BITSAT Exam 2025

Full Syllabus Test Series

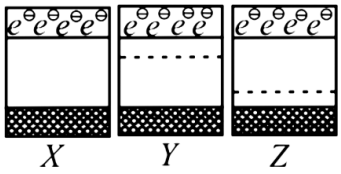
Practice Test - 2

Time: 3 hours **Max. Marks:** 390

Physics

Single Choice Question

Q1 The energy band diagrams for three semiconductor samples of silicon are as shown. We can then assert that



a) Sample X is undoped while samples Y and Z have been doped with a third group and a fifth group impurity respectively

b) Sample X is undoped while both samples Y and Z have been doped with a fifth group impurity.

c) Sample X has been doped with equal amounts of third and fifth group impurities while samples Y and Z are undoped

d) Sample X is undoped while samples Y and Z have been doped with a pentavalent and a trivalent impurity respectively.

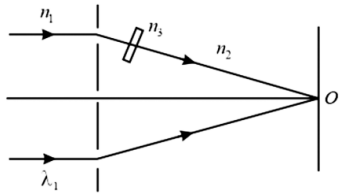
Q2 The charge of a parallel plate capacitor is varying as $q = g_0 \sin(2\pi ft)$. The plates are very large and close together (area= A, separation = d). Neglecting the edge effects, the displacement current through the capacitor is

a) $\frac{d}{A\varepsilon_0}$ **b)** $\frac{d}{\varepsilon_0}\sin 2\pi ft$ **c)** $2\pi rfq_0 \cos 2\pi ft$ **d)** $\frac{2\pi fq_0}{\varepsilon_0}\cos 2\pi ft$

Q3 A particle of mass 100 g is thrown vertically upwards with a speed of 5 m s^{-1}. The work done by the force of gravity during the time, the particle goes up is

a) –0.5 J **b)** –1.25 J **c)** 1.25 J **d)** 0.5 J

Q4 In the figure shown in a Young's double slit experiment, a parallel beam of light is incident on the slits from a medium of refractive index n_1. The wavelength of light in this medium is λ_1. A transparent slab of thickness t and refractive index n_3 is put in front of one slit. The medium between the screen and the plane of the slits is n_2. The phase difference between the light waves reaching point O (symmetrical relative to the slits) is,



a) $\frac{2\pi}{n_1\lambda_1}(n_3 - n_2)t$ **b)** $\frac{2\pi}{\lambda_1}(n_3 - n_2)t$ **c)** $\frac{2\pi n_1}{n_2\lambda_1}\left(\frac{n_3}{n_2} - 1\right)t$ **d)** $\frac{2\pi n_1}{\lambda_1}(n_3 - n_2)t$

Q5 A body covers first $\frac{1}{3}$ part of its journey with a velocity of 2 m s^{-1}, next $\frac{1}{3}$ part with a velocity of 3 ms^{-1} and the rest of the journey with a velocity 6 ms^{-1}. The average velocity of the body will be

a) 3 ms^{-1} **b)** $\frac{11}{3}$ ms^{-1} **c)** $\frac{8}{3}$ ms^{-1} **d)** $\frac{4}{3}$ ms^{-1}

Q6 The angular separation between the minute hand and the hour hand of a clock at 12 : 20 pm is

a) 120° **b)** 90° **c)** 110° **d)** 100°

Q7 A hollow sphere is filled with water through a small hole in it. It is then hung by a long thread and made to oscillate. As the water slowly flows out of the hole at the bottom, the period of oscillation will

a) Continuously decrease

b) Continuously increase

c) First decrease and then increase to original value

d) First increase and decrease to original value

Q8 Two wires, one made of copper and other of steel are joined end to end (as shown in figure). The area of cross section of copper wire is twice that of steel wire. They are placed under compressive force of magnitudes F. Find the ratio of their lengths such that change in lengths of both wires are same
($Y_S = 2 \times 10^{11}$ N/m^2 and $Y_C = 1.1 \times 10^{11}$ N/m^2)

a) 2.1 **b)** 1.1 **c)** 1.3 **d)** 2

Q9 An electric bulb, a capacitor, a battery and a switch are all in series in a circuit. How does the intensity of light vary when the switch is turn on?

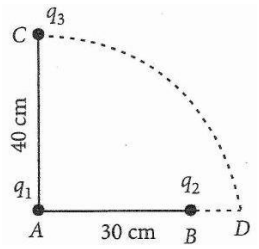
a) Continues to increase gradually

b) Gradually increases for sometime and then becomes steady

c) Sharply rises initially and then gradually decreases

d) Gradually increases for sometime and then gradually decreases

Q10 Two charges q_1 and q_2 are placed 30 cm apart, as shown in the figure. A third charge q_3 is moved along the arc of a circle of radius 40 cm from C to D. The change in the potential energy of the system is $\frac{q_3}{4\pi\varepsilon_0}k$, where k is



a) $8q_1$ **b)** $6q_1$ **c)** $8q_2$ **d)** $6q_2$

Q11 A block of mass 2 kg, slides on an inclined plane which makes an angle of 30 ° with the horizontal. The coefficient of friction between the block and the surface is $\frac{\sqrt{3}}{2}$. What force along the plane, should be applied to the block so that it moves down with constant velocity?

a) 11.21 **b)** 4.5 **c)** 6.7 **d)** 30.14

Q12 Rate of change of weight near the earth's surface varies with height (h) as

a) h **b)** h^0 **c)** h^{-1} **d)** $h^{1/2}$

Q13 The increase in the width of the depletion region in a $p-n$ junction diode is due to

a) forward bias only **b)** reverse bias only

c) both forward bias and reverse bias **d)** increase in forward current

Q14 Infinite springs with force constants, k, 2k, 4k, 8k... are connected in series. The effective force constant of the springs combination will be,

a) 2k **b)** k **c)** $\frac{k}{2}$ **d)** $\frac{k}{3}$

Q15 Light travels through a glass plate of thickness t and having refractive index μ. If c be the velocity of light in vacuum, time taken by the light to travel through this thickness of glass is

a) $\frac{t}{\mu C}$ **b)** $\frac{tC}{\mu}$ **c)** $\frac{\mu t}{C}$ **d)** μ tC

Q16 Two pendulums of length 1.69 m and 1.44 m start swinging together. After how many vibrations will they again start swinging together?

a) 8 **b)** 10 **c)** 12 **d)** 14

Q17 Which of the following is not a plastic body?

a) Rubber **b)** Clay **c)** Plasticine **d)** Putty

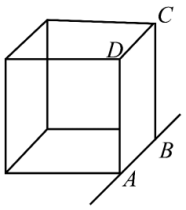
Q18 The binding energy per nucleon for deuterons (^2_1H) and helium (^4_2H) are 1.1 MeV and 7.0 MeV respectively. The energy released when two deuterons fuse to form a helium nucleus (^4_2H) is:

a) 28 MeV **b)** 2.2 MeV **c)** 23.6 MeV **d)** 18.6 MeV

Q19 The number of turns in a coil of wire of fixed radius is 600 and its self inductance is 108 mH. The self inductance of a coil of 500 turns will be,

a) 74 mH **b)** 75 mH **c)** 76 mH **d)** 77 mH

Q20 A solid cube of wood of side 2a and mass M is resting on a horizontal surface as shown in the figure. The cube is free to rotate about a fixed axis AB. A bullet of mass m(<< M) and speed υ is shot horizontally at the face opposite to ABCD at a height of $\frac{4a}{3}$ from the surface to impart the cube an angular speed ω. It strikes the face and embeds in the cube. Then ω is close to (note: the moment of inertia of the cube about an axis perpendicular to the face and passing through the center of mass is $\frac{2Ma^2}{3}$.)



a) $\frac{M\upsilon}{ma}$ **b)** $\frac{M\upsilon}{2ma}$ **c)** $\frac{m\upsilon}{Ma}$ **d)** $\frac{m\upsilon}{2Ma}$

Q21 A conductor has been given a charge -3×10^{-7} C by transferring electrons. Mass increase (in kg) of the conductor and the number of electrons added to the conductor are, respectively

a) 2×10^{-16} and 2×10^{31} **b)** 5×10^{-31} and 5×10^{19}

c) 3×10^{-19} and 9×10^{16} **d)** 2×10^{-18} and 1.8×10^{12}

Q22 Calculate the magnetic moment of a closely wound coil of 200 turns having a radius 15 cm and carrying a current of 4 A.

a) 36.5 A m^2 **b)** 56.5 A m^2 **c)** 66.5 A m^2 **d)** 108 A m^2

Q23 A hollow metallic bob is filled with a liquid. A small hole is drilled just below the centre of gravity of the bob so that the liquid slowly drops out of it. Water drops out continuously and the bob gets empty of liquid. In this entire process centre of gravity

a) remains at the centre of the bob throughout.

b) first shifts downwards from the centre of the bob, then upwards and A returns back to centre when the bob gets completely empty.

c) first shifts upwards from the centre of the bob, then downwards and returns back to centre when the bob gets completely empty.

d) keeps moving upward and downward periodically.

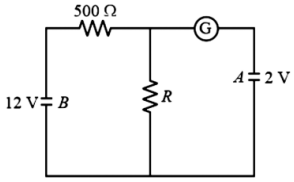
Q24 The ratio of the weights of a body on Earth's surface to that on the surface of a planet is 9 : 4 The mass of the planet is $\frac{1}{9}$th of that of the Earth. If R is the radius of the Earth, what is the radius of the planet? (Take the planets to have the same mass density)

a) $\frac{R}{4}$ **b)** $\frac{R}{2}$ **c)** $\frac{R}{3}$ **d)** $\frac{R}{9}$

Q25 Two identical thin bar magnets each of length 1 and pole strength m are placed at right angles to each other with north–pole of one touching south-pole of the other, then the magnetic moment of the system is

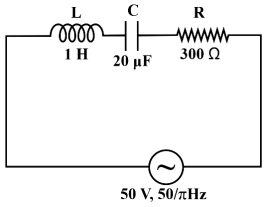
a) ml **b)** 2 ml **c)** $\sqrt{2}$ml **d)** $\frac{ml}{2}$

Q26 In the circuit, the galvanometer G shows zero deflection. If the batteries A and B have negligible internal resistance, the value of the resistor R will be



a) 200 Ω **b)** 100 Ω **c)** 500 Ω **d)** 1000 Ω

Q27 In the series LCR circuit shown the impedance is



a) 200 Ω **b)** 100 Ω **c)** 300 Ω **d)** 500 Ω

Q28 A thin circular ring of mass M and radius r is rotating about its axis with a constant angular velocity ω. Two objects, each of mass m, are attached gently to the opposite ends of a diameter of the ring. The wheel now rotates with an angular velocity

a) ω M/(M + m) **b)** ω (M – 2m)/(M + 2m)

c) ω M/(M + 2m) **d)** ω (M + 2m)/M

Q29 A machine, which is 75 % efficient, uses 12 J of energy in lifting up a 1 kg mass through a certain distance. The mass is then allowed to fall through that distance. The velocity at the end of its fall is (in ms^{-1})

a) $\sqrt{24}$ **b)** $\sqrt{32}$ **c)** $\sqrt{18}$ **d)** $\sqrt{9}$

Q30 What is the radius of iodine atom? (Atomic no. 53, mass no. 126)

a) 2.5×10^{-11} m **b)** 2.5×10^{-9} m **c)** 7×10^{-9} m **d)** 7×10^{-6} m

Chemistry

Single Choice Question

Q31 Activated charcoal has ammonia gas adsorbed on its surface area. The volume (in L) of 1.415×10^{22} molecules of NH_3 gas obtained due to desorption from charcoal surface at STP is:

a) 0.526 **b)** 0.426 **c)** 0.326 **d)** 0.226

Q32 The number and type of bonds between two carbon atoms in CaC_2 are

a) One sigma (σ) and one pi (π) bond

b) One sigma (σ) and one and half pi (π) bond

c) One sigma (σ) bond

d) One sigma (σ) and two pi (π) bond

Q33 Which of the following statements is incorrect for pair of elements Zr-Hf ?

a) Both possess same number of Valence electrons

b) Both have identical atomic sizes

c) Both have almost identical ionic radii

d) Both of these belong to same period of periodic table

Q34 The decreasing order of the stability of the ions:

$CH_3 - \overset{+}{C}H - CH_3$ (I) $\quad CH_3 - \overset{+}{C}H - OCH_3$ (II) $\quad CH_3 - \overset{+}{C}H - COCH_3$ (III)

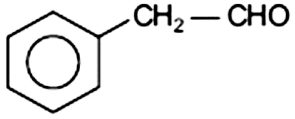
a) | > || > ||| **b)** ||| > || > | **c)** || > ||| > | **d)** || > | > |||

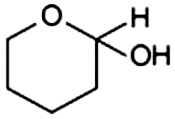
Q35 What is Z in the following sequence of reactions?
Zn CH3CI / Dust , $KMnO_4$.

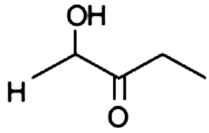
Phenol $\xrightarrow{\text{Zn Dust}}$ X $\xrightarrow{CH_3Cl/\text{Anhydrous AlCl}}$ Y $\xrightarrow{\text{Alkaline } KMnO_4}$ Z

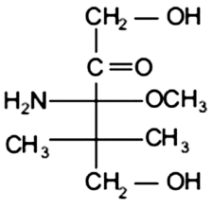
a) Benzene **b)** Toluene **c)** Benzaldehyde **d)** Benzoic acid

Q36 Among the following compounds, which can give black shiny surface and little bit smell of ammonia when treated with silver diammine complex in basic ?

(A) 

(B) 

(C) 

(D) 

a) Only A **b)** Only B and C

c) A, B, C and D **d)** Only B, C and D

Q37 Which of the following is tridentate ligand?

a) dien **b)** trien **c)** en **d)** dmg

Q38 Glucose gives positive test with :

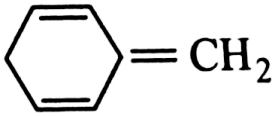
a) 2, 4DNP **b)** Tollen's reagent **c)** $NaHSO_3$ **d)** Schif test

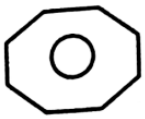
Q39 How many total spheres of constituent particles are present in a BCC type of unit cell?

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

Q40 Which of the following is the most stable species?

a) 

b) 

c) 

d) 

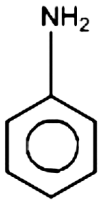
Q41 Which of the following is responsible for the depletion of the ozone layer in the upper strata of the atmosphere?

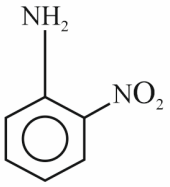
a) Chlorine **b)** Ferrocenes **c)** Fullerenes **d)** Freons

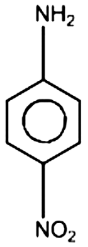
Q42 The reduction potentials of Zn_f Cu, Fe and Ag are in the order:

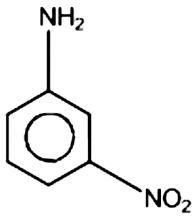
a) Zn, Cu, Fe, Ag **b)** Cu, Ag, Fe, Zn **c)** Ag, Cu, Fe, Zn **d)** Fe, Zn, Cu, Ag

Q43 Which of the following will have a larger dipole moment?

a) 

b) 

c) 

d) 

Q44 Dobereiner's law of triads is not applicable to

a) Li, Na, K **b)** B, Al, Ga **c)** Be, Mg, Ca **d)** Cl, Br, I

Q45 Bakelite is obtained from phenol by reaction with

a) HCHO **b)** $(CH_2OH)_2$ **c)** CH_3CHO **d)** CH_3COCH_3

Q46 Which of the following is an antihistamine drug?

a) Ciprofloxacin **b)** Chloroquine

c) Chloramphenicol **d)** Chlorpheniramine maleate

Q47 The pair acids in which phosphorous atom has a formal oxidation state of +3 is

a) Pyrophosphorous and hypophosphoric acids

b) Orthophosphorous and hypophosphoric acids

c) Pyrophosphorous and pyrophosphoric acids

d) Orthophosphorous and pyrophosphorous acids

Q48 A Racemic mixture is made up of two:

a) Isomeric compounds **b)** Chiral compounds

c) Meso compounds **d)** Optical isomers.

Q49 Mass % of carbon in ethanol is

a) 52 **b)** 13 **c)** 34 **d)** 90

Q50 Which of the following has a strong intermolecular hydrogen bonding?

a) CH_4 **b)** C_2H_2 **c)** H_2O **d)** C_2H_6

Q51 Thermal stability of $BaCO_3$, $CaCO_3$ and $MgCO_3$ is

a) $BaCO_3 > CaCO_3 > MgCO_3$ **b)** $BaCO_3 > MgCO_3 > CaCO_3$

c) $CaCO_3 > MgCO_3 > BaCO_3$ **d)** $MgCO_3 > CaCO_3 > BaCO_3$

Q52 Which is a radioactive isotope of hydrogen?

a) Protium **b)** Deuterium **c)** Tritium **d)** Hydronium

Q53 The value of n In the reaction,

$$Cr_2O_7^{2-} + 14H^+ + nFe^{2+} \longrightarrow 2Cr^{3+} + nFe^{3-} + 7H_2O$$

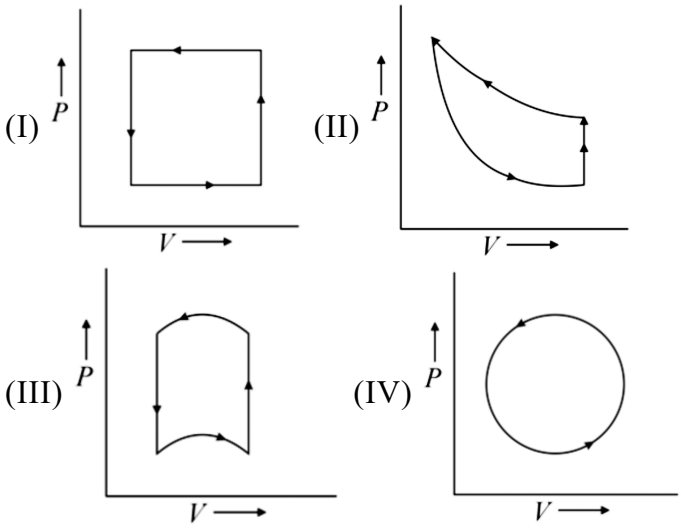
will be

a) 2 **b)** 3 **c)** 6 **d)** 7

Q54 Find out which of the following is always true for a spontaneous change at all temperature?

a) $\Delta H > 0; \Delta S < 0$ **b)** $\Delta H < 0; \Delta S < 0$ **c)** $\Delta H < 0; \Delta S > 0$ **d)** $\Delta H > 0 ; \Delta S > 0$

Q55 What will be the nature of change in internal energy in case of processes shown below?



a) +ve in all cases. **b)** –ve in all cases.

c) –ve in I and III, and +ve in II and IV. **d)** Zero in all cases.

Q56 What is the correct order of bond strength for NO, NO^+ and NO^- ?

a) $NO > NO^- > NO^-$ **b)** $NO^+ > NO > NO^-$

c) $NO^- > NO > NO^+$ **d)** $NO^+ > NO^- > NO$

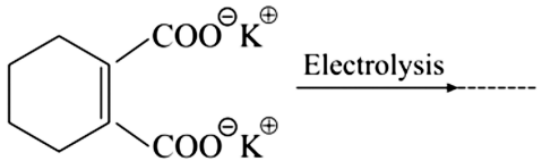
Q57 Zinc and hydrochloric acid react according to the reaction:

$Zn(s) + 2HCl\ (aq) \longrightarrow ZnCl_2(aq) + H_2(g)$

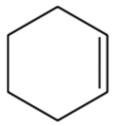
If 0.30 mole of Zn is added to hydrochloric acid containing 0. 52 mole of HCl, how many moles of H_2 are produced?

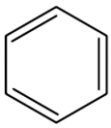
a) 0.26 **b)** 1.04 **c)** 0.52 **d)** 0.13

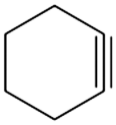
Q58

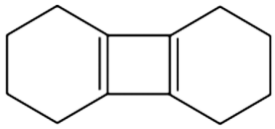


The product is:

a) 

b) 

c) 

d) 

Q59 What is the maximum number of electrons in an atom that can have the following quantum numbers n = 4, m_1 = +1 ?

a) 4 **b)** 15 **c)** 3 **d)** 6

Q60 Which of these molecules do not obey the octet rule in any of the important lewis structures needed, to describe the bonding in the molecule?

(I) $\underline{N}O_2$ (II) $\underline{As}Cl_3$ (III) $\underline{S}F_4$ (IV) $\underline{Cl}O_3^-$
(V) C_2H_4

a) Only III and IV **b)** Only II and V **c)** Only IV **d)** I, III, IV

English

Single Choice Question

Q61 Read the following passage carefully to answer the given question. Some words/phrases are printed in bold to help you locate them while answering the question.

In this work of incessant and feverish activity, men have little time to think, much less to consider ideals and objectives. Yet how are we to act, even in the present, unless we know which way we are going and what our objectives are? It is only problems can be adequately considered. It is only when the young men and women, who are in the university that these basic problems can be adequately considered. It is only when the young men and women, who are in the university today and on whom the **burden of life's problems** will fall tomorrow, learn to have clear objectives and standards of values that there is hope for the next generation. The past generation produced some great men but as a generation it led the world repeatedly to disaster. Two world wars are the price that has been paid for the lack of wisdom on man's part in this generation.

I think that there is always a close and intimate relationship between the end we aim at and the means adopted to attain it. Even if the end is right but the means are wrong, it will **vitiate** the end or divert us in a wrong direction. Means and ends are thus intimately and inextricably connected and cannot be separated. That, indeed, has been the lesson of old taught us by many great men in the past, but unfortunately it seldom remembered.

The two world wars are the price that man paid due to

a) the absence of wisdom and sagacity

b) his not caring to consider the life's problems

c) his ignoring the ideals and objectives of life

d) his excessive involvement in feverish activities

Q62 The following text is followed by four alternate summaries. Choose the option that best captures the essence of the text.

Dementia is in the public and political spotlight like never before, as society wakes up to the fact that it poses one of the greatest threats to the health and wealth of our country. The numbers are stark: 8,50,000 people in the UK are currently living with dementia, at an estimated cost of more than £26bn a year. By 2021, 1 million people will have the condition. In response, there have been many commitments from the UK government and charities, which include making significantly more funding available for research.

a) The UK is set to fund the research on Dementia in the country.

b) The UK government has finally realised the extent of damage caused by Dementia in the country and is ready to wipe it off completely.

c) The UK is gathering more funds in order to deal with Dementia-biggest threat to the country.

d) The UK government and charities are keen on arranging more funds to conduct research on Dementia one of the biggest diseases, in terms of cost and number, faced by the country.

Q63 Directions: Select the correct word or phrase to complete a grammatical sentence. In case of more than one blank, the different words given in the options shall fill in the corresponding order.

William Shakespeare was ____ greatest playwright of his time.

a) a **b)** an **c)** the **d)** three

Q64 Fill in the blanks with the most appropriate option.
I. It helps to rinse one's mouth early morning with a ____ of salt and water.
II. You can always refer to this reference material to find the ____ to these problems.

a) mixture **b)** answers **c)** liquid **d)** solution

Q65 Choose the word opposite in meaning to the given word and mark it in the Answer-Sheet.
LIGHT–HEADED

a) Cumbersome **b)** Expensive **c)** Profligate **d)** Serious

Q66 Choose the word or phrase that is most nearly opposite in meaning to the given word
Jettison (to leave)

a) Abandon **b)** Strengthen **c)** Accept **d)** Modify

Q67 Directions: In the following question, a word is given. Choose the option that is the most similar or nearest in the meaning to the given word.
Rave

a) Talk wildly **b)** Influence **c)** Talk mildly **d)** Encourage

Q68 Find out the SYNONYM of the word:
GESTICULATION

a) Dynamics **b)** Notion **c)** Respite **d)** Jumble

Q69 Directions: In the question below, a sentence has been given in active/passive voice. Out of the alternatives suggested, select the one that best expresses the same sentence in passive/active voice and select that as your answer.
Sahil Sharma makes tea.

a) Tea is made by Sahil Sharma. **b)** Tea is made by the Sharma.

c) Tea was made by Sharma. **d)** Tea has made by Sharma.

Q70 Given below is a sentence that may or may not contain an error. The sentence is divided into four parts– A, B, C and D. In case of an error, mark the option that contains the error. If there is no error, mark D.
During heavy exercise, (A)/ one get cramps in the legs (B)/ due to the accumulation of lactic acid (C)/. No error (D)

a) (A) **b)** (B) **c)** (C) **d)** (D)

Logical Reasoning

Single Choice Question

Q71 In the following question, two words are given. These words are related to each other in some way. Find out the pair of item with an identical relationship.
Story: Novel

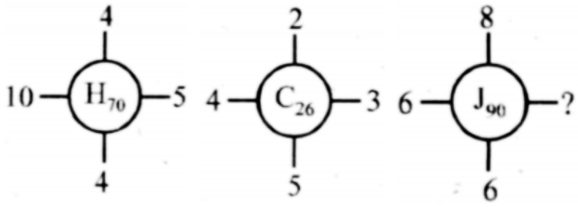
a) Sea : Ocean **b)** School : University

c) Book : Dictionary **d)** Poetry : Drama

Q72 Three of the following four are alike and hence form a group. Which of the following does not belong to the group?

a) Dogs **b)** Cats **c)** Goats **d)** Giraffes

Q73 In each question given below which one number can be placed at the sign of interrogation?



a) 5 **b)** 4 **c)** 2 **d)** 1

Q74 Which of the following cannot be a number of the series ....
64, 125, 216, 343, 512.....?

a) 8 **b)** 729 **c)** 27 **d)** 999

Q75 Choose the option which is least like the others in the group.

a) Lion: Roar **b)** Snake: Hiss **c)** Frog: Bleat **d)** Bees : Hum

Q76 Identify the odd one out.

a) Carpenter **b)** Potter **c)** Mason **d)** Farmer

Q77 Pointing to a photograph, Sura] said, “His daughter, Shobha, is a granddaughter of my mother.' Whose photograph was it?

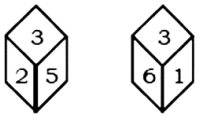
a) Suraj's brother **b)** Suraj's son

c) Suraj's uncle **d)** Cannot be determined

Q78 Pointing to a woman in a photograph, a man says, 'She is the only daughter of the only daughter of my brother-in-law's father'. How is the woman related to the man?

a) Wife **b)** Mother **c)** Daughter **d)** Niece

Q79 Two positions of the dice has been shown here. Which digit will be at top when 3, is at bottom ?



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

Q80 Given below are three different positions of a dice. Find the number of dots on the face opposite the face bearing 3 dots.

(i) (ii) (iii)

a) 4 **b)** 5

c) 6 **d)** Cannot be determined

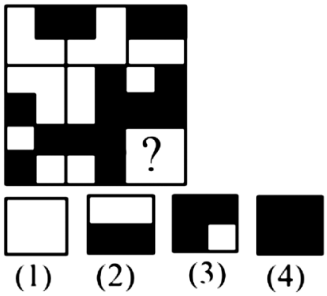
Q81 A child runs 25 Feet towards the north, then he turns towards the right and walks 40 Feet. Again he turns right and walks. 45 Feet. Then he turns left and walks. 20 Feet. Finally, he turns right and walks 20 Feet. The child is in which direction from his starting point?

a) North **b)** South **c)** South-West **d)** South-East

Q82 I am facing east. Now turn to the right and going 20 m, then turn to the left and going 20 m, then turn to the right and going 20 m, again turn to the right and going 40 m and finally, I am going 40 m to the right. Now in which direction am I from my original position?

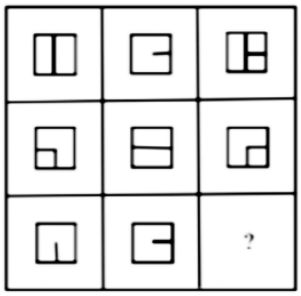
a) North **b)** West **c)** South **d)** East

Q83 Select a suitable figure from the four alternatives that would complete the figure matrix.



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

Q84 In each of the following questions, select the answer figure that will fit in the blank space in the question figure, maintaining the pattern in the proper sequence.



a)  **b)**  **c)**  **d)** 

Q85 In a certain code FIVE is written as GHWD. How is HURT written in that code?

a) IITS **b)** ITST **c)** GTSS **d)** ITQU

Q86 In a certain code, MISCHIEF is written as NKVGMOLN, then how is RELIEVED written in the code?

a) SGOMJVED **b)** SFMJFWFE **c)** SGOMJBLL **d)** SEOIJVLD

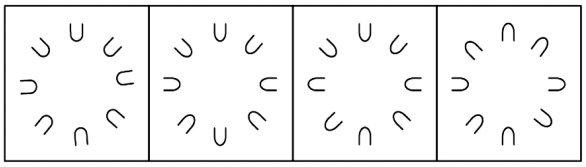
Q87 Find the value in the place of question mark in the following letter series.
In the given question, which of the letters or group of letters will continue the series?
APZ, CQY, ERX, GSW, ITV, ____

a) KVU **b)** JVK **c)** JUV **d)** KUU

Q88 In the series, you will be looking at a letter pattern. Fill in the blank in the middle of the series or end of the series.
SCD, TEF, UGH, _____ WKL
(A) CMN (B) UJI (C) VIJ (D) IJI

a) B **b)** D **c)** A **d)** C

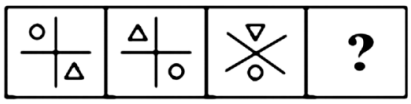
Q89 In the following series of images, three of the given images are alike in a certain way. Choose the one that is different from the others.



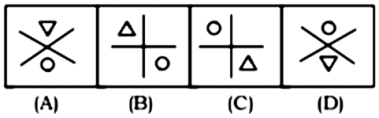
a) a **b)** b **c)** c **d)** d

Q90 Select a suitable figure from the four alternatives that would complete the figure matrix.

Question figures



Answer figure:



a) A **b)** B **c)** C **d)** D

Mathematics

Single Choice Question

Q91 If f(x) is continuous and increasing function such that the domain of $g(x) = \sqrt{f(x) - x}$ be R and $h(x) = \frac{1}{1-x}$ then the domain of $\phi(x) = \sqrt{f((ff(x))) - h((hh(x)))}$ is-

a) R **b)** {0, 1} **c)** R – {0, 1} **d)** $R^+ - \{1\}$

Q92 The value of $\lim_{x \to 0} \frac{e^{ax} - e^{bx}}{x}$ is equal to

a) a + b **b)** a – b **c)** e^{ab} **d)** 1

Q93 'The function f(x) = [x] cos $\left(\frac{2x-1}{2}\right)\pi$, [·] denotes the greatest integer function, is discontinuous at'

a) all x **b)** all integer points

c) no x **d)** x which is not an integer

Q94 If the tangent to the curve $y = \frac{x}{x^2 - 3}$, x ∈ R, $\left(x \neq \pm\sqrt{3}\right)$, at a point (α, β) ≠ (0. 0) on it is parallel to the line 2x + 6y – 11 = 0, then:

a) |2α + 6β| = 19 **b)** |2α + 6β| = 11 **c)** |6α + 2β| = 19 **d)** |6α + 2β| = 9

Q95 The system of equations 2x + 6y + 11 = 0, 6x + 20y – 6z + 3 = 0 and 6y – 18z + 1 = 0 will have:

a) Consistent with unique solution.

b) Consistent with infinitely many solution.

c) Inconsistent.

d) Data insufficient to give the answer.

Q96 Let matrix $A = \begin{bmatrix} x & y & 2 \\ 1 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$ where x, y ∈ N. If $\left|adj\left(adj\left(adj(adjA)\right)\right)\right| = 3^{32} \cdot 5^{16}$, then number of such matrix A is equal to

a) 46 **b)** 47 **c)** 48 **d)** none of these

Q97 Find the value of α for which Rolle's theorem can be applied in [0, 1], if $f(x) = x^\alpha \log x$ and f(0) = 0.

a) –2 **b)** –1 **c)** 0 **d)** $\frac{1}{2}$

Q98 If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$ and $\cos^{-1} x - \cos^{-1} y = \frac{\pi}{3}$. Then, (x, y) is equal to

a) (0, 1) **b)** $\left(\frac{1}{2}, 1\right)$ **c)** $\left(1, \frac{1}{2}\right)$ **d)** $\left(\frac{\sqrt{3}}{2}, 1\right)$

Q99 Find the equation of the curve passing through the point (0, 0) whose differential equation is $y' = e^x \sin x$.

a) $2y = e^x (\sin x - \cos x) + 1$ **b)** $2y = e^x (\sin x + \cos x) - 1$

c) $5y = e^x (\sin x + \cos x) - 1$ **d)** None of these

Q100 The 4th term of a HP is 3/5 and 8th term is 1/3, then its 6th term is

a) $\frac{1}{6}$ **b)** $\frac{3}{7}$ **c)** $\frac{1}{7}$ **d)** $\frac{3}{5}$

Q101 If α, β are the roots of $x^2 - x + 1 = 0$ then the quadratic equation whose roots area $\alpha^{2015}, \beta^{2015}$ is

a) $x^2 - x + 1 = 0$ **b)** $x^2 + x + 1 = 0$ **c)** $x^2 + x - 1 = 0$ **d)** $x^2 - x - 1 = 0$

Q102 The general solution of the differential equation $\frac{dy}{dx} = (x^3 - 2x \tan^{-1} y)(1 + y^2)$ is–

a) $2\tan^{-1} x = y^2 - 1 + 2C\ e^{-x^2}$ **b)** $2\tan^{-1} y = x^2 - 1 + 2C\ e^{-x^2}$

c) $2\tan^{-1} y = y^2 - 1 + 2C\ e^{-x^2}$ **d)** $2\tan^{-1} x = x^2 - 1 + 2C\ e^{-x^2}$

Q103 A line AB in three-dimensional space makes angle 45° and 120° with the positive x-axis and the positive y-axis respectively. lf AB makes an acute angle θ with the positive z-axis, then θ equals

a) 30° **b)** 45° **c)** 60° **d)** 75°

Q104 A vector a has components 3p and 1 with respect to a rectangular cartesian system. This system is rotated through a certain angle about the origin in the counter clockwise sense. If, with respect to new system, a has components p + 1 and $\sqrt{10}$, then a value of p is equal to:

a) 1 **b)** $-\frac{5}{4}$ **c)** $\frac{4}{5}$ **d)** -1

Q105 Foot of perpendicular drawn from the point P(2, 3, 4) to the straight line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{6}$

a) (2 > 6, 18) **b)** $\left(-\frac{27}{49}, -\frac{16}{49}, \frac{17}{49}\right)$ **c)** $\left(\frac{71}{49}, \frac{131}{49}, \frac{213}{49}\right)$ **d)** $\left(\frac{71}{343}, \frac{131}{343}, \frac{213}{343}\right)$

Q106 Orthocentre of a triangle whose vertices are (0, 0), (3, 4) and (4, 0) is

a) $\left(3, \frac{7}{3}\right)$ **b)** $\left(3, \frac{5}{4}\right)$ **c)** (5, –2) **d)** $\left(3, \frac{3}{4}\right)$

Q107 The equation of the directrix of the parabola $y^2 + 4y + 4x + 2 = 0$ is

a) x = –1 **b)** x = 1 **c)** $x = -\frac{3}{2}$ **d)** $x = \frac{3}{2}$

Q108 The number of solution(s) of the equation $z^2 = 4z + |z|^2 + \frac{16}{|z|^3}$ (z is a complex number) is/are:
(where $z = x + iy$, $x, y \in R$, $i^2 = -1$ and $x \neq 2$)

a) 0 **b)** 1 **c)** 2 **d)** 3

Q109 Find the number of words that can be made by using all the letters of the word GENIUS if each word neither begins with G nor ends with S, is

a) 24 **b)** 240 **c)** 480 **d)** 504

Q110 The value of $\lim_{x \to 0} \left(\left[\frac{100x}{\sin x} \right] + \left[\frac{99 \sin x}{x} \right] \right)$, (where [x] represents greatest integral function less than or equal to x) is 99 λ. Then the value of λ is

a) 1 **b)** 2 **c)** 3 **d)** 5

Q111 f : R → R defined by $f(x)=\frac{1}{2}x|x|+\cos x+1$ is:

a) one-one and onto **b)** one-one and into

c) many-one and onto **d)** many-one and into

Q112 If the capital letters denotes the cofactors of the corresponding small letters in the determinant

$\Delta=\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ and $\Delta'=\begin{vmatrix} A_1 & B_1 & C_1 \\ A_2 & B_2 & C_2 \\ A_3 & B_3 & C_3 \end{vmatrix}$ then $\Delta\Delta'$ equals-

a) 0 **b)** 2Δ **c)** Δ^3 **d)** Δ

Q113 If $5f(x) + 3f\left(\frac{1}{x}\right) = x + 2$ and $y = xf(x)$ then $\left(\frac{dy}{dx}\right)_{x=1}$ is equal to-

a) $\frac{1}{4}$ **b)** $\frac{7}{8}$ **c)** 1 **d)** None of these

Q114 Let $\int\frac{\sqrt{x}}{\sqrt{x^3+8}}dx=\lambda\ln\left|x^{\frac{3}{2}}+\sqrt{x^3+8}\right|+C$, then $\{\lambda\}$ is equal to

[Note: $\{\cdot\}$ denotes the fractional part of function.]

a) $\frac{1}{3}$ **b)** $\frac{2}{3}$ **c)** $\frac{1}{4}$ **d)** $\frac{3}{4}$

Q115 Let z_1 and z_2 be two roots of the equation $z^2 + az + b = 0$, z being complex. Further, assume that the origin, z_1 and z_2 form an equilateral triangle. Then,

a) $a^2 = b$ **b)** $a^2 = 2b$ **c)** $a^2 = 3b$ **d)** $a^2 = 4b$

Q116 If some three consecutive coefficients in the binomial expansion of $(x + 1)^n$ in powers of x are in the ratio 2 : 15 : 70, then the average of these three coefficients is:

a) 227 **b)** 964 **c)** 625 **d)** 232

Q117 Let A and B are two events such that $P(\overline{A\cup B})=\frac{1}{6}$, $P(A\cap B)=\frac{1}{4}$ and $P(\bar{A})=\frac{1}{4}$, where A represents the complement of event $\bar{A}$. Then, events A and B are

a) mutually exclusive and independent. **b)** independent but not equally likely.

c) equally likely but not independent. **d)** equally likely and mutually exclusive.

Q118 The mean of the three numbers is 15. The range of this data is 8 while the difference between the two smallest numbers is 1. The greatest of the three numbers is:

a) 22 **b)** 20 **c)** 18 **d)** 24

Q119 Which of the following is a contradiction?

a) $(p \wedge q) \wedge \sim(p \vee q)$ **b)** $p \vee (\sim p \wedge q)$

c) $(p \Rightarrow q) \Rightarrow p$ **d)** None of these

Q120 If the circles $x^2 + y^2 = 4$ and $x^2 + y^2 – 8x + 12 = 0$ touch each other, then the equation of their common tangent at the point, where they touch, is given by

a) $y = 2$ **b)** $x = 2$ **c)** $y = –2$ **d)** None of these

Q121 If $y = \tan^{-1} x + \cot^{-1} x + \sin^{-1} x + \cos^{-1} x$, then $\frac{dy}{dx}$ is equal to

a) $\frac{x^2-1}{x^2+1}$ **b)** π **c)** 0 **d)** 1

Q122 A person standing on the bank of a river observes that the angle of elevation of the top of a tree on the opposite bank of the river is 60° and when he retires 40 meters away from the tree the angle of elevation becomes 30°. The breadth of the river is

a) 40 m **b)** 30 m **c)** 20 m **d)** 60 m

Q123 If $F(k)=\left(1+\sin\frac{\pi}{2k}\right)\left(1+\sin(k-1)\frac{\pi}{2k}\right)$ $\left(1+\sin(2k+1)\frac{\pi}{2k}\right)\left(1+\sin(3k-1)\frac{\pi}{2k}\right)$,

then the value of F(1) + F(2) + F(3) is equal to

a) $\frac{3}{16}$ **b)** $\frac{1}{4}$ **c)** $\frac{5}{16}$ **d)** $\frac{7}{16}$

Q124 If $f(x)=\frac{2-x\cos x}{2+x\cos x}$ and g(x) = $\log_e x$, then the value of the integral $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} g(f(x))dx$ is

a) $\log_e e$ **b)** $\log_e 2$ **c)** $\log_e 1$ **d)** $\log_e 3$

Q125 For each positive integer n, let $y_n=\frac{1}{n}((n+1)(n+2)...(n+n))^{\frac{1}{n}}$. If $\lim_{n\to\infty} y_n = L$, then the value of [L] (where [x] is the greatest integer less than or equal to x) is _____

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

Q126 If the tangents are drawn to the ellipse $x^2 + 2y^2 = 2$, then the locus of the mid point of the intercept made by the tangents between the coordinate axes is

a) $\frac{1}{2x^2}+\frac{1}{4y^2}=1$ **b)** $\frac{1}{4x^2}+\frac{1}{2y^2}=1$ **c)** $\frac{x^2}{2}+\frac{y^2}{4}=1$ **d)** $\frac{x^2}{4}+\frac{y^2}{2}=1$

Q127 In how many of the distinct permutations of the letters in MISSISSIPPI do the four I's not come together?

a) 33810 **b)** 33180 **c)** 31830 **d)** 33018

Q128 Find the maximum value of the function $f(x) = 3x^3 - 18x^2 + 27x - 40$ in the set $S = \{x \in R : x^2 + 30 - 11x \le 0\}$

a) 122 **b)** 222 **c)** –122 **d)** –222

Q129 The value of $C_0 + 3C_1 + 5C_2 + 7C_3 + \ldots + (2n + 1)C_n$ is equal to

a) $2^n + n2^{n-1}$ **b)** $2^n (n + 1)$ **c)** 2^{-1} **d)** None of these

Q130 The area of the region (in square units) above the x-axis bounded by the curve y = tan x, $0 \le x \le \frac{\pi}{2}$ and the tangent to the curve at $x = \frac{\pi}{4}$ is

a) $\frac{1}{2}\left(\log 2-\frac{1}{2}\right)$ **b)** $\frac{1}{2}(1+\log 2)$ **c)** $\frac{1}{2}(1-\log 2)$ **d)** $\frac{1}{2}\left(\log 2+\frac{1}{2}\right)$

Answer Key

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**D**	**C**	**B**	**A**	**A**	**C**	**D**	**B**	**C**	**C**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**A**	**B**	**B**	**C**	**C**	**C**	**A**	**C**	**B**	**D**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**D**	**B**	**B**	**B**	**C**	**B**	**D**	**C**	**C**	**A**
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	**A**	**D**	**D**	**D**	**D**	**C**	**A**	**B**	**A**	**A**
Que.	41	42	43	44	45	46	47	48	49	50
Ans.	**D**	**C**		**B**	**A**	**D**	**D**	**D**	**A**	**C**
Que.	51	52	53	54	55	56	57	58	59	60
Ans.	**A**	**C**	**C**	**C**	**D**	**B**	**A**	**D**	**D**	**D**
Que.	61	62	63	64	65	66	67	68	69	70
Ans.	**A**	**D**	**C**	**D**	**D**	**C**	**A**	**A**	**A**	**B**
Que.	71	72	73	74	75	76	77	78	79	80
Ans.	**A**	**D**	**B**	**D**	**C**	**D**	**A**	**C**	**D**	**C**
Que.	81	82	83	84	85	86	87	88	89	90
Ans.	**D**	**B**	**D**	**C**	**A**	**C**	**D**	**D**	**D**	**D**
Que.	91	92	93	94	95	96	97	98	99	100
Ans.	**C**	**B**	**C**	**C**	**C**	**A**	**D**	**B**	**A**	**B**
Que.	101	102	103	104	105	106	107	108	109	110
Ans.	**A**	**B**	**C**	**D**	**C**	**D**	**D**	**A**	**D**	**B**
Que.	111	112	113	114	115	116	117	118	119	120
Ans.	**A**	**C**	**B**	**B**	**D**	**D**	**B**	**B**	**A**	**B**
Que.	121	122	123	124	125	126	127	128	129	130
Ans.	**C**	**C**	**D**	**C**	**C**	**A**	**A**	**A**	**B**	**A**