NATIONAL ENTRANCE SCREENING TEST

NEST 2019

Section : **General**

Q.1 The number of 3-digit prime numbers that can be formed using digits 1, 3 and 5 without repetition of digits is

Ans

✔ 1. 0

✘ 2. 1

✘ 3. 2

✘ 4. 3

Question Type : **MCQ**
Question ID : **4941032092**
Status : **Answered**
Chosen Option : **1**
Marks : **3.00**

Q.2 In history of science, there are numerous examples of female scientists associated with opening of new areas of research through their trailblazing work. Some female scientists and the research avenues opened by them are listed below. Choose the **incorrect** pair.

Ans

✘ 1. Dorothy Hodgkin - protein crystallography

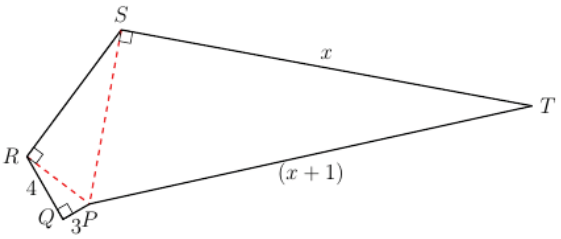
✔ 2. Rosalind Franklin - magnetic resonance imaging (MRI)

✘ 3. Ada Lovelace - computer programming

✘ 4. Lise Meitner - nuclear fission

Question Type : **MCQ**
Question ID : **4941032089**
Status : **Answered**
Chosen Option : **2**
Marks : **3.00**

Q.3 Find perimeter of the pentagon $PQRST$ (drawn with thick black lines), if all side lengths are integers. You are given $l(PQ) = 3$ units, $l(QR) = 4$ units, $l(ST) = x$ units and $l(TP) = (x + 1)$ units.



Ans

✘ 1. 228

✔ 2. 188

✘ 3. 216

✗ 4. 206

Question Type : **MCQ**
Question ID : **4941032091**
Status : **Answered**
Chosen Option : **2**
Marks : **3.00**

Q.4 Choose an **incorrect** pair of a fruit and the most prominent organic acid contained in it.

Ans

✓ 1. Banana - Butyric acid

✗ 2. Mango - Malic acid

✗ 3. Tamarind - Tartaric acid

✗ 4. Tomato - Citric acid

Question Type : **MCQ**
Question ID : **4941032090**
Status : **Answered**
Chosen Option : **2**
Marks : **0.00**

Q.5 On the surface of the earth, M is a place in northern hemisphere, P is the geographic north pole and N is a point on the equator on the same longitude as M. The latitude of point M is defined as

Ans

✓ 1.

the angle subtended by minor arc MN at the centre of the earth.

✗ 2.

the shortest distance between M and P measured along the surface of the earth.

✗ 3.

the angle subtended by minor arc MP at the centre of the earth.

✗ 4.

the shortest distance between M and N measured along the surface of the earth.

Question Type : **MCQ**
Question ID : **4941032093**
Status : **Answered**
Chosen Option : **1**
Marks : **3.00**

Comprehension:

Confirmation bias is the tendency to favour information in a way that confirms one's pre-existing beliefs. This tendency is stronger for emotionally charged issues and for deeply entrenched beliefs. Explanations for the observed biases include wishful thinking and the limited human capacity to process information. Another explanation is that people are weighing up the costs of being wrong, rather than investigating in a scientific way. Even scientists are prone to confirmation biases.

Some confirmation biases can originate from a 'biased search for information'. Experiments have found repeatedly that people tend to test hypotheses in a one-sided way, by searching for evidence consistent with their current hypotheses. Even a small change in a research question's wording can affect how people search through available information, and hence the conclusions they reach. Personality traits influence and interact with biased search processes.

Confirmation biases are not limited to the collection of evidence. Even if two individuals have the same information, the way they interpret it can be biased. We call it as 'biased interpretation'. People set higher standards of evidence for hypotheses that go against their current expectations. This effect, known as 'disconfirmation bias', has been established by several experiments.

People may also remember evidence selectively to reinforce their expectations, even if they gather and interpret evidence in a neutral manner. This effect is called 'selective recall', 'confirmatory memory', or 'access-biased memory'. Although there is no conclusive theory to explain how this works, one can say that information matching to prior expectations will be more easily stored and recalled than information that does not match, unless the new information is too startling and leaves an impression on a person's mind.

(Adapted from Wikipedia)

SubQuestion No : 6

Q.6 Person R claims that he knows an astrologer whose predictions have turned out to be true most of the times. This is an example of

Ans

✗ 1. biased search for information.

✗ 2. biased interpretation.

✓ 3. confirmatory memory.

✗ 4. wishful thinking.

Question Type : **MCQ**
Question ID : **4941032097**
Status : **Answered**
Chosen Option : **3**
Marks : **3.00**

Comprehension:

Confirmation bias is the tendency to favour information in a way that confirms one's pre-existing beliefs. This tendency is stronger for emotionally charged issues and for deeply entrenched beliefs. Explanations for the observed biases include wishful thinking and the limited human capacity to process information. Another explanation is that people are weighing up the costs of being wrong, rather than investigating in a scientific way. Even scientists are prone to confirmation biases.

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(Adapted from Wikipedia)

SubQuestion No : 7

Q.7 While plotting results of the experiment on a graph, a student realised that 6 data points out of 9 lie exactly along a straight line but other 3 points are off the best fit line. She showed the graph to her teacher and argued that the 3 points are not lying on the same line as she might have been careless while taking those readings. This is an example of

Ans

✗ 1. wishful thinking.

✗ 2. confirmatory memory.

✗ 3. biased search for information.

✓ 4. biased interpretation.

Question Type : **MCQ**
Question ID : **4941032096**
Status : **Answered**
Chosen Option : **4**
Marks : **3.00**

Comprehension:

Confirmation bias is the tendency to favour information in a way that confirms one's pre-existing beliefs. This tendency is stronger for emotionally charged issues and for deeply entrenched beliefs. Explanations for the observed biases include wishful thinking and the limited human capacity to process information. Another explanation is that people are weighing up the costs of being wrong, rather than investigating in a scientific way. Even scientists are prone to confirmation biases.

Some confirmation biases can originate from a 'biased search for information'. Experiments have found repeatedly that people tend to test hypotheses in a one-sided way, by searching for evidence consistent with their current hypotheses. Even a small change in a research question's wording can affect how people search through available information, and hence the conclusions they reach. Personality traits influence and interact with biased search processes.

Confirmation biases are not limited to the collection of evidence. Even if two individuals have the same information, the way they interpret it can be biased. We call it as 'biased interpretation'. People set higher standards of evidence for hypotheses that go against their current expectations. This effect, known as 'disconfirmation bias', has been established by several experiments.

People may also remember evidence selectively to reinforce their expectations, even if they gather and interpret evidence in a neutral manner. This effect is called 'selective recall', 'confirmatory memory', or 'access-biased memory'. Although there is no conclusive theory to explain how this works, one can say that information matching to prior expectations will be more easily stored and recalled than information that does not match, unless the new information is too startling and leaves an impression on a person's mind.

(Adapted from Wikipedia)

SubQuestion No : 8

Q.8 In a game, player P had to guess name of the personality that player Q had in mind, through a series of yes/no questions. Through previous questions, P knew that the chosen personality was a male freedom fighter who followed principle of non-violence. Player P thought that the given personality was 'Mahatma Gandhi'. To be sure, he posed the next question, "Does the surname of the person start with letter G?" Posing of this question is an example of

Ans

✗ 1. confirmatory memory.

✓ 2. biased search for information.

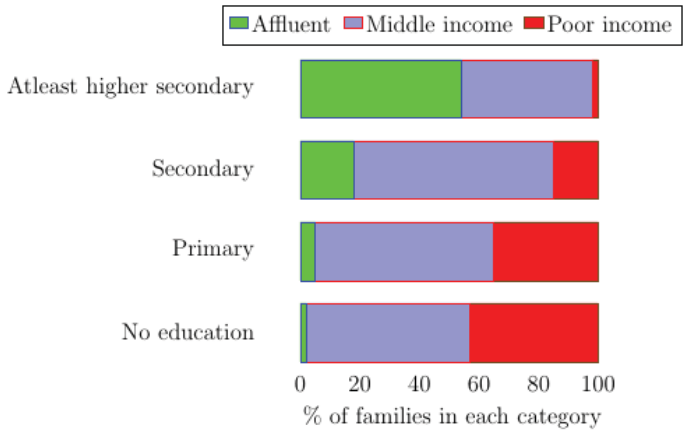
✗ 3. biased interpretation.

✗ 4. wishful thinking.

Question Type : **MCQ**
Question ID : **4941032095**
Status : **Answered**
Chosen Option : **2**
Marks : **3.00**

Comprehension:

The chart shows the relation between family income and the highest education level of at least one person in that family across households in India (adapted from: NFHS unit level data, Mint research). Study the chart carefully to answer the following questions:



SubQuestion No : 9

Q.9 The statement that **cannot** be deduced from the data is

Ans ✗ 1.

The percentage of affluent and poor income families (across education levels) have a negative correlation.

✓ 2.

Majority of affluent families have attained at least higher secondary education.

✗ 3.

At least higher secondary level of education in the family implies greater likelihood of higher family income and vice versa.

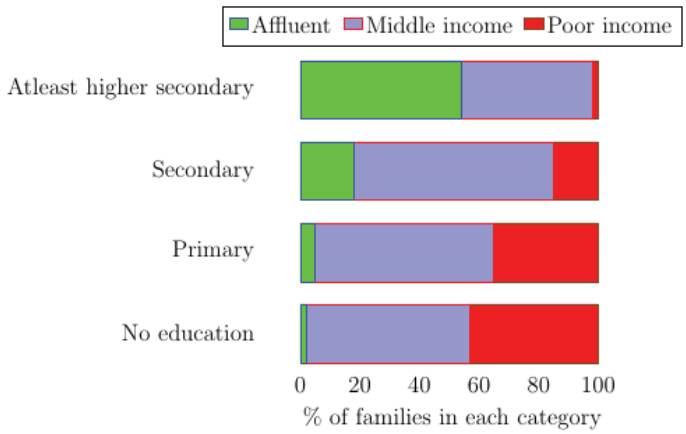
✗ 4.

Family income is not a definitive indicator of attaining higher education level.

Question Type : **MCQ**
Question ID : **4941032099**
Status : **Answered**
Chosen Option : **2**
Marks : **3.00**

Comprehension:

The chart shows the relation between family income and the highest education level of at least one person in that family across households in India (adapted from: NFHS unit level data, Mint research). Study the chart carefully to answer the following questions:



SubQuestion No : 10

Q.10 Choose the **incorrect** statement with respect to the middle income families.

Ans ✗ 1.

it has higher representation among families with secondary education compared to other income groups.

✗ 2.

ratio of middle income families to affluent families drops with increase in education level.

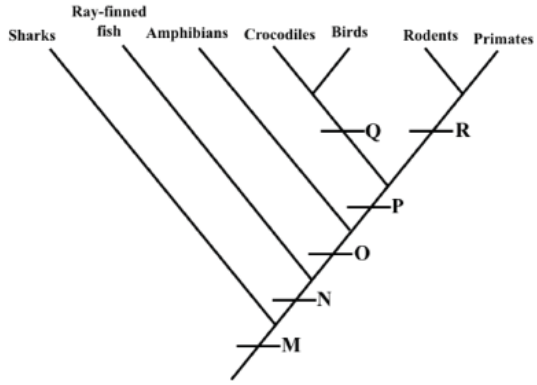
✓ 3. it is the largest group across all education levels.

✗ 4. it is the largest group with no education.

Question Type : **MCQ**
Question ID : **4941032100**
Status : **Answered**
Chosen Option : **3**
Marks : **3.00**

Section : **Biology**

Q.1 Cladogram is a diagram used to represent the evolutionary relationship between groups of organisms. The following cladogram shows relationship between some groups of vertebrates. From the options provided, identify the features that denote **M**, **N**, **O**, **P**, **Q** and **R** in the correct order.



Ans ✓ 1.

Vertebrae, Bony skeleton, Four limbs, Amniotic egg, Eggs with shells, Hair

✗ 2.

Vertebrae, Four limbs, Bony skeleton, Amniotic egg, Hair, Eggs with shells

✗ 3.

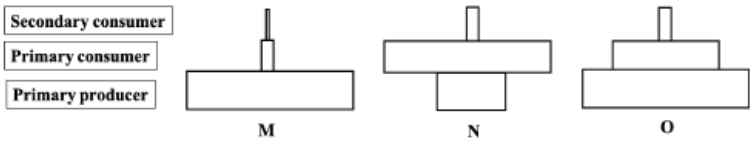
Vertebrae, Bony skeleton, Amniotic egg, Four limbs, Eggs with shells, Hair

✗ 4.

Vertebrae, Bony skeleton, Four limbs, Hair, Eggs with shells, Amniotic egg

Question Type : **MCQ**
Question ID : **4941032108**
Status : **Answered**
Chosen Option : **1**
Marks : **3.00**

Q.2 The biomass pyramids of three ecosystems are represented below.



The ecosystems most likely are:

Ans

✔ 1. **M**: Deciduous forest, **N**: Marine, **O**: Grassland

✘ 2. **M**: Marine, **N**: Deciduous forest, **O**: Grassland

✘ 3. **M**: Grassland, **N**: Deciduous forest, **O**: Marine

✘ 4. **M**: Grassland, **N**: Marine, **O**: Deciduous forest

Question Type : **MCQ**
Question ID : **4941032104**
Status : **Answered**
Chosen Option : **1**
Marks : **3.00**

Q.3 Trypsin is a digestive enzyme of serine protease group. It is considered an endopeptidase, i.e., the cleavage occurs within the polypeptide chain rather than at the terminal amino acids located at the ends of polypeptides. Trypsin cleaves peptide chains mainly at the carboxyl side of the amino acids lysine (**K**) or arginine (**R**), except when either is followed by proline (**P**) on the C-terminal side or preceded by aspartic acid (**D**) on the N-terminal side. It is also known that only surface-accessible '**K**' or '**R**' are cleaved by the enzyme. Otherwise cleavable amino acids, '**K**' and/or '**R**' if buried inside, cannot be recognized and cleaved by the enzyme trypsin. A fragment of a protein has the following sequence of amino acids that may lead to two different structures **P1** and **P2** from the same peptide. In **P1**, the peptide is linear; while in **P2**, the peptide is folded with 26^{th} amino acid lysine (**K**) buried inside.

H_2N-A-R-C-E-G-K-H-I-N-D-R-L-L-R-M-V-K-M-F-H-R-I-G-S-C-K-P-S-T-W-Y-V-C-E-G-R-P-H-I-N-D-COOH
(1, 10, 20, 30, 40)

Following a trypsin digestion, the number of peptide fragments that will be formed for **P1** and **P2**, respectively are

Ans

✘ 1. 2, 2

✘ 2. 4, 5

✔ 3. 6, 6

✘ 4. 5, 5

Question Type : **MCQ**
Question ID : **4941032106**
Status : **Answered**
Chosen Option : **1**
Marks : **-1.00**

Q.4 Mammalian sperm cells are highly specialized male gametes produced only for the function of fertilization. During spermatogenesis, these cells lose several subcellular entities and retain only those which are absolutely essential. Therefore, the mature sperm cells from humans will contain

Ans

✘ 1. 70S Ribosomes, Centrosome and Microtubules.

✘ 2. 80S Ribosomes, Mitochondria and Vesicles.

✘ 3. 55S Ribosomes, Centrosome and Vesicles.

✔ 4. 55S Ribosomes, Mitochondria and Microtubules.

Question Type : **MCQ**
Question ID : **4941032101**
Status : **Answered**
Chosen Option : **4**
Marks : **3.00**

Q.5 If the ratio (A+G)/(T+C) in one strand of DNA is 0.7, the same ratio in the complementary strand will be

Ans

✔ 1. 1.43

✘ 2. 0.43

✘ 3. 2.43

✘ 4. 0.30

Question Type : **MCQ**
Question ID : **4941032105**
Status : **Answered**
Chosen Option : **1**
Marks : **3.00**

Q.6 The second half of the distal tubule and the cortical collecting tubule of kidneys are equipped with the Principal and Intercalated cells. Of these, the Principal cells reabsorb Na^+ and excrete K^+ and are equipped with receptors for the hormone aldosterone. In primary hyperaldosteronism disease, there is an excess production of aldosterone which causes high blood pressure and K^+ imbalance. Spironolactone, a diuretic drug is generally used to treat these conditions. Choose the correct option for the mode of action of Spironolactone.

Ans

✘ 1.

It stimulates effect of aldosterone on Na^+ excretion and K^+ reabsorption

✘ 2.

It inhibits effect of aldosterone on Na^+ excretion and K^+ reabsorption

✘ 3.

It stimulates effect of aldosterone on Na^+ reabsorption and K^+ excretion

✔ 4.

It inhibits effect of aldosterone on Na^+ reabsorption and K^+ excretion

Question Type : **MCQ**
Question ID : **4941032107**
Status : **Answered**
Chosen Option : **2**
Marks : **-1.00**

Q.7 In a plant, red flower colour is dominant over white, tall stem is dominant over dwarf and round seed shape is dominant over wrinkled. A plant that is heterozygous for all three characters was allowed to self-fertilize. What is the proportion of the offspring expected to be homozygous for red flower colour, homozygous for tall stem and heterozygous for seed shape?

Ans

✘ 1. 1/4

✘ 2. 1/8

✔ 3. 1/32

✘ 4. 1/16

Question Type : **MCQ**
Question ID : **4941032102**
Status : **Answered**
Chosen Option : **2**

Marks : **-1.00**

Q.8 Which of the following statements about photosynthesis and respiration are correct?

(i) Both photosynthesis and respiration produce ATP.

(ii) Respiration is an exothermic process, while photosynthesis is an endothermic one.

(iii) Respiration and photosynthesis are linked in the mitochondria through oxaloacetate-malate transformations.

(iv) Respiration produces NADPH, while Photosynthesis produces NADH.

Ans

✔ 1. (i), (ii) and (iii)

✘ 2. (i), (iii) and (iv)

✘ 3. (i), (ii) and (iv)

✘ 4. (ii), (iii) and (iv)

Question Type : **MCQ**
Question ID : **4941032103**
Status : **Answered**
Chosen Option : **3**
Marks : **-1.00**

Q.9 When antibodies are mixed with their corresponding antigens present on the surface of animal cells, erythrocytes, or bacteria, they cross-link these objects to form visible clumps. This serological reaction is called as agglutination and is very similar to the precipitation reaction. Both reactions are specific because they depend on the specific antibody and antigen pair. Antigens involved in precipitation reaction are much smaller and more soluble than those involved in agglutination making the latter reaction easily detectable. Which of the following options is best suited to make the precipitation reaction more easily detectable?

Ans

✘ 1. Decreasing the affinity of the antibody for the antigen.

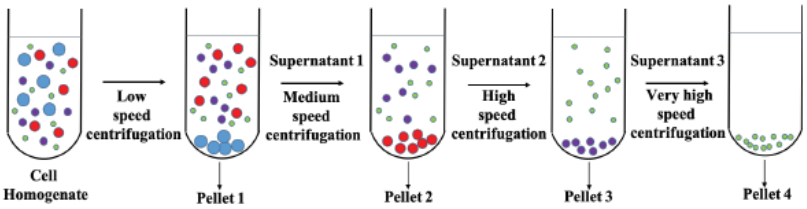
✔ 2.
Attaching soluble antigens to large, inert carriers such as erythrocytes or latex beads.

✘ 3. Increasing the ionic strength of the reaction solution.

✘ 4.
Performing the experiment at lower temperature such as 4^{o}C.

Question Type : **MCQ**
Question ID : **4941032109**
Status : **Answered**
Chosen Option : **2**
Marks : **3.00**

Q.10 Differential centrifugation is a technique used to separate cell components on the basis of size and density. The larger and denser components experience the greatest centrifugal force and sediment to form a pellet at the bottom of the tube; while smaller, less dense components remain in suspension above, a portion called the supernatant. Repeated centrifugation at progressively higher speeds will fractionate cell homogenates into their components.



Four researchers (**P**, **Q**, **R** and **S**) jointly perform the centrifugation procedure from human liver cells to study electron transport chain, protein synthesis, tubulin polymerization, and cytochrome P450, respectively. Identify the pellet used by the researchers for their respective experiments.

Ans

✔ 1. **P**: Pellet 2, **Q**: Pellet 4, **R**: Pellet 1, **S**: Pellet 3

✘ 2. **P**: Pellet 1, **Q**: Pellet 4, **R**: Pellet 3, **S**: Pellet 2

✘ 3. **P**: Pellet 1, **Q**: Pellet 2, **R**: Pellet 3, **S**: Pellet 4

✘ 4. **P**: Pellet 1, **Q**: Pellet 3, **R**: Pellet 2, **S**: Pellet 4

Question Type : **MCQ**
Question ID : **4941032110**
Status : **Answered**
Chosen Option : **3**
Marks : **-1.00**

Q.11 A sex-linked recessive gene in humans produces color-blind men when hemizygous ($X^{cb}Y$), and color-blind women when homozygous ($X^{cb}X^{cb}$). A non-linked, autosomal, but sex-influenced gene for pattern baldness is dominant in men (BB or Bb) and is only manifested in women when they are homozygous dominant (BB). A heterozygous bald, color-blind man marries a non-bald woman with normal vision whose father was non-bald and color-blind and whose mother was bald with normal vision. Choose the correct option(s) for the phenotypic expectations for their children.

Ans

✔ 1.

Non-bald, normal vision daughters are 3:8; Non-bald, normal vision sons are 1:8

✔ 2.

Non-bald, color-blind daughters are 3:8; Non-bald, color-blind sons are 1:8

✔ 3.

Bald, normal vision daughters are 1:8; Bald, normal vision sons are 3:8

✔ 4.

Bald, color-blind daughters are 1:8; Bald, color-blind sons are 3:8

Question Type : **MSQ**
Question ID : **4941032112**
Status : **Answered**
Chosen Option : **1,2,3,4**
Marks : **4.00**

Q.12 A purified linear double-stranded DNA fragment was independently subjected to five treatments using different restriction enzymes (RE) and the unique fragment sizes of DNA thus obtained were measured using conventional agarose gel electrophoresis. The results for such treatments are as depicted in the table below.

Treatment	Measured sizes of DNA fragments (kb)
No digestion	9
Enzyme *Eco*RI	2 and 7
Enzyme *Hind*III	3 and 6
Enzyme *Hind*III and *Eco*RI	1, 2, and 6
Enzyme *Nde*I	4 and 5
Enzyme *Nde*I and *Eco*RI	2, 3 and 4

Which of the following option(s) is/are correct?

Ans

✗ 1. RE site for *Nde*I lies between those for *Hind*III and *Eco*RI.

✓ 2. RE sites for *Eco*RI and *Nde*I are 3 kb apart.

✓ 3. RE site for *Hind*III lies between those for *Eco*RI and *Nde*I.

✓ 4.
A double digestion with *Hind*III and *Nde*I would give rise to 2, 3 and 4 kb fragments.

Question Type : **MSQ**
Question ID : **4941032114**
Status : **Answered**
Chosen Option : **1,2,4**
Marks : **0.00**

Q.13 A transgenic crop plant (2n) was generated by transforming it with a kanamycin-resistant gene '**P**' that integrates in its nuclear genome. Positive transformants were screened using this antibiotic as a selective agent. Southern blot analysis revealed a single copy insertion. Which of the following statement(s) is/are correct?

Ans

✗ 1.
P/- transgenic line can have stronger expression level of gene 'P' than the P/P transgenic line.

✓ 2.
If the transformants are selfed, the offspring will have either P/P, P/- or -/- genotypes.

✓ 3.
The Southern analysis band pattern for P/P and P/- will not be the same.

✓ 4. P/P, P/- genotype plants should survive the selection.

Question Type : **MSQ**
Question ID : **4941032113**
Status : **Answered**
Chosen Option : **1,2,4**
Marks : **0.00**

Q.14 Approximately 400 million years ago, closely related fish species **Q** got separated from species **P** by continental drift. Species **Q** got confined in a small region where environmental temperature ranged between 4°C and 10°C. The species **P** got populated in a bigger region where the environmental temperature ranged between 24°C and 35°C. Genome sequencing and other physiological analyses established the following facts:

Characteristics	Species P	Species Q
Size of the whole genome	30 billion base pair	15 billion base pair
Approximate number of total genes	27,000	26,000
Total amount of non-coding DNA	14 billion base pair	2 billion base pair
Maximum body weight	45 Kg	300 mg
Maximum length	6.6 feet	27 mm
Average weight	~25 Kg	~250 mg
Average length of the adult	1.6 feet	2.4 inches
Longevity	10 years	3-5 years
Breeding duration	3 months in a year	throughout the year
Generation time	3 years	3 months

In comparison to species **P**, which statement(s) is/are most likely to be correct?

Ans

✔ 1.

Species **Q** has a high energy expenditure ratio (reproduction/muscle development).

✔ 2.

Species **Q** achieved adaptive benefit by reducing its genome size and eliminating its redundant genes.

✘ 3.

Species **Q** makes more ATP and tends to spend less time for reproductive purposes.

✔ 4.

The missing genes in species **Q** may provide clues about regulation of body size and longevity.

Question Type : **MSQ**
Question ID : **4941032111**
Status : **Answered**
Chosen Option : **1,2,4**
Marks : **4.00**

Q.15 A group of researchers performed a genetic survey of two different human populations, one living in a deep tropical forest and the other in a faraway metropolitan city of the same country. Their haemoglobin genes were analyzed and classified as normal or sickle cell anaemic. Five years later, the same group of researchers performed another survey for the occurrence of malaria in these two populations. The reports are tabulated as follows:

Year 2010	Forest	City
Total number of individuals in the population	4020	40225
Number of individuals with normal haemoglobin gene	990	40219
Number of individuals with sickle cell anaemia gene	3030	06

Year 2015	Forest	City
Total number of individuals in the population	4455	42115
Number of individuals who had malaria in the last 5 years	3516	4113
Number of individuals died due to anaemia in the last 5 years	35	355

Sickle cell anaemia manifests in an individual because of a defective haemoglobin gene. Assuming that the rate of exposure to malarial parasites remains constant both in forest and in the city during the last 100 years, and other compounding factors do not exist, which of the following statement(s) is/are most likely to be correct?

Ans ✔ 1.

The percentage of individuals dying due to anaemia in both forest and city is almost the same.

✔ 2.

Individuals carrying gene for sickle cell anaemia are better protected against malaria.

✔ 3. Malarial infection is independent of the haemoglobin gene.

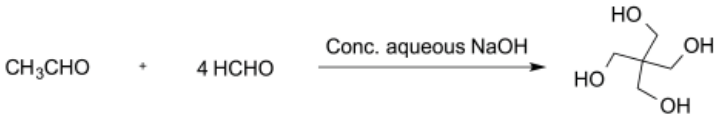
✘ 4.

Individuals carrying gene for normal haemoglobin are better protected against malaria.

Question Type : **MSQ**
Question ID : **4941032115**
Status : **Answered**
Chosen Option : **2,3**
Marks : **0.00**

Section : **Chemistry**

Q.1 The following reaction involves sequentially



Ans ✔ 1. 3 Aldol reactions and 1 Cannizzaro reaction

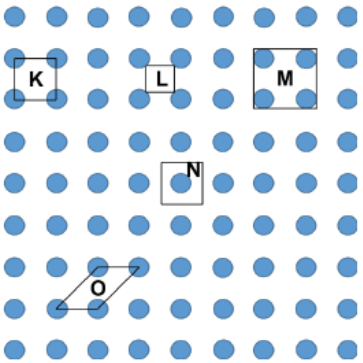
✘ 2. 3 Cannizzaro reactions and 1 Aldol reaction

✘ 3. 3 Aldol reactions and 2 Cannizzaro reactions

✘ 4. 2 Cannizzaro reactions and 2 Aldol reactions

Question Type : **MCQ**
Question ID : **4941032119**
Status : **Answered**
Chosen Option : **1**
Marks : **3.00**

Q.2 The set of quadrilaterals **(K, L, M, N and O)** representing the correct unit cell in the lattice given below is



Ans ✘ 1. M, N and O

✘ 2. K, L and O

✔ 3. K, N and O

✘ 4. K, L and M

Question Type : **MCQ**
Question ID : **4941032121**
Status : **Answered**
Chosen Option : **3**
Marks : **3.00**

Q.3 The transition metal M in the diamagnetic complex, $[M(CN)_6]^{3-}$, is

Ans

✗ 1. Ni

✓ 2. Co

✗ 3. Fe

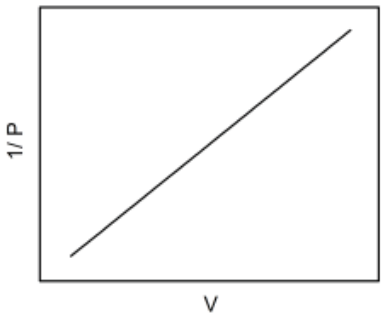
✗ 4. Zn

Question Type : **MCQ**
Question ID : **4941032122**
Status : **Answered**
Chosen Option : **2**
Marks : **3.00**

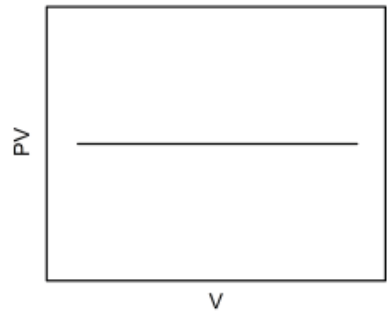
Q.4 Consider the chemical equilibrium $A(s) \rightleftharpoons B(s) + C(g)$ inside a vessel fitted with a movable piston at temperature T. The correct plot corresponding to volume change (assuming ideal gas behavior) is

Ans

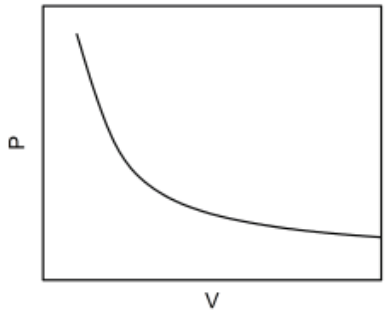
✗ 1.



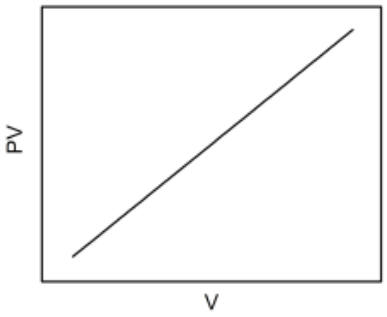
✗ 2.



✗ 3.

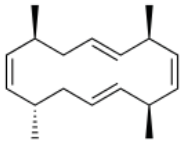


✔ 4.



Question Type : **MCQ**
Question ID : **4941032125**
Status : **Answered**
Chosen Option : **4**
Marks : **3.00**

Q.5 The number of optically active compound(s) obtained upon complete ozonolysis of the following optically active compound is



Ans

✘ 1. 4

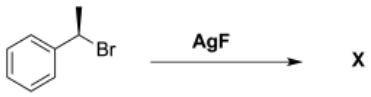
✔ 2. 1

✘ 3. 3

✘ 4. 2

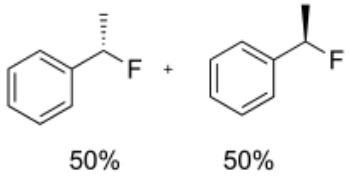
Question Type : **MCQ**
Question ID : **4941032117**
Status : **Answered**
Chosen Option : **4**
Marks : **-1.00**

Q.6 The major product or the mixture of products (X) of the following reaction is

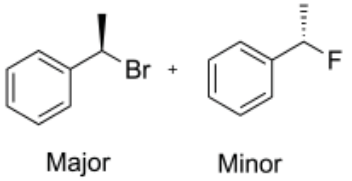


Ans

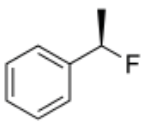
✔ 1.

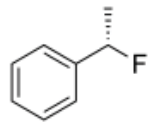


✘ 2.



✘ 3.



4. 

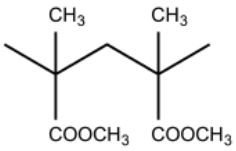
Question Type : **MCQ**
Question ID : **4941032116**
Status : **Answered**
Chosen Option : **1**
Marks : **3.00**

Q.7 Two dilute solutions, A and B are prepared by dissolving two completely dissociable solutes, MA (Mol wt. X) and $M'A_2$ (Mol wt. 2X) in water, respectively. Each solution contains W_2 g of the respective solute, dissolved in W_1 g of water. If the elevation of boiling point of A and B are measured to be $\Delta T_b(A)$ and $\Delta T_b(B)$ respectively, the ratio $\Delta T_b(A)/\Delta T_b(B)$ would be

Ans
1. $3/2$
2. $4/3$
3. $2/3$
4. $1/3$

Question Type : **MCQ**
Question ID : **4941032124**
Status : **Answered**
Chosen Option : **2**
Marks : **3.00**

Q.8 The most popular bone cement is a synthetic polymer having the fragment structure as given below.



The monomer(s) of the above polymer is/are

Ans
1. $CH_3CH{=}CH\text{-}COOCH_3$
2. $CH_3CH{=}CH_2 + CH_2{=}CHCOOCH_3$
3. $CH_2{=}C(CH_3)COOCH_3$
4. $CH_2O + CH_3CH_2COOCH_3$

Question Type : **MCQ**
Question ID : **4941032118**
Status : **Answered**
Chosen Option : **3**
Marks : **3.00**

Q.9 Nitrogen is known to form a variety of oxides and oxyacids. NO and N_2O are unstable, while NO_2 is a stable oxide. NO_2 is a brown acidic gas at room temperature and on cooling below 20 °C gives N_2O_4. NO_2/N_2O_4 dissolves in water to give nitric acid. N_2O_4 reacts with NO to form N_2O_3. When some metals react with dil. HNO_3 at room temperature, oxides of nitrogen in lower oxidation states are formed. The correct statement is

Ans
1. O-N-O bond angles in N_2O_4 and N_2O_3 are same.
2. NO_2 dimerises to form N_2O_4 due to redox reaction.

✗ 3. The reaction of zinc with dil. HNO_3 produces NO_2.

✓ 4. When N_2O_3 dissolves in water, it gives nitrous acid.

Question Type : **MCQ**
Question ID : **4941032120**
Status : **Answered**
Chosen Option : **4**
Marks : **3.00**

Q.10 The ground state energy of hydrogen atom in the n^{th} stationary state is given by the expression $E_n = -(2\pi^2)me^4/(n^2h^2)$, where m $(= m_e\ m_p\ /(m_e + m_p))$ is the reduced mass, e is the electronic charge, and m_e and m_p are the mass of electron and proton, respectively. The ground state energy of hydrogen atom as calculated by this expression is -13.6 eV. If the first ionization potential of deuterium atom is I_D, the correct statement is

Ans

✗ 1. $I_D = 27.2$ eV.

✗ 2. $I_D < 13.6$ eV

✓ 3. $I_D > 13.6$ eV

✗ 4. $I_D = 13.6$ eV.

Question Type : **MCQ**
Question ID : **4941032123**
Status : **Answered**
Chosen Option : **3**
Marks : **3.00**

Q.11 Prussian blue, a blue pigment used for paints and fabrics was the first synthetic co-ordination compound. It has a cubic structure with Fe in both +2 and +3 oxidation states. It is obtained by the addition of iron(III) salts to sodium/potassium ferro-cyanide in aqueous solution. The action of sodium ferrocyanide with sodium nitrite in aqueous solution produces a beautiful ruby red diamagnetic iron complex **(X)**, which gives a violet colored complex **(Y)** in the presence of sulphide. **X** on treatment with NaOH gives back sodium ferrocyanide. The correct statement(s) is/are

Ans ✗ 1.

In Prussian blue, the same number of Fe(II) and Fe(III) ions are present.

✓ 2. The oxidation state of Fe in complex Y is +2.

✓ 3. The hybridization of Fe in ferrocyanide ion is d^2sp^3.

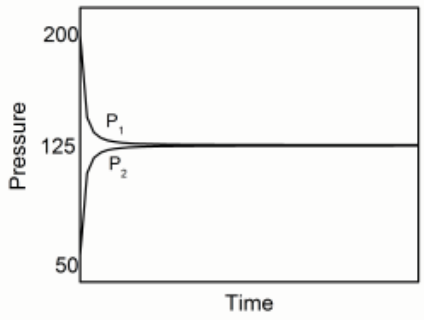
✗ 4. The complex **X** is $Na_4[Fe(CN)_6NO]$.

Question Type : **MSQ**
Question ID : **4941032127**
Status : **Answered**
Chosen Option : **3,4**
Marks : **0.00**

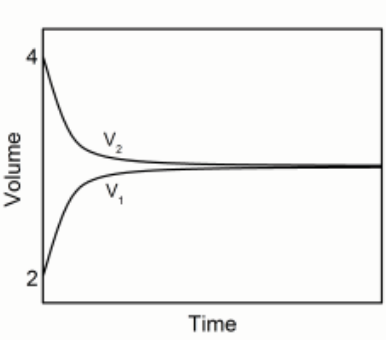
Q.12 A thermally insulated vessel is partitioned into two compartments by a rigid, movable, and frictionless diathermal (heat conducting) piston. Each compartment contains one mole of an ideal gas. The piston is initially clamped and the temperature, pressure, and volume of the gases in the first and second compartments are: $T_1 = 400$ K, $V_1 = 2$ L; and $T_2 = 200$ K, $V_2 = 4$ L. The piston is then released and the system is allowed to attain thermodynamic equilibrium in both the compartments. The correct figure(s) depicting this spontaneous process, is/are: (work associated with the movement of the piston may be neglected)

Ans

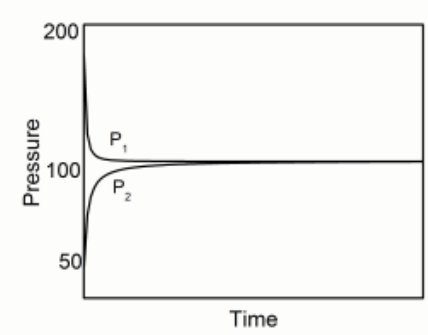
1.



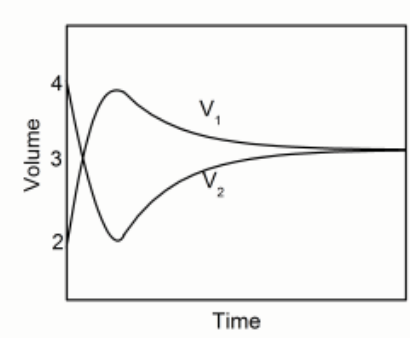
2.



3.

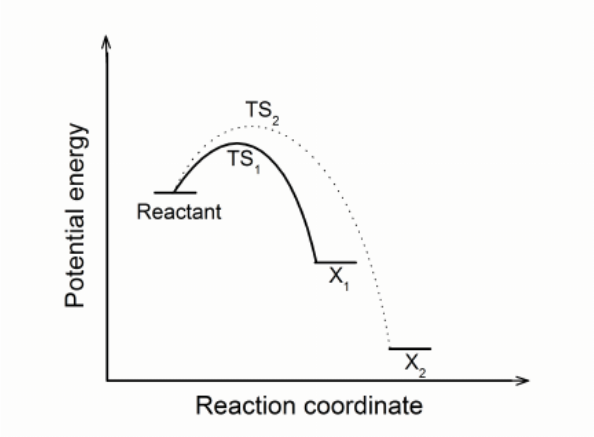


4.



Question Type : **MSQ**
Question ID : **4941032129**
Status : **Answered**
Chosen Option : **3,4**
Marks : **4.00**

Q.13 Treatment of 2-bromo-2-methylbutane with sodium ethoxide in ethanol at 70 °C gives a mixture of two products X_1 and X_2 through one step processes. The energy profile diagrams of the two processes are shown below.



Ans

✔ 1. Product X_1 is 2-methyl-1-butene.

✘ 2. Product X_2 is formed faster than X_1.

✔ 3.

If the same reaction is carried out using potassium tertbutoxide in tertbutanol at 75 °C, the major product will be 2-methyl-1-butene.

✘ 4.

In the reaction using sodium ethoxide in ethanol large amount of 2-ethoxy-2-methylbutane is formed.

Question Type : **MSQ**
Question ID : **4941032126**
Status : **Answered**
Chosen Option : **1,3,4**
Marks : **0.00**

Q.14 Interhalogen compounds are formed when two halogens (F, Cl, Br, I) react together. They are represented by XX'_n, where X is halogen of larger size and X′ of smaller size. The total number of halogens in XX'_n depends on the radii of X and X′. The **correct** statement(s) regarding XX'_n is/are

Ans

✔ 1.

Halide ions reacts with interhalogen compounds to give polyhalides.

✔ 2.

Interhalogen compounds are covalent in nature and more reactive than halogens, in general.

✔ 3.

Iodine can form an interhalogen compound containing maximum numbers of halogen atoms.

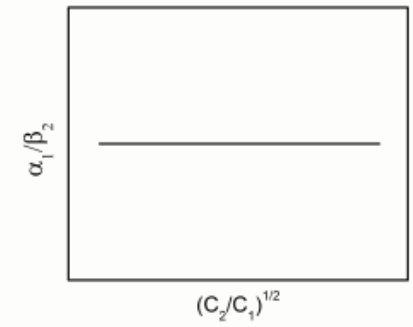
✘ 4. FCl_3 is one of the stable interhalogen compounds.

Question Type : **MSQ**
Question ID : **4941032128**
Status : **Answered**
Chosen Option : **1,3**
Marks : **0.00**

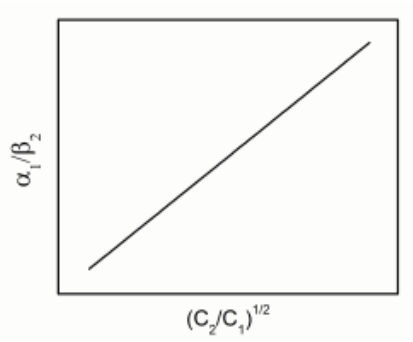
Q.15 Consider three vessels containing aqueous solutions of a weak acid HA (initial concentration C_1, degree of dissociation α_1), another weak acid HB (initial concentration C_2, degree of dissociation β_2), and their mixture (initial concentration of HA $= C_1$, degree of dissociation α_3 and initial concentration of HB $= C_2$, degree of dissociation β_3), respectively. When C_1 and C_2 are varied, the correct plot (assuming α and β to be small) is

Ans

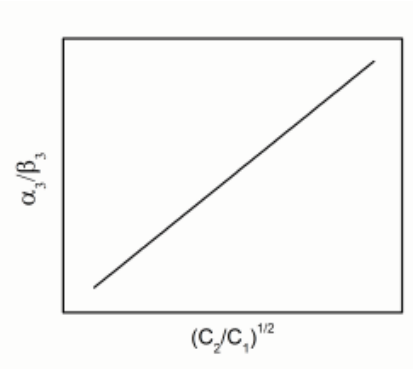
✗ 1.



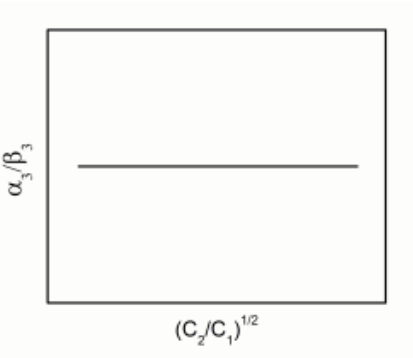
✓ 2.



✗ 3.



✓ 4.



Question Type : **MSQ**
Question ID : **4941032130**
Status : **Answered**
Chosen Option : **2,4**
Marks : **4.00**

Section : **Mathematics**

Q.1 For $\alpha > -1$ and $\beta > -1$, the value of $\lim_{n\to\infty} n^{\beta-\alpha}\dfrac{1^\alpha + 2^\alpha + \cdots + n^\alpha}{1^\beta + 2^\beta + \cdots + n^\beta}$ is

Ans

1. $\frac{\beta}{\alpha+1}$

2. $\frac{\alpha+1}{\beta+1}$

3. $\frac{\beta+1}{\alpha+1}$

4. $\frac{\alpha}{\beta+1}$

Question Type : **MCQ**
Question ID : **4941032140**
Status : **Answered**
Chosen Option : **3**
Marks : **3.00**

Q.2 The value of $\int_{\pi/6}^{\pi/3} \frac{\ln(\tan x)}{\sin^4 x + \cos^4 x} dx$ is

Ans

1. $\frac{\pi}{2}$

2. $\frac{\pi}{4}$

3. 0

4. π

Question Type : **MCQ**
Question ID : **4941032133**
Status : **Answered**
Chosen Option : **3**
Marks : **3.00**

Q.3 Let $s(n)$ be the sum of digits of a positive integer n. Then the number of solutions of the equation $n + s(n) + s(s(n)) = 2019$ with $n \geq 2000$ is

Ans

1. 4

2. 2

3. 19

4. 3

Question Type : **MCQ**
Question ID : **4941032131**
Status : **Answered**
Chosen Option : **2**
Marks : **-1.00**

Q.4 Let α and β be the roots of the equation $x^2 - 4x + \lambda = 0$ and let γ and δ be the roots of the equation $x^2 - 64x + \mu = 0$. If $\alpha, \beta, \gamma, \delta$ are in geometric progression with positive common ratio, then the value of λ is

Ans

1. $\frac{16}{25}$

2. $\frac{32}{25}$

✔ 3. $\frac{64}{25}$

✘ 4. $\frac{4}{25}$

Question Type : **MCQ**
Question ID : **4941032136**
Status : **Answered**
Chosen Option : **3**
Marks : **3.00**

Q.5 A box contains more than 100 balls of which some are red and the remaining are blue. If we take out two balls at random, the probability of getting one blue and one red is 1/2. The minimium number of balls in the box is

Ans

✘ 1. 101

✔ 2. 121

✘ 3. 120

✘ 4. 125

Question Type : **MCQ**
Question ID : **4941032134**
Status : **Answered**
Chosen Option : **2**
Marks : **3.00**

Q.6 The sum of the focal distances of any point on an ellipse is equal to the length of the

Ans

✘ 1. diameter through that point

✘ 2. minor axis

✔ 3. major axis

✘ 4. latus rectum

Question Type : **MCQ**
Question ID : **4941032137**
Status : **Answered**
Chosen Option : **3**
Marks : **3.00**

Q.7 The number of two-digit positive integers divisible by both their digits is

Ans

✘ 1. 15

✘ 2. 12

✔ 3. 14

✘ 4. 13

Question Type : **MCQ**
Question ID : **4941032135**
Status : **Answered**
Chosen Option : **3**
Marks : **3.00**

Q.8 The domain of the function $f(x) = \log_{|x|}([x])$ is

Ans

✔ 1. $(1, \infty)$

✗ 2. $\mathbb{R} - \{-1, 0, 1\}$

✗ 3. $(0, \infty)$

✗ 4. $[1, \infty)$

Question Type : **MCQ**
Question ID : **4941032132**
Status : **Answered**
Chosen Option : **1**
Marks : **3.00**

Q.9 If the length of the median drawn on the base of a triangle is half the length of its base, then the triangle is

Ans

✗ 1. obtuse-angled

✗ 2. equilateral

✓ 3. right-angled

✗ 4. acute-angled

Question Type : **MCQ**
Question ID : **4941032139**
Status : **Answered**
Chosen Option : **3**
Marks : **3.00**

Q.10 A variable sphere of constant radius passes through the point $(0, 0, 1)$ and touches the xy-plane. The locus of the centre of the sphere is

Ans

✗ 1. $x^2 + y^2 = \dfrac{1}{4}$

✗ 2. the point $(0, 0, \frac{1}{2})$

✗ 3. $x^2 + y^2 + (z - \frac{1}{2})^2 = \dfrac{1}{4}$

✓ 4. $x^2 + y^2 + (z - 1)^2 = z^2$

Question Type : **MCQ**
Question ID : **4941032138**
Status : **Answered**
Chosen Option : **4**
Marks : **3.00**

Q.11 For a positive integer m, let $\sigma(m)$ denote the sum of positive divisors of m and $\varphi(m)$ denote the number of elements of the set $\{j : 1 \leq j \leq m \text{ with } \gcd(j, m) = 1\}$, and define $f(m) = \dfrac{\sigma(m)}{\varphi(m)}$. Let p, q be distinct primes and r, s be positive integers. Then

Ans

✗ 1. $f(p) \leq f(q)$ if $p < q$

✓ 2. $f(p^r) < f(p^s)$ if $r < s$

✗ 3. there are primes $p \neq q$ such that $f(p) = f(q)$

✓ 4. $f(p^r q^s) = f(p^r) f(q^s)$

Question Type : **MSQ**
Question ID : **4941032141**
Status : **Answered**

Chosen Option : **2,4**
Marks : **4.00**

Q.12 Let $g : \mathbb{R} \longrightarrow \mathbb{R}$ be the function given by

$$g(x) = \begin{cases} |x|^x & \text{if } x \neq 0 \\ 1 & \text{if } x = 0. \end{cases}$$

Then

Ans

✗ 1. g is differentiable at $x = 0$

✗ 2. g is a strictly increasing function on $\mathbb{R}$

✓ 3. g is continuous at $x = 0$

✗ 4. $g(x) = 0$ for some $x \in \mathbb{R}$

Question Type : **MSQ**
Question ID : **4941032144**
Status : **Answered**
Chosen Option : **3**
Marks : **4.00**

Q.13 Let P be a 3×3 real matrix. Let $Q = \frac{1}{2}(P + P^T)$ where P^T is the transpose of P.
Then

Ans

✓ 1.

P is symmetric if RPR^T is symmetric for a 3×3 nonsingular matrix R

✓ 2. for every 3×1 matrix X, $X^TQX = X^TPX$

✓ 3.

$X^TSX = X^TPX$ for every 3×1 matrix X implies $S = Q$, where S is a 3×3 symmetric matrix

✓ 4. P is symmetric if $Q = P$

Question Type : **MSQ**
Question ID : **4941032143**
Status : **Answered**
Chosen Option : **1,2,4**
Marks : **0.00**

Q.14 Let $\vec{a}$ and $\vec{b}$ be two given vectors in $\mathbb{R}^3$ and $\vec{a} \neq \vec{0}$. Consider the equation

$$(*) \qquad \vec{a} \times \vec{r} = \vec{b}.$$

Then

Ans

✗ 1. $\vec{a} \cdot \vec{b} = 0$ implies that $(*)$ has finitely many solutions for $\vec{r}$

✓ 2. $(*)$ has a solution for $\vec{r}$ implies $\vec{a} \cdot \vec{b} = 0$

✓ 3. $\vec{a} \cdot \vec{b} = 0$ implies that $(*)$ has infinitely many solutions for $\vec{r}$

✗ 4. $\vec{a} \cdot \vec{b} = 0$ implies that $(*)$ has a unique solution for $\vec{r}$

Question Type : **MSQ**
Question ID : **4941032145**
Status : **Answered**
Chosen Option : **2,3**
Marks : **4.00**

Q.15 Let $f : \mathbb{R} \to \mathbb{R}$ be a continuous function such that $f(x) \neq x$ for any $x \in \mathbb{R}$ and $f(0) = 1$. Then

Ans

✓ 1. there exists $x \in \mathbb{R}$ such that $f(x) > 2$

✓ 2. f may have more than one zeros

✗ 3. f has a unique zero

✗ 4. $f(x) \leq 2$ for all $x \in \mathbb{R}$

Question Type : **MSQ**
Question ID : **4941032142**
Status : **Answered**
Chosen Option : **1,2**
Marks : **4.00**

Section : **Physics**

Q.1 A spherical copper particle has about 125 atoms. If the atomic radius of copper is 140 pm (1 pm $= 10^{-12}$m), the diameter of the particle is close to the wavelength of

Ans

✗ 1. green light.

✓ 2. electron beam of energy 1.4 eV.

✗ 3. sound waves of frequency 340 Hz travelling in air at room temperature.

✗ 4. x-rays of energy 12.40 keV.

Question Type : **MCQ**
Question ID : **4941032153**
Status : **Answered**
Chosen Option : **1**
Marks : **-1.00**

Q.2 A particle is moving in a circular orbit of radius r under the influence of an attractive central force. Assume the Bohr quantization condition to hold. It is found that the frequency of revolution of the particle is independent of the quantum number n. Then, the force is proportional to

Ans

✗ 1. $1/r$

✗ 2. $1/r^2$

✔ 3. r

✘ 4. r^2

Question Type : **MCQ**
Question ID : **4941032150**
Status : **Answered**
Chosen Option : **3**
Marks : **3.00**

Q.3 A 4.0 kg box slides down a vertical wall with constant speed while a person pushes it up at an angle of 45° with the vertical. If the coefficient of friction between the block and the wall is 0.41 then the magnitude of the force applied by the person is close to

Ans

✘ 1. 4 N.

✔ 2. 40 N.

✘ 3. 20 N.

✘ 4. 400 N.

Question Type : **MCQ**
Question ID : **4941032146**
Status : **Answered**
Chosen Option : **2**
Marks : **3.00**

Q.4 A short solenoid (length L and radius r, with n turns per unit length) lies well inside and on the axis of a very long, coaxial solenoid (radius R and N turns per unit length, with $R > r$). Current I flows in the short solenoid. Choose the correct statement.

Ans

✘ 1.
Flux through outer solenoid due to current I in the inner solenoid is proportional to the ratio R/r.

✘ 2.
If instead the current I were to flow in the outer solenoid, then the flux due to it through the inner solenoid would be greater than flux through the outer solenoid due to current I in the inner solenoid.

✘ 3. Mutual inductance of the solenoids is $\mu_0 \pi r^2 n N L^2/R$.

✔ 4. Mutual inductance of the solenoids is $\pi \mu_o r^2 n N L$.

Question Type : **MCQ**
Question ID : **4941032154**
Status : **Answered**
Chosen Option : **4**
Marks : **3.00**

Q.5 Unpolarized red light is incident on the surface of a lake at a grazing angle θ. An observer seeing the light reflected from the water surface through a polarizer notices that on rotating the polarizer, the intensity of light drops to zero at a certain orientation. The red light is replaced by unpolarized blue light. The observer sees the same effect with reflected blue light at a grazing angle θ'. Then,

Ans

✘ 1. $\theta < \theta'$

✘ 2. $\theta' = \theta < 45^\circ$

✘ 3. $\theta' = \theta > 45^\circ$

✔ 4. $\theta' < \theta$

Question Type : **MCQ**
Question ID : **4941032151**

Status : **Answered**
Chosen Option : **4**
Marks : **3.00**

Q.6 An object is placed at a distance of 10 cm from a thin convex lens of focal length 5 cm. A plane mirror is kept 15 cm behind the convex lens. An observer viewing the object from front of the lens will see

Ans

✔ 1.
three images, with only one of the image being diminished and two inverted.

✘ 2.
two images, with only one upright and same size as that of the object.

✘ 3. two images, with one of them diminished and inverted.

✘ 4.
three images, with all images being the same size as that of the object.

Question Type : **MCQ**
Question ID : **4941032152**
Status : **Answered**
Chosen Option : **2**
Marks : **-1.00**

Q.7 A charge $+q$ is distributed over a thin ring of radius r with line charge density $\lambda = q\sin^2\theta/(\pi r)$. Note that the ring is in the x-y plane and θ is the angle made by r with the x-axis. The work done by the electric force in displacing a point charge $+Q$ from the center of the ring to infinity is

Ans

✘ 1. equal to $\frac{qQ}{8\pi\epsilon_0 r}$.

✘ 2.
equal to zero only if the path is a straight line perpendicular to the plane of the ring.

✘ 3. always zero because electrostatic field is conservative.

✔ 4. equal to $\frac{qQ}{4\pi\epsilon_0 r}$.

Question Type : **MCQ**
Question ID : **4941032155**
Status : **Answered**
Chosen Option : **4**
Marks : **3.00**

Q.8 A metal rod of cross-sectional area 10^{-4} m^2 is hanging in a chamber kept at 20 °C with a weight attached to its free end. The coefficient of thermal expansion of the rod is 2.5×10^{-6} K^{-1} and its Young's modulus is 4×10^{12} N·m^{-2}. The weight attached to the rod is increased by 5000 N but the temperature of the chamber is lowered so that the length of the wire is unchanged. Then, the temperature of the chamber is

Ans

✘ 1. 5 °C

✔ 2. 15 °C

✘ 3. 12 °C

✘ 4. 0 °C

Question Type : **MCQ**
Question ID : **4941032149**
Status : **Answered**
Chosen Option : **2**

Marks : **3.00**

Q.9 A particle of charge Q moves with speed v directly towards another particle of charge Q' which is connected to a light spring. The far end of the spring is fixed to a smooth horizontal table. Let P and E be the total momentum and energy of the charge-spring system respectively. Ignore gravity. Then,

Ans

✔ 1. E is conserved but not P.

✘ 2. neither P nor E is conserved.

✘ 3. both P and E are conserved.

✘ 4. P is conserved but not E.

Question Type : **MCQ**
Question ID : **4941032147**
Status : **Answered**
Chosen Option : **1**
Marks : **3.00**

Q.10 An ideal diatomic gas of n moles and with initial pressure P and volume V undergoes a thermodynamic process. In this process the pressure is directly proportional to volume and the *rms* speed of the molecules is doubled. Then, the amount of heat required in this process is

Ans

✔ 1. $9nPV$

✘ 2. $3nPV$

✘ 3. $6nPV$

✘ 4. nPV

Question Type : **MCQ**
Question ID : **4941032148**
Status : **Answered**
Chosen Option : **1**
Marks : **3.00**

Q.11 Two containers C_1 and C_2 of volumes V and $4V$ respectively hold the same ideal gas and are connected by a thin horizontal tube of negligible volume with a valve which is initially closed. The initial temperature and pressure of the gas in C_1 are 300K and P, respectively and those in C_2 are 400K and $5P$, respectively. Heaters are employed to maintain the temperatures in both the containers at their initial values even after the valve is opened. Then,

Ans

✘ 1.
the gas will flow from one container to the other but the entropy of the system remains constant.

✔ 2.
the gas will flow from the hot container to the cold one and the process is irreversible.

✔ 3.
there will be an increase in pressure of the cold container and decrease of the hot one.

✔ 4.
at equilibrium the number of moles of gas in the hot container will be thrice that of the cold one.

Question Type : **MSQ**
Question ID : **4941032157**
Status : **Answered**
Chosen Option : **2,3,4**

Marks : **4.00**

Q.12 Ten electrons, each of mass m_e are confined to a one dimensional box of size L. Assume that the electrons are non-interacting, obey the Pauli exclusion principle and can be described by de Broglie waves. Define $\alpha = h^2/8m_e$ and U_0 to be the ground state energy. Then

Ans

✔ 1. the total energy of the first excited state is $U_0 + 11\alpha/L^2$

✔ 2. $U_0 = 110\ \alpha/L^2$

✘ 3. the energy level of the highest occupied state is $100\ \alpha/L^2$.

✘ 4. The total energy of the second excited state is $U_0 + 22\alpha/L^2$

Question Type : **MSQ**
Question ID : **4941032158**
Status : **Answered**
Chosen Option : **1,2**
Marks : **4.00**

Q.13 A rope of length L and uniform linear density μ is hanging from the ceiling. A transverse wave pulse, generated close to the free end of the rope, travels upwards through the rope. Then,

Ans

✔ 1. the tension will vary across the length of the rope.

✔ 2.
the velocity of the wave will be maximum close to the ceiling.

✘ 3. the wavelength of the wave will be 4L.

✔ 4.
the time taken by the wave to travel the length of the rope is $2\sqrt{L/g}$.

Question Type : **MSQ**
Question ID : **4941032159**
Status : **Answered**
Chosen Option : **1,2,4**
Marks : **4.00**

Q.14 The wall of a dam is straight with height H and length L. It holds a lake of water on one side of height h $(h < H)$ and base dimension $L \times L$. Let the density of water be ρ_w. Ignore atmospheric pressure. Then due to the water

Ans

✔ 1. the torque about the bottom on the wall is $\rho_w g L h^3/6$

✘ 2. the torque about the bottom on the wall is $\rho_w g L h^3/3$

✔ 3. the force on the wall is $\rho_w g L h^2/2$

✘ 4. the force on the wall is $\rho_w g L h^2$

Question Type : **MSQ**
Question ID : **4941032156**
Status : **Answered**
Chosen Option : **1,3**
Marks : **4.00**

Q.15 A circuit consists of a coil with inductance L and an uncharged capacitor of capacitance C. The coil is in a constant uniform magnetic field such that the flux through the coil is Φ. At time $t = 0$, the magnetic field was abruptly switched off. Let $\omega_0 = 1/\sqrt{LC}$ and ignore the resistance of the circuit. Then,

Ans

✔ 1.
magnitude of the charge on the capacitor is $|Q(t)| = C\omega_0\Phi \sin\omega_0 t$.

✗ 2. initial current in the circuit is infinite.

✗ 3. magnitude of the charge on the capacitor is $|Q(t)| = 2C\omega_0\Phi \sin \omega_0 t$.

✓ 4. the cyclotron frequencies of all the particles are same.

Question Type : **MSQ**
Question ID : **4941032160**
Status : **Answered**
Chosen Option : **2**
Marks : **0.00**