinatiion and a parallel combination, respectively of the two given resistors

b) parallel combination and a series combination respectively of the two given resistors

c) series combination of two given resistors in both the cases

d) parallel combination of the two gives resistors in both the cases

9. Five resistances are connected as shown in the figure. The effective resistance between points A and B is:



a) $\frac{10}{3}\Omega$ b) $\frac{20}{3}\Omega$ c) $15\,\Omega$ d) $6\,\Omega$

10. An electric kettle is rated at 230 V, 1000 W. What is he resistance of its element and what maximum current can pass through it?

a) 4.35 A b) 6.46 A c) 7.40 A d) 9.36 A

11. If a charge of 1.6×10^{-19} culomb flows per second through any cross section of any conductor, the current constitute will be

a) 2.56×10^{-19} A b) 6.25×10^{-19} A

c) 1.6×10^{-19} A d) 3.2×10^{-19} A

12. In a wire of length 4m and diameter 6mm, a current of 120 ampere is passed. The potential difference across the wire is found to be 18 volt. The resistance of wire will be

a) 0.15 ohm b) 0.25 ohm

c) 6.660 ohm d) none of the above

13. An electric current i is flowing in a circular coil of radius a. At what distance from the center of the axis of the coil will the magnetic field be 1/8th of its value at the centre?

a) 3a b) $\sqrt{3}a$ c) a/3 d) $a/\sqrt{3}$

14. When the number of turns in a toroidal coil is doubled, the value of magnetic flux density will become

a) four times b) eight times

c) half d) double

15. Electric motor

a) is based on electromagnetic induction

b) converts kinetic energy into electric energy

c) converts electric energy into kinetic energy

d) none

16. The mains power supply of a house is through a 2 A fuse. How many 50 W bulbs can be used in this house at the normal voltage?

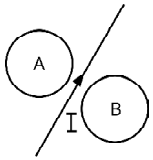
a) 5 b) 6 c) 7 d) 8

17. Two coils of self inductances L_1 and L_2 are placed so close together that effective flux in one coil is completely linked with the other. If M is the mutual inductance between them, then

a) $M=L_1L_2$ b) $M=L_1/L_2$

c) $M=(L_1L_2)^2$ d) $M = \sqrt{(L_1 L_2)}$

18. Consider the situation shown in figure. If the current I in the long straight wire XY is increased at a steady rate then the induced emf's in loops A and B will be-



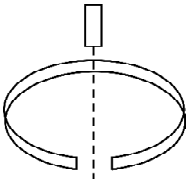
a) clockwise in A, anticlockwise in B

b) anticlockwise in A, clockwise in B

c) clockwise in both A and B

d) anticlockwise in both A and B

19. A copper ring having a cut such as not to form a complete loop is held horizontally and a bar magnet is dropped through the ring with its length along the axis of the ring. Then acceleration of the falling magnet is - (neglect air friction)



a) g

b) less than g

c) more than g

d) 0

20. Which quantity is conserved in nuclear reaction?

a) Mass number

b) Atomic number

c) (a) and (b)

d) None

21. Choose the incorrect staement

a) We are encouraged to plant more trees so as to ensure clean environment and also provide bio-mass fuel

b) Gobar-gas is produced when crops, vegetable wastes etc., decompose in the absence of oxygen.

c) The main ingredient of bio-gas is ethane and it gives a lot of smoke and also produces a lot of residual ash

d) Bio-mass is a renewable source of energy.

22. Study the following statements and choose the correct answer.

i) Nuclear forces obey inverse square law

ii) positron is antiparticle of electron.

a) (i) is true, (ii) is false

b) (i) is false, (ii) is true

c) both (i) and (ii) are false

d) both (i) and (ii) are true

23. The dependence of density [d] of nuclear matter on the mass number A is

a) $d \propto A$ b) $d \propto \sqrt{A}$ c) d = const. d) $d \propto 1/A$

24. If N_0 is the original mass of the substance of half-life period $t_{1/2}$ = 5 years, then the amount of substance left after 15 years is

a) $N_0/8$ b) $N_0/16$ c) $N_0/2$ d) $N_0/4$

25. Which of the following cannot be emitted by radioactive substances during their decay?

a) Protons b) Neutrinoes

c) Helium nuclei d) Electrons

26. The hormone which helps in the osmoregulation is

a) antidiuretic b) thyroxine

c) epinephrin d) norepinephrine

27. The chief inorganic substance present in the urine is

a) sodium chloride b) potassium

c) Calcium d) Magnesium

28. FSH is produced by

a) posterior lobe of pituitary gland

b) middle lobe of pituitary gland

c) anterior lobe of pituitary gland

d) none of the above

29. Which of the following tissues provide control and coordination in animals?

a) Muscular and skeletal b) Skeletal and nervous

c) Nervous and muscular d) Muscular and transport

30. Growth - related movements are known as:

a) Tropic movements b) Nastic movements

c) Directional movements d) Both (a) and (c)

31. In a synapse, chemical signal is transmitted from

a) dendritic end of one neuron to axonal end of another neuron.

b) axon to cell body of the same neuron.

c) cell body to axonal end of the same neuron.

d) axonal end of one neuron to dendritic end of another neuro.

32. Embryo sac is found in

a) endosperm b) ovule

c) embryo d) seed

33. The mechanism in mitosis ensuring genetical continuity is

a)having chromosome number between two daughter cells

b)formation of unequal daughter cells

c)segregation of paternal and maternal characters

d)formation of two daughter cells with identical DNA

34. A feature of reproduction that is common to amoeba, Spirogyra and Yeast is that

a) they reproduce asexualy.

b) they are all unicellular.

c) they reproduce only sexually.

d) they are all multicelluar.

35. The given slides A and B were identified by four students, I,II, III and IV as stated below:

Slide A	Slide B
I. Binary fission in Amoeba II. Budding in yeast III. Binary fission in Amoeba IV. Budding in yeast	Daughter cells of Amoeba Buds of yeast Buds of yeast Daughter cells in Amoeba

a) I b) II

c) III d) IV

36. Good example for multiple allelism is

a) blood groups b) skin colour in man

c) haemophilia d) colour blindness

37. Which of the following was central point in Darwin's theory of evolution by natural selection?

a) The biological structures of an organism is most likely to inherit from its parents are those that have become better suited to the environment through constant use

b) Mutations occur to help future generations adapt to their environment

c) Slight variations among individuas significantly affect the chance that a given individual will survive in its evironment and be able to reproduce

d) Genes change in order to help organisms cope with problems encountered within their environment.

38. If A and B have n characteristics common while A and C have n/2 charactersitics common, then which of the two organisms are more closely related?

a) A and C

b) A and B

c) Characteristitics need to be konown

d) None of these

39. Limbs of a frog, lizzard, bird, human are

a) analogous

b) homologus

c) analogous and homologous

d) used to fly

40. The pollutant present in coal mine exhaust is

a) carbon monoxide

b) carbon dioxide

c) water vapour

d) ash

41. Radioactive wastes from nuclear plants affect man by causing

a) sterility

b) genetic defects

c) somatic effects

d) nervous disorders

42. Excessive exposure of humans to UV-rays results in

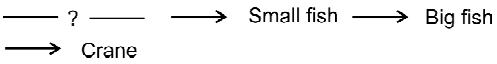
i) damage to immune system ii) damage to lungs

iii) skin cancer iv) peptic ulcers

a) (i) and (ii) b) (ii) and (iv)

c) (i) and (iii) d) (iii) and (iv)

43. Which is the missing organism in this food chain ?



a) Water b) Oxygen c) Plants d) Air

44. Which of the following is necessary for speciation to occur ?

a) A large number of mutations accumulating within a population

b) Reproductive isolation of two population of organisms

c) A reduction in the number of individuals in a population

d) Matings beween two populations of organisms produce offspring with low survivorship

45. Which of the following canals brought about greenery in Rajasthan?

a) Jawaharlal Canal b) Rajiv Gandhi Canal

c) Mahatma Gandhi Canal d) Indira Gandhi Canal

46. Among the statements given below, select the ones that correctly describe the concept of substainable development

i) Planned growth with minimum damage to the environment

ii) Growth irrespective of the extent of damage caused to the environment

iii) Stopping all developmental work to conserve te environment.

iv) Growth that is acceptable to all the stateholders.

a) (i) and (iv) b) (ii) and (iii)

c) (ii) and (iv) d) (iii) only.

47. Expand the abbreviation GAP.

a) Governmental Agency for Pollution Control

b) Ganga Assimilation by Photosynthesis

c) Ganga Action Plan

d) Governmental Agency for Animal Protection.

48. The breakdown of pyruvate to give carbon dioxide, water and energy takes place in

a) Cytoplasm b) Mitochondrion

c) Chloroplast d) Nucleus

49. Raisins are soaked in water for determining the percentage of water absorbed by raisins.

The formula, used by a student, for calculating the percentage of water absorbed, is:

a) $\frac{Initial\ weight - Final\ weight}{Initial\ weight} \times 100$

b) $\frac{Final\ weight - Initial\ weight}{Initial\ weight} \times 100$

c) $\frac{Final\ weight - Initial\ weight}{Final\ weight} \times 100$

d) $\frac{Initial\ weight - Final\ weight}{Final\ weight} \times 100$

50. Light is not needed by plants in which phase of Photosynthesis

a) Light reaction b) Dark reaction

c) Light reaction and dark reaction

d) Only light reaction

51. Consider the reaction:

$H_2S + Cl_2 \rightarrow 2HCl + S$

The statement which is not correct for the given reaction is :

a) Cl_2 get reduced to HCl b) H_2S get oxidised to S

c) Cl_2 is the oxidising agent d) H_2S is the oxidising agent

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

a) $CuO + H_2 \rightarrow H_2O + Cu$ b) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

c) $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$ d) $Zn + 2HCl \rightarrow H_2 + ZnCl_2$

53. In the following equations:

$Na_2CO_3 + xHCL \rightarrow 2Nacl + Co_2 + H_2O$

the value of x is -

a) 1 b) 2

c) 3 d) 4

54. For the reaction $2A + B \rightarrow 3C + D$

which of the following does not express the reaction rate ?

a) $-\frac{d[B]}{dt}$ b) $\frac{d[D]}{dt}$ c) $-\frac{1}{2}\frac{d[A]}{dt}$ d) $-\frac{1}{3}\frac{d[C]}{dt}$

55. According to Le-chatelier's principle, adding heat to a $solid \rightleftharpoons liquid$ **equilibrium will cause the**

a) temperature to increase

b) temperature to decrease

c) amount of liquid to decrease

d) amount of solid to decrease

56. An acid used in lead storage batteries is:

a) H_2So_4 b) HNO_3 c) HCl d) CH_3COOH

57. Of the aqueous solutions listed below, which would be the best conductor of an electric current ?

a)1.00 M HCl b) 1.00 M $HC_2H_3O_2$

c)1.00 M $C_2 H_5 OH$ d) 1.00 M HClO

58. A Student was given four unknown colourless samples labelled as A, B, C and D and asked to test their pH using pH paper. He observed that the colour of pH paper truned to light green, dark red, light orange and dark blue with samples A, B, C and D respectively.

The correct sequence of increasing order of the pH value for samples is :

a)A < B < C < D b) A < D < C < B

c)C < B < A < D d) B < C < A < D

59. Conjugate acid of NH_2^- is :

a) NH_4^+ b) NH_3 c) NH_2 d) NH

60. Calculate the pOH of a solution at 25^0C that contains 1 x 10^{-10} M of hydroniumions, i.e. H_3O^+.

a) 4.000 b) 9.0000 c) 1.000 d) 7.000

61. In Ag - CuSO4 cell silver electrode will serve as

a)anode b) cathode

c)Both anode and cathode d) None of these

62. By convention potential of standard hydrogen electrode at all temperature is

a) 0V b) IV c) 10V d) 100V

63. The slag formed in the extraction of copper from copper pyrites is :

a) $CaSiO_3$ b) $FeSiO_3$ c) FeS d) $Ca_3(PO_4)_2$

64. Which of the following reactions can be used to join railway tracks ?

a) $3MnO_2 + 4Al \rightarrow 3Mn + 2Al_2O_3$

b) $Fe_2O_3 + 2Al \rightarrow 2Fe\ Al_2O_3$

c) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

d) $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

65. Of the following, which cannot be obtained by electrolysis of the aqueous solution of their salt is

a) Ag b) Mg and Al c) Cu d) Cr

66. Oxidation of a primary alcohol with KMn_o2 / OH gives a/an :

a) carboxylic acid b)ether

c) ketone d) ester

67. Which one of the following reactions represents 'esterification' ?

a) $CH_3COOH + C_2H_5OH \xrightarrow{Conc\ H_2SO_4} CH_3COOC_2H_5 + H_2O$

b) $CH_3COOC_2H_5 + NaOH \longrightarrow CH_3COONa + C_2H_5OH$

c) $2C_2H_5OH + 2Na \longrightarrow 2C_2H_5ONa + H_2$

d) $C_2H_5OH \xrightarrow[443K]{Conc\ H_2SO_4} CH_2 = CH_2 + H_2O$

68. The number of oxygen molecules uded in the combustion of 1 molecule of ethanol is

a) 1 b) 2

c) 3 d) 4

69. Which of the following does not belong to the same homologous series ?

a) CH_4 b) C_2H_6

c) C_3H_8 d) C_4H_8

70. The IUPAC name of the compound having the formula $(CH_3)_3CCH = CH_2$ is

a) 3,3,3-trimethyl -1-propane

b) 1,1,1-trimethyl -1-butene

c) 3,3-dimethyl -l-butene

d) 1,1-dimethyl-1,3-butene

71. Howmany different isomers are possible for a hydrocarbon with the molecular formula C_4H_{10}

a) 1 b) 2

c) 3 d) 5

72. Glacial acetic acid is

a) 100% acetic acid free of water

b) solidified acetic acid

c) gaseous acetic acid

d) frozen acetic acid

73. If element a belongs to group III, and second period of the periodic table, which of the following sets of properties would it exhibit ?

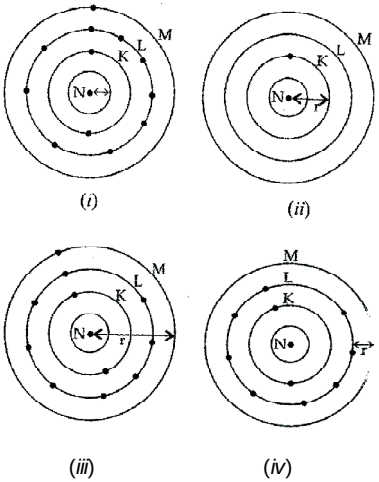
a) Liquid, most metallic

b) Gaseous, moderately metallic

c) Solid, nonmetallic

d) Solid, less metallic

74. Which one of the following depict the correct representation of atomic radius(r) of an atom ?



a) (i) and (ii) b) (ii) and (iii)

c) (iii) and (iv) d) (i) and (iv)

75. If the two members of a Dobereiner triad are phosphorus and antimony, the third member of this triad is

a) arsenic b) sulphur

c) iodine d) calcium

KEY TO MODEL PAPER - I

1. a	2. d	3. b	4. b	5. d	6. c
7. d	8. b	9. a	10. a	11. c	12. a
13. b	14. d	15. c	16. d	17. d	18. a
19. a	20. c	21. c	22. b	23. c	24. a
25. a	26. a	27. a	28. c	29. c	30. a
31. d	32. b	33. d	34. a	35. a	36. a
37. c	38. c	39. b	40. d	41. b	42. c
43. c	44. b	45. d	46. a	47. c	48. b
49. b	50. b	51. d	52. c	53. b	54. d
55. d	56. a	57. a	58. d	59. b	60. a
61. b	62. a	63. b	64. b	65. b	66. a
67. a	68. c	69. d	70. c	71. b	72. a
73. d	74. b	75. a			