Graduate Aptitude Test in Engineering 2017

Question Paper Name: Life Sciences 12th Feb 2017
Subject Name: Life Sciences
Duration: 180
Total Marks: 100

Organizing Institute:

Indian Institute of Technology Roorkee

Chemistry (XL-P) (Compulsory)

Question Number : 1 **Correct : 1 Wrong : -0.33**

CO reacts readily with

(A) Fe (B) Fe^{2+} (C) Fe^{4+} (D) Fe^{3+}

Question Number : 2 **Correct : 1 Wrong : -0.33**

Molecules that are **NOT** isoelectronic to NO_2^+ ion are

(A) CO_2 and N_3^-
(B) NCO^- and H_3BCN^-
(C) BO_2^- and $H_3CC{\equiv}CH$
(D) OF_2 and O_3^-

Question Number : 3 **Correct : 1 Wrong : -0.33**

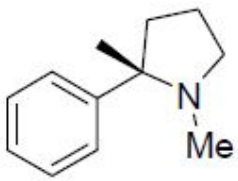
The extensive quantity among the following is

(A) Pressure
(B) Temperature
(C) Chemical potential
(D) Volume

Question Number : 4 **Correct : 1 Wrong : -0.33**

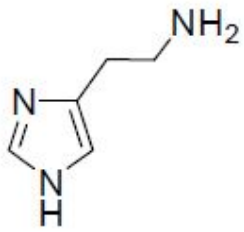
The compound that gives characteristic foul smell upon heating with potassium hydroxide and chloroform is

(A)



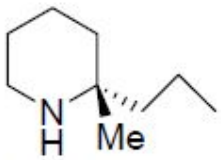
Nicotine

(B)



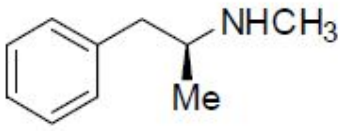
Histamine

(C)



Coniine

(D)

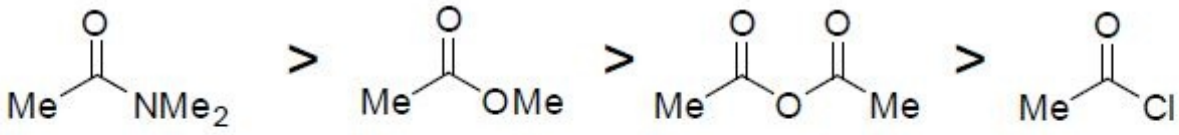


Methamphetamine

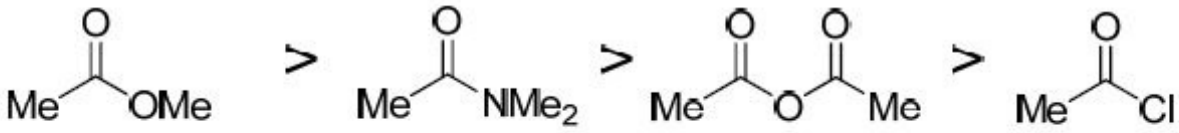
Question Number : 5 **Correct : 1 Wrong : -0.33**

The correct order of stability in water is

(A)



(B)



(C)

(D)

Question Number : 6 **Correct : 2 Wrong : -0.66**

The pair of molecules having non-linear structures is

(A) ICl_2^- and BeH_2

(B) CS_2 and I_3^-

(C) SCl_2 and ClO_2^-

(D) XeF_2 and CN_2^{2-}

Question Number : 7 **Correct : 2 Wrong : -0.66**

The decreasing order of bond lengths for O_2, B_2, N_2 and C_2 is

(A) $B_2 > C_2 > N_2 > O_2$
(B) $B_2 > C_2 > O_2 > N_2$
(C) $N_2 > C_2 > O_2 > B_2$
(D) $B_2 > O_2 > N_2 > C_2$

Question Number : 8 **Correct : 2 Wrong : -0.66**

The octahedral metal oxide with the highest CFSE value is

(A) ZnO (B) MnO (C) VO (D) TiO

Question Number : 9 **Correct : 2 Wrong : -0.66**

Assuming independent non-interacting electrons, the first ionization energy of Helium atom is

(A) 13.6 eV (B) 27.2 eV (C) 54.4 eV (D) 108.8 eV

Question Number : 10 **Correct : 2 Wrong : -0.66**

For a reaction A + B $\longrightarrow$ products, the following data was obtained.

$[A]_0$ (M)	$[B]_0$ (M)	Initial rate
0.1	0.1	r
0.2	0.1	4r
0.1	0.2	2r

A_0 and B_0 are initial concentrations of A and B, respectively. The overall order of the reaction is

(A) 2
(B) 3
(C) 4
(D) 6

Question Number : 11 **Correct : 2 Wrong : -0.66**

The EMF for the following cell at 298.15 K is

$Ag(s) \mid Ag^{+}(aq., 0.01\ M) \parallel Ag^{+}(aq., 1.0\ M) \mid Ag(s)$

(Standard reduction potential for $Ag^{+} + e^{-} \longrightarrow Ag$ is -0.80 V)

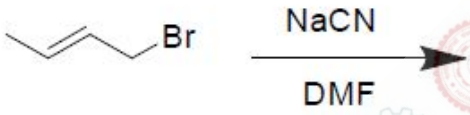
(A) 0.12 V (B) 0.68 V (C) 0.80 V (D) 0.92 V

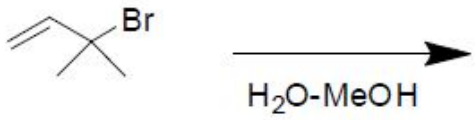
Question Number : 12 **Correct : 2 Wrong : 0**

One gram of a protein is dissolved in one liter of water. The resulting solution exerts an osmotic pressure of 1.4 Torr at 298 K. Assuming that the protein does not ionize in solution, the molecular weight of the protein is _____ $g\ mol^{-1}$. ($R = 0.082\ L\ atm\ mol^{-1}\ K^{-1}$)

Question Number : 13 **Correct : 2 Wrong : -0.66**

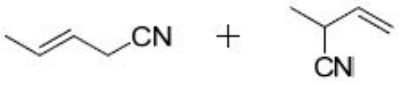
The type of nucleophilic substitution and the possible products for each of the reactions P and Q are

P: 

Q: 

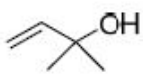
(A) P: S_N2

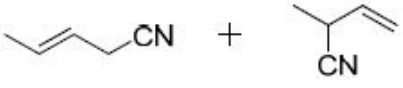
Q: S_N1

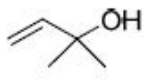
(B) P: S_N1 

Q: S_N2

(C) P: S_N2

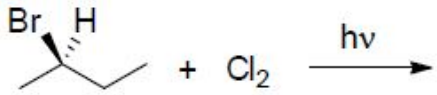
Q: S_N1 

(D) P: S_N1 

Q: S_N2 

Question Number : 14 **Correct : 2 Wrong : -0.66**

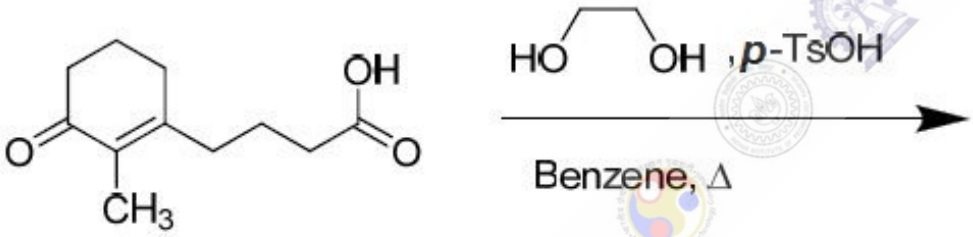
If mono-chlorination occurs at every carbon in the following reaction, the number of isomers (stereo isomers + constitutional isomers) that one can have is



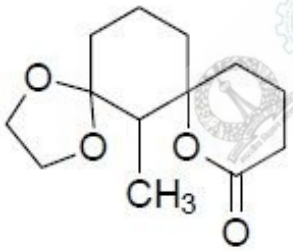
(A) 4 (B) 5 (C) 6 (D) 8

Question Number : 15 **Correct : 2 Wrong : -0.66**

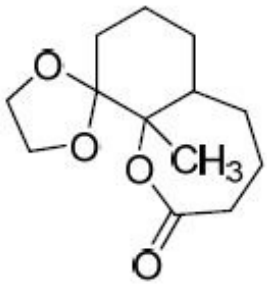
The major product in the following reaction is



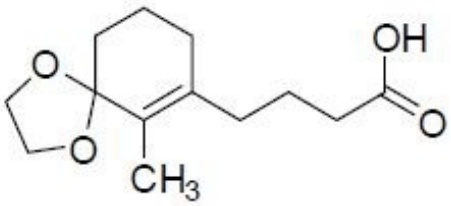
(A)



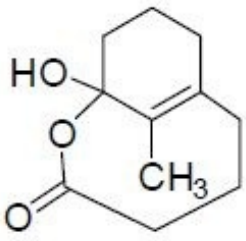
(B)



(C)



(D)



General Aptitude

Question Number : 116 **Correct : 1 Wrong : -0.33**

The event would have been successful if you _____able to come.

(A) are (B) had been (C) have been (D) would have been

Question Number : 117 **Correct : 1 Wrong : -0.33**

There was no doubt that their work was thorough.

Which of the words below is closest in meaning to the underlined word above?

(A) pretty (B) complete (C) sloppy (D) haphazard

Question Number : 118 **Correct : 1 Wrong : -0.33**

Four cards lie on a table. Each card has a number printed on one side and a colour on the other. The faces visible on the cards are 2, 3, red, and blue.

Proposition: If a card has an even value on one side, then its opposite face is red.

The cards which MUST be turned over to verify the above proposition are

(A) 2, red (B) 2, 3, red (C) 2, blue (D) 2, red, blue

Question Number : 119 **Correct : 1 Wrong : -0.33**

What is the value of x when $81 \times \left(\frac{16}{25}\right)^{x+2} \div \left(\frac{3}{5}\right)^{2x+4} = 144$?

(A) 1 (B) -1 (C) -2 (D) Cannot be determined

Question Number : 120 **Correct : 1 Wrong : -0.33**

Two dice are thrown simultaneously. The probability that the product of the numbers appearing on the top faces of the dice is a perfect square is

(A) 1/9 (B) 2/9 (C) 1/3 (D) 4/9

Question Number : 121 **Correct : 2 Wrong : -0.66**

Bhaichung was observing the pattern of people entering and leaving a car service centre. There was a single window where customers were being served. He saw that people inevitably came out of the centre in the order that they went in. However, the time they spent inside seemed to vary a lot: some people came out in a matter of minutes while for others it took much longer.

From this, what can one conclude?

(A) The centre operates on a first-come-first-served basis, but with variable service times, depending on specific customer needs.
(B) Customers were served in an arbitrary order, since they took varying amounts of time for service completion in the centre.
(C) Since some people came out within a few minutes of entering the centre, the system is likely to operate on a last-come-first-served basis.
(D) Entering the centre early ensured that one would have shorter service times and most people attempted to do this.

Question Number : 122 **Correct : 2 Wrong : -0.66**

A map shows the elevations of Darjeeling, Gangtok, Kalimpong, Pelling, and Siliguri. Kalimpong is at a lower elevation than Gangtok. Pelling is at a lower elevation than Gangtok. Pelling is at a higher elevation than Siliguri. Darjeeling is at a higher elevation than Gangtok.

Which of the following statements can be inferred from the paragraph above?

i. Pelling is at a higher elevation than Kalimpong
ii. Kalimpong is at a lower elevation than Darjeeling
iii. Kalimpong is at a higher elevation than Siliguri
iv. Siliguri is at a lower elevation than Gangtok

(A) Only ii (B) Only ii and iii (C) Only ii and iv (D) Only iii and iv

Question Number : 123 Correct : 2 Wrong : -0.66

P, Q, R, S, T and U are seated around a circular table. R is seated two places to the right of Q. P is seated three places to the left of R. S is seated opposite U. If P and U now switch seats, which of the following must necessarily be true?

(A) P is immediately to the right of R
(B) T is immediately to the left of P
(C) T is immediately to the left of P or P is immediately to the right of Q
(D) U is immediately to the right of R or P is immediately to the left of T

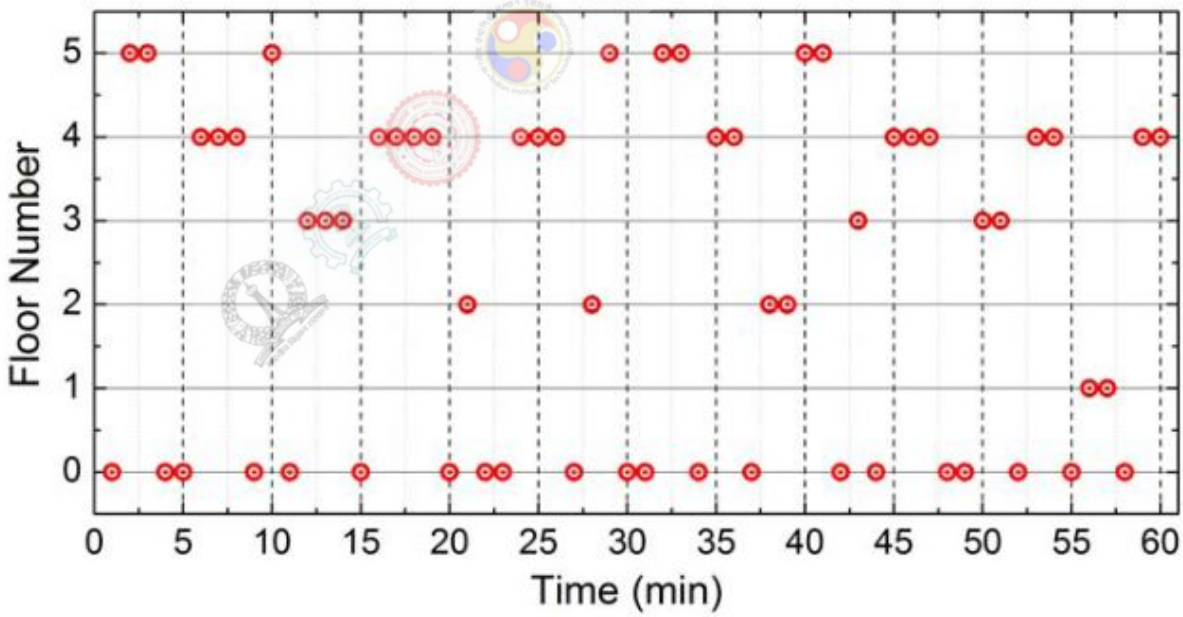
Question Number : 124 Correct : 2 Wrong : -0.66

Budhan covers a distance of 19 km in 2 hours by cycling one fourth of the time and walking the rest. The next day he cycles (at the same speed as before) for half the time and walks the rest (at the same speed as before) and covers 26 km in 2 hours. The speed in km/h at which Budhan walks is

(A) 1 (B) 4 (C) 5 (D) 6

Question Number : 125 Correct : 2 Wrong : -0.66

The points in the graph below represent the halts of a lift for durations of 1 minute, over a period of 1 hour.



Which of the following statements are correct?

i. The elevator never moves directly from any non-ground floor to another non-ground floor over the one hour period
ii. The elevator stays on the fourth floor for the longest duration over the one hour period

(A)) Only i (B) Only ii (C) Both i and ii (D) Neither i nor ii

Biochemistry (XL-Q)

Question Number : 16 **Correct : 1 Wrong : -0.33**

The molecular weight of a protein as determined by native PAGE is 400 kDa. This protein when run on a non-reducing SDS-PAGE gave a band of 200 kDa, and on a reducing SDS-PAGE, gave a band of 100 kDa. The protein has

(A) four subunits of which two sets are linked by two disulfide bridges
(B) four subunits which are linked by four disulfide bridges
(C) two subunits only and none are linked by disulfide bridges
(D) two subunits which are linked by disulfide bridges

Question Number : 17 **Correct : 1 Wrong : -0.33**

Which one of the following techniques CANNOT be used to determine the sequence of a novel protein?

(A) De novo sequencing by ESI-MS/MS
(B) Edman degradation
(C) Sanger sequencing
(D) Peptide mass fingerprinting

Question Number : 18 **Correct : 1 Wrong : -0.33**

Which type of polyacrylamide gel can be used for analyzing the four different proteins listed below?
Protein P: 60 kDa, pI 4
Protein Q: 45 kDa, pI 8
Protein R: 60 kDa, pI 6
Protein S: 45 kDa, pI 7.5

(A) 20% gel, pH 4-7
(B) 20% gel, pH 3-10
(C) 12% gel, pH 3-10
(D) 12% gel, pH 4-7

Question Number : 19 **Correct : 1 Wrong : 0**

The number of fragments generated when the peptide '**ANDCQEGKFMLKPDTWRYVSFMRPA**' is subjected to complete digestion with trypsin are ……

Question Number : 20 **Correct : 1 Wrong :- 0.33**

Puromycin is a structural analog of

(A) alanyl-tRNA (B) tyrosyl-tRNA (C) methionyl-tRNA (D) glycyl-tRNA

Question Number : 21 **Correct : 1 Wrong :- 0.33**

Which one of the enzymes is responsible for arsenic toxicity?

(A) Pyruvate kinase
(B) Aldolase
(C) Phosphofructokinase
(D) Pyruvate dehydrogenase

Question Number : 22 **Correct : 1 Wrong :- 0.33**

Which one is TRUE for Calvin cycle?

(A) Glycerol 3-phosphate is generated in this cycle
(B) CO_2 is not consumed in this cycle
(C) This is a reductive pentose phosphate cycle
(D) Ribose 5-phosphate is a carboxylation substrate in this cycle

Question Number : 23 **Correct : 1 Wrong :- 0.33**

Administration of primaquine causes severe hemolytic anemia because it

(A) increases the demand for NADPH to a level that cells can't meet
(B) decreases the demand for NADPH
(C) inactivates glutathione peroxidase of erythrocytes
(D) increases reduced glutathione level of erythrocytes

Question Number : 24 **Correct : 1 Wrong :- 0.33**

Which one of the following will NOT form lipid bilayer?

(A) Cholesterol
(B) Phosphatidyl ethanolamine
(C) Triacylglycerol
(D) Phosphatidyl serine

Question Number : 25 **Correct : 1 Wrong :- 0.33**

Which one of the following features is NOT appropriate for Fab fragment of IgG ?

(A) Contains antigen binding site
(B) Contains an intact L chain
(C) Two fragments are formed from one IgG molecule
(D) Mediates complement fixation in the intact IgG molecule

Question Number : 26 **Correct : 2 Wrong : 0**

The duration of DNA synthesis (S phase) in plant cells is 11 h and the DNA is replicated at a rate of 100 bp/s/fork. A plant species has about 3.0×10^{10} bp DNA/genome. The number of bidirectional forks per genome required for replication will be .....

Question Number : 27 **Correct : 2 Wrong : 0**

In a PCR reaction, with one double stranded DNA of 600 bp, nano gram of DNA produced after 40 cycles of amplification will be .....

Question Number : 28 **Correct : 2 Wrong : 0**

A solution containing GTP has molar extinction coefficient of 1.55×10^4 $mol^{-1}dm^3cm^{-1}$ at a given wavelength. The concentration of GTP solution is 1.290×10^{-5} mol dm^{-3}. The absorbance of GTP solution in 1 cm cuvette at the same wavelength will be .....

Question Number : 29 **Correct : 2 Wrong : -0.66**

Which one of the following is NOT TRUE for class I MHC protein?

(A) MHC class I protein are polymorphic
(B) T-cell receptors recognizes MHC class I protein
(C) MHC class I protein are displayed on the surfaces of nucleated vertebrate cells
(D) β_2-microglobulin is covalently associated with MHC class I protein

Question Number : 30 **Correct : 2 Wrong : 0**

In an enzyme catalyzed reaction, the initial reaction velocity is only one fourth of its maximum velocity. If the substrate concentration is 3.0×10^{-3} mM, the value of K_m in micro molar (μM) will be ….

Question Number : 31 **Correct : 2 Wrong : -0.66**

Match the following enzymes in column I with their cofactors in column II

Column I	**Column II**
(P) Pyruvate decarboxylase	i. Biocytin
(Q) Glyceraldehyde 3-phosphate dehydrogenase	ii. $NADP^+$
(R) Pyruvate carboxylase	iii. NAD^+
(S) Glucose-6-phosphate dehydrogenase	iv. Thiamine pyrophosphate

(A) P-ii; Q-i; R-iv; S-iii
(B) P-iv; Q-iii; R-i; S-ii
(C) P-i; Q-ii; R-iii; S-iv
(D) P-iii; Q-i; R-iv; S-ii

Question Number : 32 **Correct : 2 Wrong : -0.66**

Match the molecule in column I with its function in column II

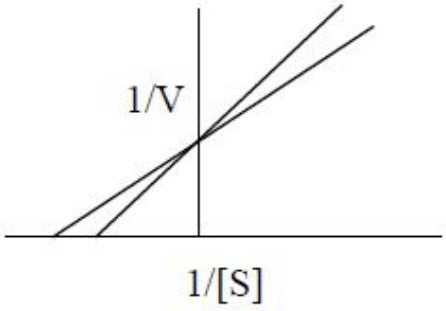
Column I	**Column II**
(P) Cholera toxin	(i) modifies $G_{\alpha i}$
(Q) Pertussis toxin	(ii) inhibits c-AMP phosphodiesterase
(R) IP3	(iii) modifies $G_{\alpha s}$
(S) Caffeine	(iv) increases intracellular Ca^{2+} level

(A) P-iii ; Q-i; R-iv, S-ii
(B) P-iv ; Q-i; R-iii, S-ii
(C) P-ii ; Q-iv; R-i, S-iii
(D) P-iii ; Q-i; R-ii, S-iv

Question Number : 33 **Correct : 2 Wrong : -0.66**

In an *in vitro* dehydrogenation reaction of succinate catalyzed by succinate dehydrogenase, malonate is added. Which one of the following curves represents the effect of malonate on the catalysis of succinate dehydrogenase?

(A)



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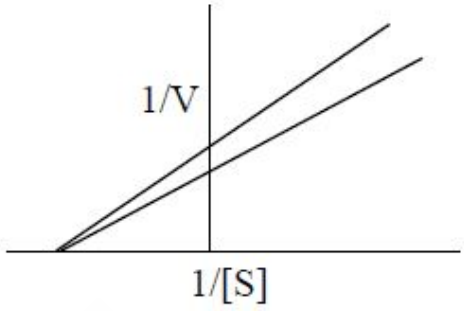
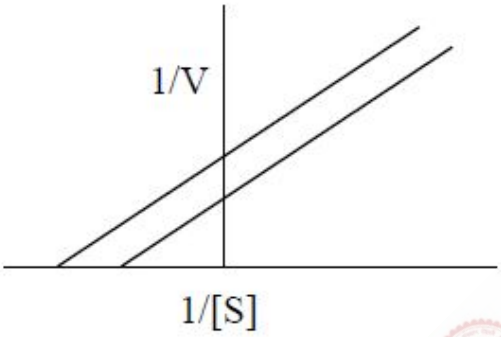
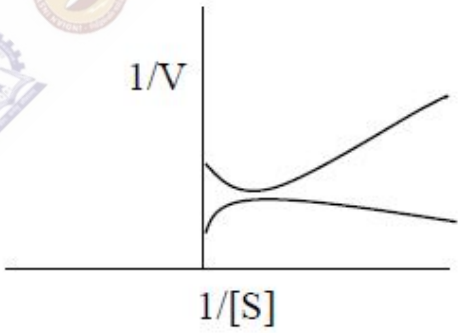


(C)



(D)



Question Number : 34 **Correct : 2 Wrong : -0.66**

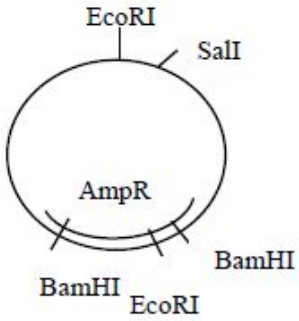
Cardiotonic steroids have ability to strengthen heart muscle contraction due to the fact that these steroids

(A) inhibit K^+-dependent dephosphorylation of Na^+-K^+ ATPase
(B) activate Na^+-K^+ ATPase
(C) increase uptake of Na^+ by activation of Na^+-Ca^{2+} exchanger
(D) increase uptake of Ca^{2+} by activation of Na^+-Ca^{2+} exchanger

Question Number : 35 **Correct : 2 Wrong : -0.66**

A newly isolated circular plasmid gave two bands of 3.2 and 3 kb on digestion with EcoRI and two bands of 5.0 kb and 1.2 kb on digestion with BamHI. Double digestion with EcoRI and BamHI, yielded four bands of 2.6 kb, 2.4 kb, 0.8 kb and 0.4 kb. Digestion with SalI led to disruption of ampicillin resistance gene cassette. The correct restriction map is

(A)



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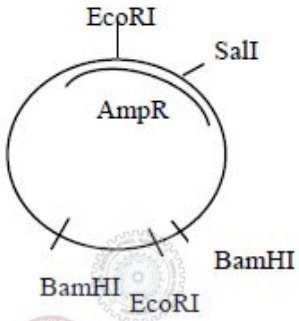
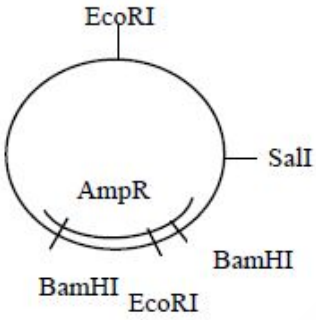
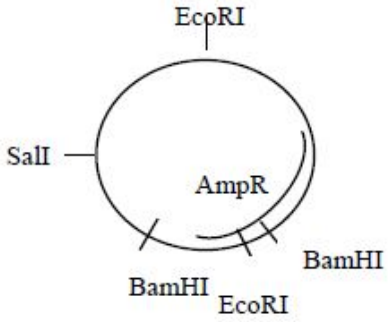


(C)



(D)



General Aptitude

Question Number : 116 **Correct : 1 Wrong : -0.33**

The event would have been successful if you _____able to come.

(A) are (B) had been (C) have been (D) would have been

Question Number : 117 **Correct : 1 Wrong : -0.33**

There was no doubt that their work was thorough.

Which of the words below is closest in meaning to the underlined word above?

(A) pretty (B) complete (C) sloppy (D) haphazard

Question Number : 118 **Correct : 1 Wrong : -0.33**

Four cards lie on a table. Each card has a number printed on one side and a colour on the other. The faces visible on the cards are 2, 3, red, and blue.

Proposition: If a card has an even value on one side, then its opposite face is red.

The cards which MUST be turned over to verify the above proposition are

(A) 2, red (B) 2, 3, red (C) 2, blue (D) 2, red, blue

Question Number : 119 **Correct : 1 Wrong : -0.33**

What is the value of x when $81 \times \left(\frac{16}{25}\right)^{x+2} \div \left(\frac{3}{5}\right)^{2x+4} = 144$?

(A) 1 (B) -1 (C) -2 (D) Cannot be determined

Question Number : 120 **Correct : 1 Wrong : -0.33**

Two dice are thrown simultaneously. The probability that the product of the numbers appearing on the top faces of the dice is a perfect square is

(A) 1/9 (B) 2/9 (C) 1/3 (D) 4/9

Question Number : 121 **Correct : 2 Wrong : -0.66**

Bhaichung was observing the pattern of people entering and leaving a car service centre. There was a single window where customers were being served. He saw that people inevitably came out of the centre in the order that they went in. However, the time they spent inside seemed to vary a lot: some people came out in a matter of minutes while for others it took much longer.

From this, what can one conclude?

(A) The centre operates on a first-come-first-served basis, but with variable service times, depending on specific customer needs.
(B) Customers were served in an arbitrary order, since they took varying amounts of time for service completion in the centre.
(C) Since some people came out within a few minutes of entering the centre, the system is likely to operate on a last-come-first-served basis.
(D) Entering the centre early ensured that one would have shorter service times and most people attempted to do this.

Question Number : 122 **Correct : 2 Wrong : -0.66**

A map shows the elevations of Darjeeling, Gangtok, Kalimpong, Pelling, and Siliguri. Kalimpong is at a lower elevation than Gangtok. Pelling is at a lower elevation than Gangtok. Pelling is at a higher elevation than Siliguri. Darjeeling is at a higher elevation than Gangtok.

Which of the following statements can be inferred from the paragraph above?

i. Pelling is at a higher elevation than Kalimpong
ii. Kalimpong is at a lower elevation than Darjeeling
iii. Kalimpong is at a higher elevation than Siliguri
iv. Siliguri is at a lower elevation than Gangtok

(A) Only ii (B) Only ii and iii (C) Only ii and iv (D) Only iii and iv

Question Number : 123 Correct : 2 Wrong : -0.66

P, Q, R, S, T and U are seated around a circular table. R is seated two places to the right of Q. P is seated three places to the left of R. S is seated opposite U. If P and U now switch seats, which of the following must necessarily be true?

(A) P is immediately to the right of R
(B) T is immediately to the left of P
(C) T is immediately to the left of P or P is immediately to the right of Q
(D) U is immediately to the right of R or P is immediately to the left of T

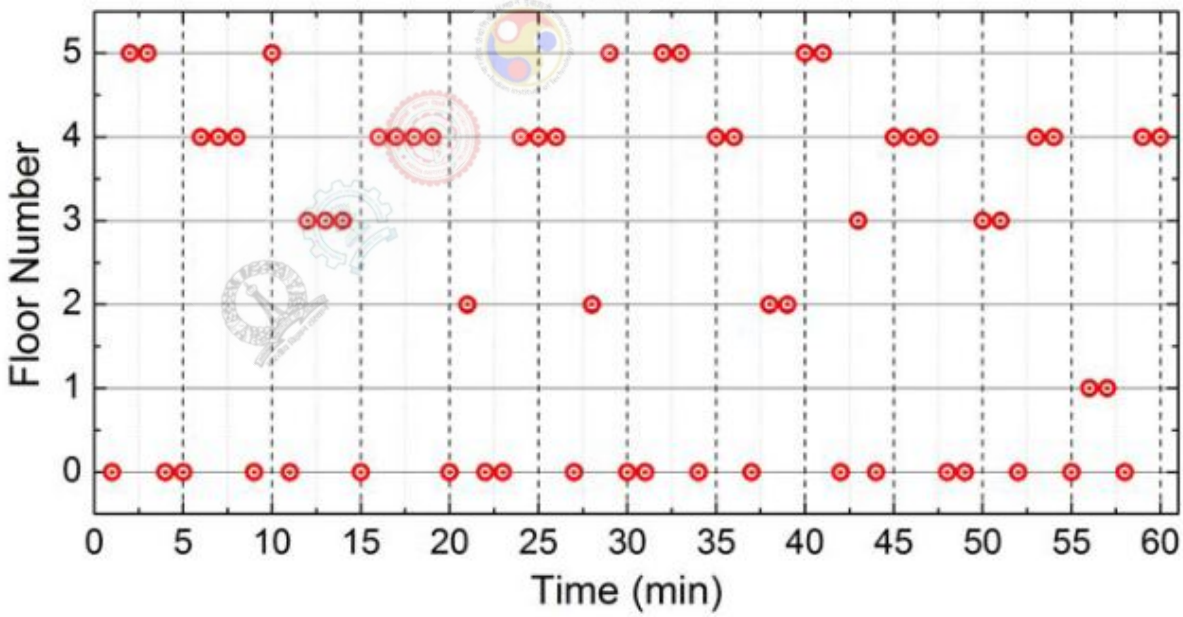
Question Number : 124 Correct : 2 Wrong : -0.66

Budhan covers a distance of 19 km in 2 hours by cycling one fourth of the time and walking the rest. The next day he cycles (at the same speed as before) for half the time and walks the rest (at the same speed as before) and covers 26 km in 2 hours. The speed in km/h at which Budhan walks is

(A) 1 (B) 4 (C) 5 (D) 6

Question Number : 125 Correct : 2 Wrong : -0.66

The points in the graph below represent the halts of a lift for durations of 1 minute, over a period of 1 hour.



Which of the following statements are correct?

i. The elevator never moves directly from any non-ground floor to another non-ground floor over the one hour period
ii. The elevator stays on the fourth floor for the longest duration over the one hour period

(A)) Only i (B) Only ii (C) Both i and ii (D) Neither i nor ii

Botany (XL-R)

Question Number : 36 **Correct : 1 Wrong : -0.33**

As per the Angiosperm Phylogeny Group (APG II, 2003) classification, which of the following plant families comprises of only single genus with single species?

(A) Lauraceae
(B) Aristolochiaceae
(C) Amborellaceae
(D) Typhaceae

Question Number : 37 **Correct : 1 Wrong : -0.33**

A cavity, lysigenous in origin and possessing volatile oil is found in the pericarp of one of the following plants. Identify the **CORRECT** answer.

(A) Litchi
(B) Citrus
(C) Mango
(D) Coconut

Question Number : 38 **Correct : 1 Wrong : -0.33**

Among the following, which genetic material is naturally inherited through maternal inheritance in higher plants?

(A) Nuclear DNA
(B) Plasmid DNA
(C) Chloroplast DNA
(D) T-DNA

Question Number : 39 **Correct : 1 Wrong : -0.33**

A typical floral meristem differs from shoot apical meristem on the basis of

(A) Determinate growth
(B) Presence of auxin
(C) Presence of stem cells
(D) Negative geotropism

Question Number : 40 **Correct : 1 Wrong : -0.33**

Which of the following plant hormones is a carotenoid-cleavage product?

(A) Phytosulfokine
(B) Brassinosteroid
(C) Methyl jasmonate
(D) Strigolactone

Question Number : 41 **Correct : 1 Wrong : -0.33**

Two of the *vir* operons of Ti plasmid in *Agrobacterium tumefaciens* are constitutively expressed. Identify the **CORRECT** pair.

(A) *virA* and *virG*
(B) *virF* and *virH*
(C) *virC* and *virD*
(D) *virB* and *virE*

Question Number : 42 **Correct : 1 Wrong : -0.33**

Which of the following fungi is an example of obligate biotrophic plant pathogen?

(A) *Alternaria brassicicola*
(B) *Botrytis cinerea*
(C) *Puccinia triticina*
(D) *Sclerotinia sclerotiorum*

Question Number : 43 **Correct : 1 Wrong : -0.33**

The phenomenon where an organism lives at the expense of another organism by harming it but not killing, is called

(A) Commensalism
(B) Predation
(C) Symbiosis
(D) Parasitism

Question Number : 44 **Correct : 1 Wrong : -0.33**

Which of the following is **TRUE** for *K*-strategist species?

(A) Produce relatively large number of offspring
(B) Population often grow exponentially
(C) Provide relatively little or no parental care to offspring
(D) Occur in stable and predictable habitats

Question Number : 45 **Correct : 1 Wrong : -0.33**

Identify the **INCORRECT** statement with relation to plant secondary metabolites.

(A) Atropine is a member of indole alkaloids
(B) Limonene is a cyclic terpene found in citrus plants
(C) Green tea is rich in polyphenols
(D) Cyanidin contributes to the red color in rose petals

Question Number : 46 **Correct : 2 Wrong : -0.66**

Choose the **CORRECT** set of matches between group I and group II in relation to nitrogen fixation and assimilation

GROUP I	**GROUP II**
P. *Nitrobacter*	1. $NO_3^- \rightarrow NO_2^-$
Q. Nitrite reductase	2. $N_2 \rightarrow 2NH_3$
R. Nitrogenase	3. $NO_2^- \rightarrow NH_4^+$
S. Nitrate reductase	4. $NO_2^- \rightarrow NO_3^-$

(A) P-4, Q-3, R-2, S-1
(B) P-4, Q-3, R-1, S-2
(C) P-1, Q-2, R-4, S-3
(D) P-3, Q-4, R-2, S-1

Question Number : 47 Correct : 2 Wrong : -0.66

Two plant cells M and N are lying side by side making direct contact. "M" has osmotic potential (Ψs) of -10 bar and pressure potential (Ψp) of 4 bar. On the other hand, "N" has osmotic potential (Ψs) of -12 bar and pressure potential (Ψp) of 5 bar.

Based on these data, what would be the direction of movement of water between M and N?

(A) M to N
(B) N to M
(C) There will be no movement
(D) In both directions

Question Number : 48 Correct : 2 Wrong : -0.66

Two independent non-segregating recessive mutants (*m1* and *m2*) display similar defects in petal formation. When they were crossed with each other (*m1* x *m2*), all the F1 plants developed normal petals. In view of this observation, which of the following conclusions is **CORRECT**?

(A) Mutations in both *m1* and *m2* are in the same gene
(B) Mutations in both *m1* and *m2* are in two separate genes
(C) Inheritance is non-Mendelian
(D) None of the above

Question Number : 49 Correct : 2 Wrong : 0

In a hypothetical trihybrid cross of three loci (*viz*. A, B, C), all were inherited in a complete dominant manner over their recessive alleles a, b, c, respectively. When a test cross between F1 and parent 'aabbcc' was performed, following genotypes of eight phenotypically distinct classes were observed with respective numbers

Class	Genotype	Number
1	ABC	412
2	abc	406
3	Abc	85
4	aBC	80
5	ABc	08
6	abC	07
7	AbC	01
8	aBc	01

The genetic distance (up to one decimal) between A and C loci will be _____ cM.

Question Number : 50 **Correct : 2 Wrong : 0**

In a typical sexually reproducing angiospermic plant, if an endosperm cell contains 4.8×10^8 nucleotide pairs of DNA, then a microsporocyte of this plant will have _____ $\times10^8$ nucleotide pairs of DNA.

Question Number : 51 **Correct : 2 Wrong : -0.66**

Identify the **CORRECT** matching between group I and group II in relation to ecology

GROUP I	GROUP II
P. The physical environment of an organism	1. Trophic level
Q. The totality of the needs of a population for survival and its resource utilization	2. Habitat
R. The position of a species in a food chain	3. Ecosystem
S. Basic functional unit comprising living community and its physical environment	4. Niche
	5. Ecological pyramid

(A) P-2, Q-5, R-4, S-1
(B) P-2, Q-4, R-1, S-3
(C) P-5, Q-2, R-3, S-1
(D) P-1, Q-3, R-4, S-2

Question Number : 52 **Correct : 2 Wrong : -0.66**

Choose the **CORRECT** set of matches between group I and group II in relation to plant genetic transformation methods.

GROUP I	GROUP II
P. Helium	1. *Agrobacterium tumefaciens*
Q. Acetosyringone	2. Microinjection
R. Polyethylene glycol	3. Particle bombardment
S. Agarose embedding	4. Protoplast

(A) P-4, Q-3, R-2, S-1
(B) P-2, Q-1, R-4, S-3
(C) P-3, Q-4, R-1, S-2
(D) P-3, Q-1, R-4, S-2

Question Number : 53 **Correct : 2 Wrong : -0.66**

Match the pathogen, disease caused and the affected plant in the **CORRECT** combination.

Pathogen	**Disease**	**Plant**
P. *Blumeria graminis*	i. Blast disease	1. Groundnut
Q. *Magnaporthe grisea*	ii. Powdery mildew	2. Apple
R. *Venturia inaequalis*	iii. Tikka disease	3. Barley
S. *Cercospora personata*	iv. Scab disease	4. Rice

(A) P-i-1, Q-ii-2, R-iii-3, S-iv-4
(B) P-i-2, Q-ii-1, R-iii-4, S-iv-3
(C) P-ii-3, Q-i-4, R-iv-2, S-iii-1
(D) P-ii-3, Q-i-4, R-iii-2, S-iv-1

Question Number : 54 Correct : 2 Wrong : -0.66

Choose the plant part, its use and the source species in **CORRECT** combination.

Plant Part	**Use**	**Species**
P. Bark	i. Insecticide	1. *Crocus sativus*
Q. Leaf	ii. Food colorant	2. *Papaver somniferum*
R. Capsule	iii. Flavoring agent	3. *Azadirachta indica*
S. Stigma	iv. Analgesic	4. *Cinnamomum zeylanicum*

(A) P-i-1, Q-ii-2, R-iii-3, S-iv-4
(B) P-iii-4, Q-ii-1, R-iv-2, S-i-3
(C) P-ii-1, Q-i-3, R-iv-2, S-iii-4
(D) P-iii-4, Q-i-3, R-iv-2, S-ii-1

Question Number : 55 Correct : 2 Wrong : -0.66

Which **TWO** of the following reactions are **INCORRECT** in relation to C_2 oxidative photosynthetic carbon cycle in land plants?

P. 2 (Ribulose-1,5-biphosphate) + 2(CO_2) → 2 (phosphoglycolate) + 2 (3-phosphoglycerate) + $4H^+$

Q. Serine + α-ketoglutarate → hydroxypyruvate + glutamine

R. 2 (Phosphoglycolate) + 2(H_2O) → 2 (glycolate) + 2Pi

S. Hydroxypyruvate + NADH + H^+ → glycerate + NAD^+

(A) P and Q
(B) Q and R
(C) R and S
(D) S and P

General Aptitude

Question Number : 116 **Correct : 1 Wrong : -0.33**

The event would have been successful if you _____able to come.

(A) are (B) had been (C) have been (D) would have been

Question Number : 117 **Correct : 1 Wrong : -0.33**

There was no doubt that their work was thorough.

Which of the words below is closest in meaning to the underlined word above?

(A) pretty (B) complete (C) sloppy (D) haphazard

Question Number : 118 **Correct : 1 Wrong : -0.33**

Four cards lie on a table. Each card has a number printed on one side and a colour on the other. The faces visible on the cards are 2, 3, red, and blue.

Proposition: If a card has an even value on one side, then its opposite face is red.

The cards which MUST be turned over to verify the above proposition are

(A) 2, red (B) 2, 3, red (C) 2, blue (D) 2, red, blue

Question Number : 119 **Correct : 1 Wrong : -0.33**

What is the value of x when $81 \times \left(\frac{16}{25}\right)^{x+2} \div \left(\frac{3}{5}\right)^{2x+4} = 144$?

(A) 1 (B) -1 (C) -2 (D) Cannot be determined

Question Number : 120 **Correct : 1 Wrong : -0.33**

Two dice are thrown simultaneously. The probability that the product of the numbers appearing on the top faces of the dice is a perfect square is

(A) 1/9 (B) 2/9 (C) 1/3 (D) 4/9

Question Number : 121 **Correct : 2 Wrong : -0.66**

Bhaichung was observing the pattern of people entering and leaving a car service centre. There was a single window where customers were being served. He saw that people inevitably came out of the centre in the order that they went in. However, the time they spent inside seemed to vary a lot: some people came out in a matter of minutes while for others it took much longer.

From this, what can one conclude?

(A) The centre operates on a first-come-first-served basis, but with variable service times, depending on specific customer needs.
(B) Customers were served in an arbitrary order, since they took varying amounts of time for service completion in the centre.
(C) Since some people came out within a few minutes of entering the centre, the system is likely to operate on a last-come-first-served basis.
(D) Entering the centre early ensured that one would have shorter service times and most people attempted to do this.

Question Number : 122 **Correct : 2 Wrong : -0.66**

A map shows the elevations of Darjeeling, Gangtok, Kalimpong, Pelling, and Siliguri. Kalimpong is at a lower elevation than Gangtok. Pelling is at a lower elevation than Gangtok. Pelling is at a higher elevation than Siliguri. Darjeeling is at a higher elevation than Gangtok.

Which of the following statements can be inferred from the paragraph above?

i. Pelling is at a higher elevation than Kalimpong
ii. Kalimpong is at a lower elevation than Darjeeling
iii. Kalimpong is at a higher elevation than Siliguri
iv. Siliguri is at a lower elevation than Gangtok

(A) Only ii (B) Only ii and iii (C) Only ii and iv (D) Only iii and iv

Question Number : 123 Correct : 2 Wrong : -0.66

P, Q, R, S, T and U are seated around a circular table. R is seated two places to the right of Q. P is seated three places to the left of R. S is seated opposite U. If P and U now switch seats, which of the following must necessarily be true?

(A) P is immediately to the right of R
(B) T is immediately to the left of P
(C) T is immediately to the left of P or P is immediately to the right of Q
(D) U is immediately to the right of R or P is immediately to the left of T

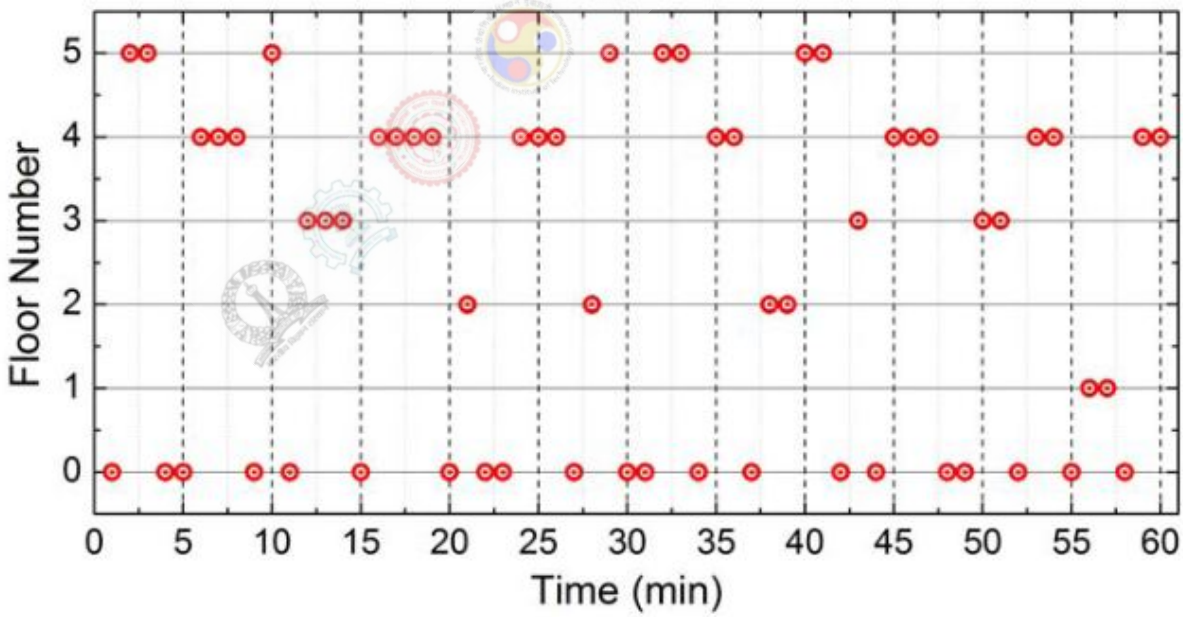
Question Number : 124 Correct : 2 Wrong : -0.66

Budhan covers a distance of 19 km in 2 hours by cycling one fourth of the time and walking the rest. The next day he cycles (at the same speed as before) for half the time and walks the rest (at the same speed as before) and covers 26 km in 2 hours. The speed in km/h at which Budhan walks is

(A) 1 (B) 4 (C) 5 (D) 6

Question Number : 125 Correct : 2 Wrong : -0.66

The points in the graph below represent the halts of a lift for durations of 1 minute, over a period of 1 hour.



Which of the following statements are correct?

i. The elevator never moves directly from any non-ground floor to another non-ground floor over the one hour period
ii. The elevator stays on the fourth floor for the longest duration over the one hour period

(A)) Only i (B) Only ii (C) Both i and ii (D) Neither i nor ii

Microbiology (XL-S)

Question Number : 56 **Correct : 1 Wrong : -0.33**

Which one of the following is the end product of dissimilatory sulfate reduction by sulfate reducing bacteria?

(A) Hydrogen sulfide (B) Sulfur dioxide (C) Sulfur (D) Thiosulfate

Question Number : 57 **Correct : 1 Wrong : -0.33**

Which one of the following is the terminal electron acceptor in the given metabolic reaction catalyzed by methanogens?

$$4H_2 + CO_2 \longrightarrow CH_4 + 2H_2O$$

(A) H_2 (B) CO_2 (C) CH_4 (D) H_2O

Question Number : 58 **Correct : 1 Wrong : -0.33**

Microbes that have their optimal growth rate near 15 °C but can still grow at 0 °C to 20 °C are known as

(A) mesophiles (B) psychrotrophs (C) psychrotolerant (D) psychrophiles

Question Number : 59 **Correct : 1 Wrong : -0.33**

Which one of the following is NOT a contribution by Robert Koch?

(A) Identification of causative agent of anthrax.
(B) Discovery of causative agent of tuberculosis.
(C) Discovery of causative agent of leprosy.
(D) Identification of causative agent of cholera.

Question Number : 60 **Correct : 1 Wrong : -0.33**

Unicellular eukaryotic organisms belong to which one of the following kingdoms of classification?

(A) Monera (B) Plantae (C) Protista (D) Animalia

Question Number : 61 **Correct : 1 Wrong : -0.33**

Which one of the following is a contagious disease?

(A) Chickenpox (B) Tetanus (C) Malaria (D) Filariasis

Question Number : 62 **Correct : 1 Wrong : -0.33**

The inner mitochondrial membrane comprises of a series of folds known as

(A) cristae (B) thylakoids (C) cisterns (D) cilia

Question Number : 63 **Correct : 1 Wrong : -0.33**

Which one of the following antibiotics is NOT produced by *Streptomyces* sp.?

(A) Amphotericin B
(B) Neomycin
(C) Vancomycin
(D) Gentamicin

Question Number : 64 **Correct : 1 Wrong : -0.33**

Which one of the following statements is TRUE about MacConkey (MAC) agar medium?

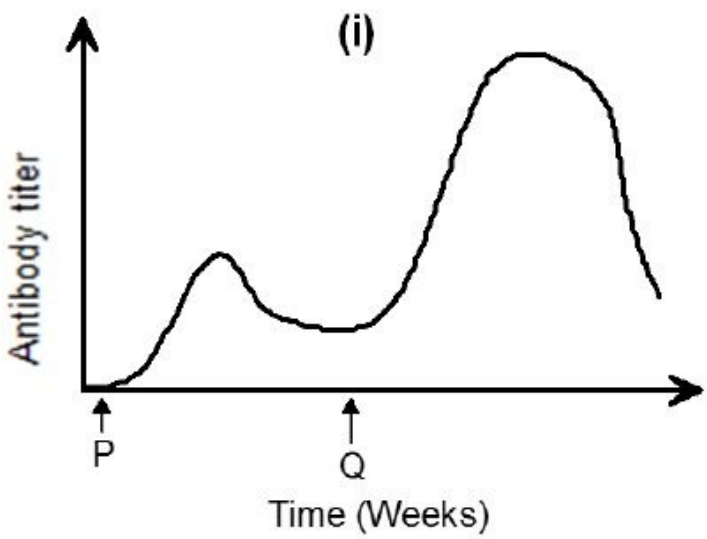
(A) MAC agar medium is a selective and differential medium for Gram-positive bacteria.
(B) MAC agar medium is a selective and differential medium for Gram-negative bacteria.
(C) MAC agar medium is an enriched medium for Gram-positive bacteria.
(D) MAC agar medium is a synthetic medium for Gram-positive and Gram-negative bacteria.

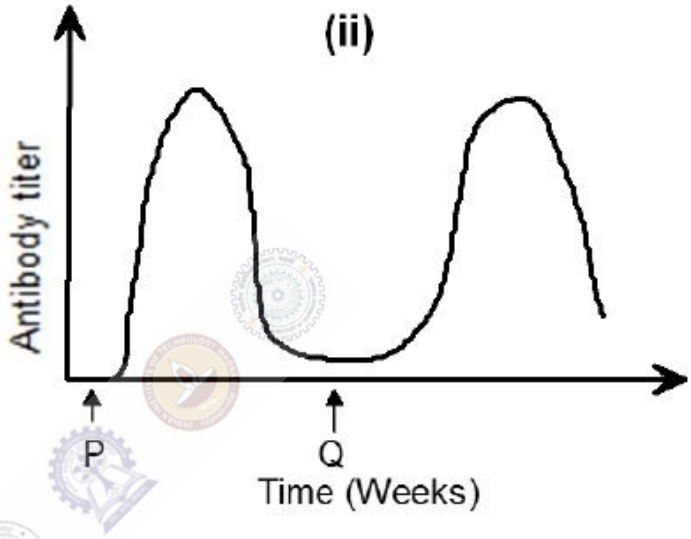
Question Number : 65 **Correct : 1 Wrong : -0.33**

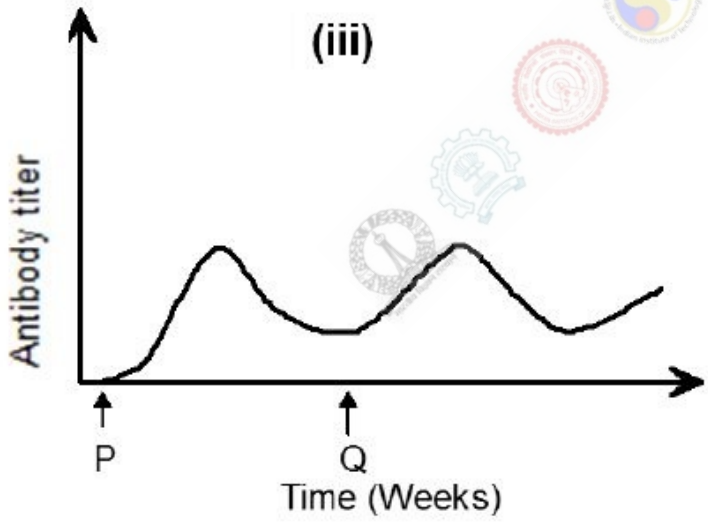
As an antiseptic, alcohol is effective against

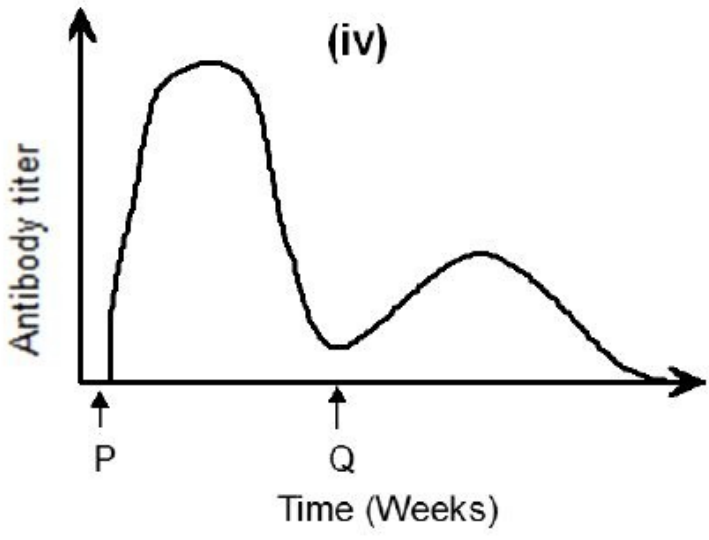
(A) bacteria and non-enveloped viruses
(B) bacterial endospores and fungi
(C) bacteria and fungi
(D) fungi and non-enveloped viruses

An antigen X was injected into a rabbit for the first time at time P. Then the rabbit was given a booster dose of X at time Q. Which one of the following figures accurately depicts the adaptive immune response by the rabbit against X?





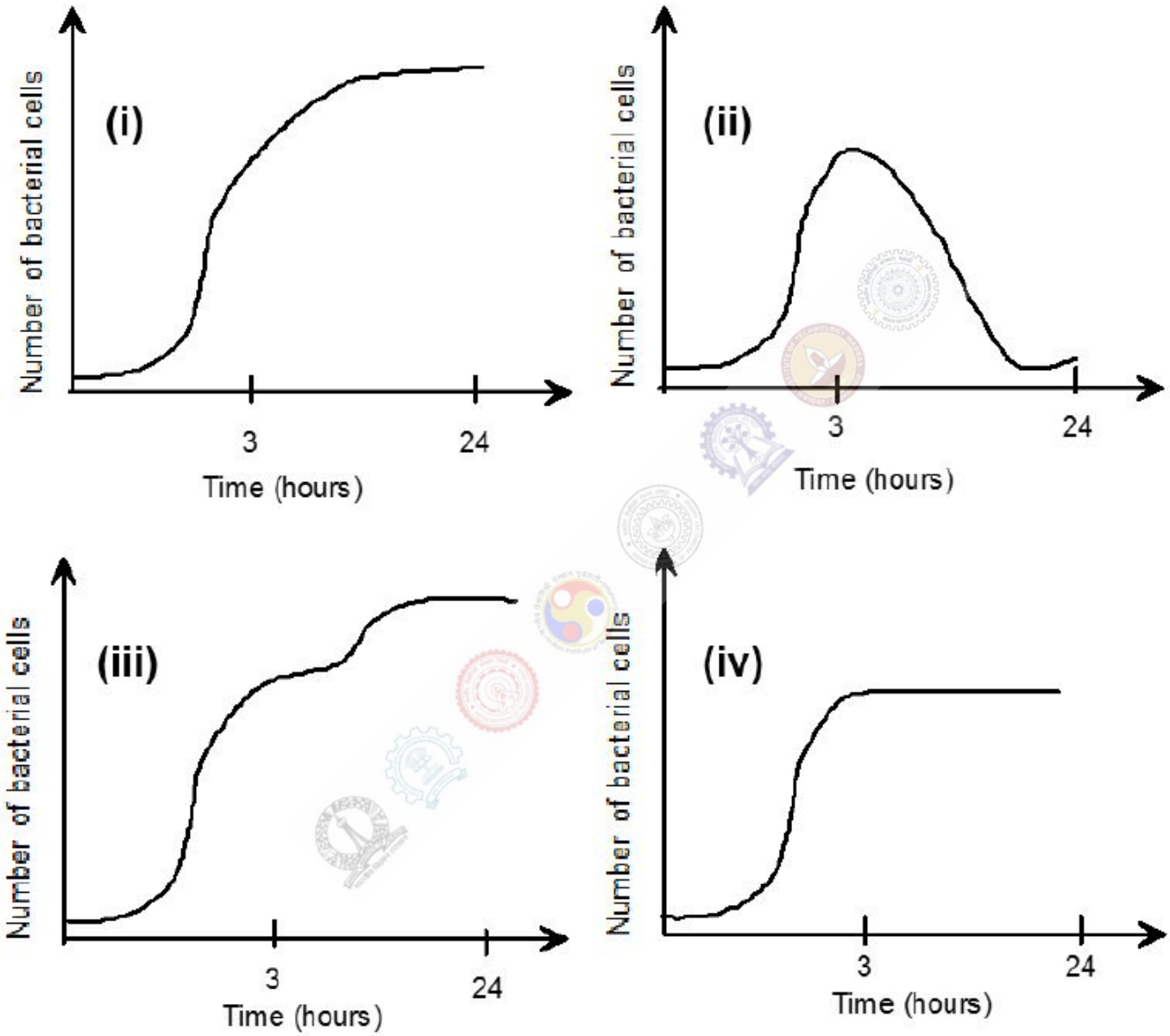




(A) i (B) ii (C) iii (D) iv

Question Number : 67 **Correct : 2 Wrong : -0.66**

A bactericidal agent X is added after 3 hours of growth of a bacterial culture. Following the addition of X, the bacterial growth was measured using the standard plate count method till 24 hours. Which one of the following figures is the most accurate representation of the action of X?



(A) i (B) ii (C) iii (D) iv

Question Number : 68 **Correct : 2 Wrong : -0.66**

Match the diseases given in **Group I** with their causative agents from **Group II**.

Group I	**Group II**
(P) Plague	(I) *Coxiella burnetii*
(Q) Rabies	(II) *Plasmodium* spp.
(R) Q fever	(III) *Yersinia pestis*
(S) Malaria	(IV) *Lyssavirus*

(A) P-III, Q-IV, R-I, S-II
(B) P-III, Q-I, R-II, S-IV
(C) P-IV, Q-III, R-I, S-II
(D) P-III, Q-I, R-IV, S-II

Question Number : 69 **Correct : 2 Wrong : -0.66**

Match the enzymes given in **Group I** with the events from **Group II**.

Group I	**Group II**
(P) UvrABC endonuclease	(I) Retrovirus replication
(Q) Reverse transcriptase	(II) Base excision repair
(R) AP endonuclease	(III) Nucleotide excision repair
(S) ATP sulfurylase	(IV) Pyrosequencing

(A) P-II, Q-I, R-IV, S-III
(B) P-III, Q-I, R-II, S-IV
(C) P-IV, Q-III, R-I, S-II
(D) P-II, Q-I, R-III, S-IV

Question Number : 70 **Correct : 2 Wrong : -0.66**

Match the terms given in **Group I** with the descriptions from **Group II**.

Group I	**Group II**
(P) Photoautotrophs	(I) Use inorganic chemical reactions for energy production
(Q) Chemoautotrophs	(II) Use organic compounds for energy production
(R) Photoheterotrophs	(III) Use sunlight as energy source and carbon dioxide as carbon source
(S) Chemoheterotrophs	(IV) Use sunlight as energy source and organic compounds as carbon source

(A) P-II, Q-I, R-IV, S-III
(B) P-III, Q-I, R-IV, S-II
(C) P-IV, Q-III, R-I, S-II
(D) P-II, Q-IV, R-III, S-I

Question Number : 71 **Correct : 2 Wrong : 0**

One-ml sample of a bacterial culture was serially diluted to 10^5 times, and 46 colonies were obtained after plating this diluted sample on an agar medium. The number of cells present per ml in the undiluted original sample were _____

Question Number : 72 **Correct : 2 Wrong : 0**

The transformation efficiency of competent cells prepared in a laboratory is 10^4 CFU/µg of plasmid DNA. If 0.01 µg of this plasmid is used to transform these competent cells, the number of transformed bacteria in CFU after plating will be _____

Question Number : 73 **Correct : 2 Wrong : 0**

Assume that the average DNA content of a single microbial cell is 4 femtogram. A soil sample analyzed for its microbial community DNA is found to contain 0.32 µg DNA per gram of the soil. The number of microbial cells per milligram of the soil are _____

Question Number : 74 **Correct : 2 Wrong : 0**

Assume that a bacterial culture has a mean generation time of 2 hours. If the number of bacteria present after 24 hours of culture are 4.1×10^7, the initial number of bacteria present were _____

Question Number : 75 **Correct : 2 Wrong : -0.66**

The minimal inhibitory concentration (MIC) of an antibiotic X against *Clostridium tetani*, *Staphylococcus* sp., *Shigella* sp., and *Streptococcus* sp. is 25, 15, 2 and 1 µg/ml, respectively. Assuming that the bioavailable concentration of X in an animal model is 20 µg/ml, which one of these bacteria may develop resistance against X in the animal model?

(A) *Clostridium tetani*
(B) *Staphylococcus* sp.
(C) *Shigella* sp.
(D) *Streptococcus* sp.

General Aptitude

Question Number : 116 **Correct : 1 Wrong : -0.33**

The event would have been successful if you _____able to come.

(A) are (B) had been (C) have been (D) would have been

Question Number : 117 **Correct : 1 Wrong : -0.33**

There was no doubt that their work was thorough.

Which of the words below is closest in meaning to the underlined word above?

(A) pretty (B) complete (C) sloppy (D) haphazard

Question Number : 118 **Correct : 1 Wrong : -0.33**

Four cards lie on a table. Each card has a number printed on one side and a colour on the other. The faces visible on the cards are 2, 3, red, and blue.

Proposition: If a card has an even value on one side, then its opposite face is red.

The cards which MUST be turned over to verify the above proposition are

(A) 2, red (B) 2, 3, red (C) 2, blue (D) 2, red, blue

Question Number : 119 **Correct : 1 Wrong : -0.33**

What is the value of x when $81 \times \left(\frac{16}{25}\right)^{x+2} \div \left(\frac{3}{5}\right)^{2x+4} = 144$?

(A) 1 (B) -1 (C) -2 (D) Cannot be determined

Question Number : 120 **Correct : 1 Wrong : -0.33**

Two dice are thrown simultaneously. The probability that the product of the numbers appearing on the top faces of the dice is a perfect square is

(A) 1/9 (B) 2/9 (C) 1/3 (D) 4/9

Question Number : 121 **Correct : 2 Wrong : -0.66**

Bhaichung was observing the pattern of people entering and leaving a car service centre. There was a single window where customers were being served. He saw that people inevitably came out of the centre in the order that they went in. However, the time they spent inside seemed to vary a lot: some people came out in a matter of minutes while for others it took much longer.

From this, what can one conclude?

(A) The centre operates on a first-come-first-served basis, but with variable service times, depending on specific customer needs.
(B) Customers were served in an arbitrary order, since they took varying amounts of time for service completion in the centre.
(C) Since some people came out within a few minutes of entering the centre, the system is likely to operate on a last-come-first-served basis.
(D) Entering the centre early ensured that one would have shorter service times and most people attempted to do this.

Question Number : 122 **Correct : 2 Wrong : -0.66**

A map shows the elevations of Darjeeling, Gangtok, Kalimpong, Pelling, and Siliguri. Kalimpong is at a lower elevation than Gangtok. Pelling is at a lower elevation than Gangtok. Pelling is at a higher elevation than Siliguri. Darjeeling is at a higher elevation than Gangtok.

Which of the following statements can be inferred from the paragraph above?

i. Pelling is at a higher elevation than Kalimpong
ii. Kalimpong is at a lower elevation than Darjeeling
iii. Kalimpong is at a higher elevation than Siliguri
iv. Siliguri is at a lower elevation than Gangtok

(A) Only ii (B) Only ii and iii (C) Only ii and iv (D) Only iii and iv

Question Number : 123 Correct : 2 Wrong : -0.66

P, Q, R, S, T and U are seated around a circular table. R is seated two places to the right of Q. P is seated three places to the left of R. S is seated opposite U. If P and U now switch seats, which of the following must necessarily be true?

(A) P is immediately to the right of R
(B) T is immediately to the left of P
(C) T is immediately to the left of P or P is immediately to the right of Q
(D) U is immediately to the right of R or P is immediately to the left of T

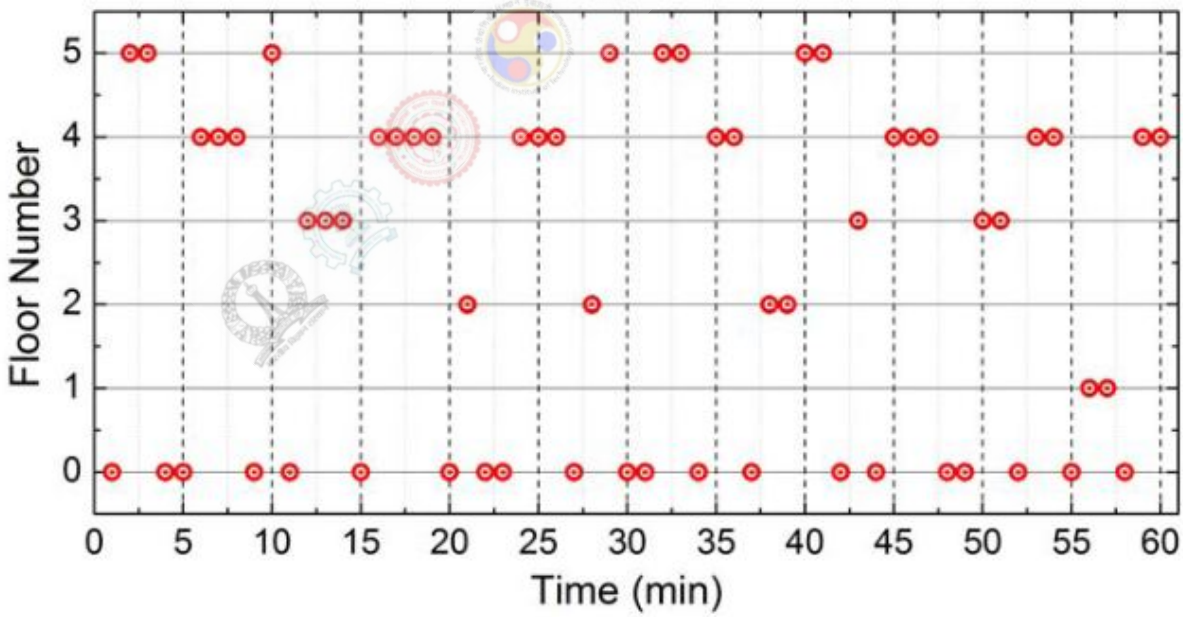
Question Number : 124 Correct : 2 Wrong : -0.66

Budhan covers a distance of 19 km in 2 hours by cycling one fourth of the time and walking the rest. The next day he cycles (at the same speed as before) for half the time and walks the rest (at the same speed as before) and covers 26 km in 2 hours. The speed in km/h at which Budhan walks is

(A) 1 (B) 4 (C) 5 (D) 6

Question Number : 125 Correct : 2 Wrong : -0.66

The points in the graph below represent the halts of a lift for durations of 1 minute, over a period of 1 hour.



Which of the following statements are correct?

i. The elevator never moves directly from any non-ground floor to another non-ground floor over the one hour period
ii. The elevator stays on the fourth floor for the longest duration over the one hour period

(A)) Only i (B) Only ii (C) Both i and ii (D) Neither i nor ii

Zoology (XL-T)

Question Number : 76 **Correct : 1 Wrong : -0.33**

The characteristic feature of deuterostomes is depicted by

(A) coelom formed by the hollowing out of a previously solid cord of mesodermal cells
(B) spiral and determinate cleavage
(C) formation of mouth from blastopore
(D) formation of anus from blastopore

Question Number : 77 **Correct : 1 Wrong : -0.33**

One of the most remarkable features of evolution is the formation of amnion and allantoin. This appeared for the "first time" in evolutionary time scale in

(A) reptiles
(B) birds
(C) fishes
(D) humans

Question Number : 78 **Correct : 1 Wrong : -0.33**

A woman with blood group A gave birth to a baby with blood group AB. The blood group of the father would be

(A) only AB
(B) only B
(C) either AB or B
(D) blood group O

Question Number : 79 **Correct : 1 Wrong : -0.33**

The enzyme amylase can break alpha glycosidic linkages between glucose monomers. Hence, amylase can digest which one of the following carbohydrates?

(A) Cellulose
(B) Starch
(C) Chitin
(D) Xylans

Question Number : 80 **Correct : 1 Wrong : -0.33**

The metabolic pathway which is common to both fermentation and cellular respiration is

(A) the TCA cycle
(B) the electron transport chain
(C) glycolysis
(D) synthesis of acetyl CoA from pyruvate

Question Number : 81 **Correct : 1 Wrong : -0.33**

A female "**Spotted sand piper**" courts males repeatedly. This behavior can be explained by the term

(A) polyandry
(B) polygyny
(C) monogamy
(D) sexual cannibalism

Question Number : 82 **Correct : 1 Wrong : -0.33**

Malaria is caused by *Plasmodium* species, which is a parasite having a complex life cycle. The fusion between male and female gametocytes of *Plasmodium* happens inside

(A) human liver
(B) human RBCs
(C) mosquito midgut
(D) mosquito salivary glands

Question Number : 83 **Correct : 1 Wrong : -0.33**

Aromatase inhibitors are often prescribed for post-menopausal women to treat estrogen receptor positive breast cancer patients, because these class of drugs

(A) reduce prostaglandin biosynthesis
(B) reduce the level of estradiol biosynthesis
(C) inhibit conversion of testosterone to dihydrotestosterone
(D) are non-toxic in post-menopausal women

Question Number : 84 **Correct : 1 Wrong : -0.33**

The covalent modification performed by kinases which regulate proteins in signaling pathways is

(A) glycosylation
(B) methylation
(C) ubiquitination
(D) phosphorylation

Question Number : 85 **Correct : 1 Wrong : -0.33**

Which one of the following statements is NOT correct?

(A) During metaphase, the 2 copies of chromosomal DNA are held together at the centromere
(B) The short arm of chromosomes is referred to as p and the long arm is referred to as q
(C) The terminal structures at the end of the chromatids are referred to as telomeres
(D) The terms heterochromatin and euchromatin refer to the active and repressed regions of the chromosome respectively

Question Number : 86 **Correct : 2 Wrong : 0**

A particular species is found to have 2n=16 chromosomes. The number of linkage groups in this species will be _____

Question Number : 87 **Correct : 2 Wrong : 0**

In the Meselson and Stahl experiment, *E. coli* was grown in a medium containing $^{15}NH_4Cl$. After 24 hours, *E. coli* were transferred to medium containing $^{14}NH_4Cl$. After the fourth generation in medium containing $^{14}NH_4Cl$, the ratio between hybrids ($^{15}N/^{14}N$) and light ($^{14}N/^{14}N$) labeled DNA will be 1: *n*, where the value of *n* is ____

Question Number : 88 **Correct : 2 Wrong : 0**

The population data present in an island is as follows

Genotype	Number
AA	300
Aa	500
aa	200
Total	1000

The allele frequency of *A* (upto two decimals) will be _____

Question Number : 89 **Correct : 2 Wrong : 0**

A cell in G1 phase has 16 chromosomes. The total number of chromatids that would be found per cell during Metaphase II of meiosis are _____

Question Number : 90 **Correct : 2 Wrong : -0.66**

Upon activation of phospholipase C by ligand binding to G-protein coupled receptor, the Ca^{+2} concentration in cytosol will

(A) decrease due to blockage of $InsP_3$ gated channel on endoplasmic reticulum
(B) decrease due to blockage of $InsP_3$ gated channel on plasma membrane
(C) increase due to efflux of Ca^{+2} from $InsP_3$ gated channel on mitochondria
(D) increase due to efflux of Ca^{+2} from $InsP_3$ gated channel on endoplasmic reticulum as well as influx of Ca^{+2} from $InsP_3$ gated channel on plasma membrane

Question Number : 91 **Correct : 2 Wrong : -0.66**

Match the following molecules in Group I with their function in Group II

Group I	**Group II**
P. Transferrin	(i) Uptake of glucose
Q. Insulin	(ii) Binds iron
R. α-macroglobulin	(iii) Substratum for cell attachment
S. Fibronectin	(iv) Proteinase inhibitor
	(v) Binds to oxygen in RBC

(A) P-ii; Q-i; R-iv; S-iii
(B) P-ii; Q-i; R-v; S-iii
(C) P-ii; Q-i; R-iv; S-ii
(D) P-i; Q-iii; R-ii; S-v

Question Number : 92 **Correct : 2 Wrong : -0.66**

If a heavy chain of an antibody molecule weighs 65,000 Daltons (Da) and a light chain weighs 25,000 Da, the approximate calculated weight of an IgM antibody in Da will be

(A) 90,000
(B) 180,000
(C) 360,000
(D) 900,000

Question Number : 93 **Correct : 2 Wrong : -0.66**

MATCH the signaling pathways in Group I with their functions in Group II, during the process of development

Group I	**Group II**
P. Hedgehog signaling	(i) Involved in signaling at 4-cell embryo stage in *C. elegans* through *glp 1* expression
Q. Hox proteins	(ii) Involves frizzled receptor on target cell membrane and establish polarity in insects
R. Wnt signaling	(iii) Plays critical role in facial morphogenesis in vertebrates and its mutation causes cyclopia
S. Notch signaling	(iv) Required for *T-bx* transcription factor expression for vertebrate limb development

(A) P-iii; Q-ii; R-iv; S-i
(B) P-iii; Q-iv; R-ii; S-i
(C) P-iv; Q-iii; R-ii; S-i
(D) P-iii; Q-iv; R-i; S-ii

Question Number : 94 **Correct : 2 Wrong : 0**

In a population which is in Hardy-Weinberg equilibrium, the frequency of the recessive genotype of a certain trait is 0.09. The percentage of individuals with heterozygous genotype is __ %

Question Number : 95 **Correct : 2 Wrong : 0**

An enzyme preparation has activity of 2 Units per 20 µl, and protein concentration 0.4 mg/ml. The specific activity (Units/mg) of this enzyme will be ___

General Aptitude

Question Number : 116 **Correct : 1 Wrong : -0.33**

The event would have been successful if you _____able to come.

(A) are (B) had been (C) have been (D) would have been

Question Number : 117 **Correct : 1 Wrong : -0.33**

There was no doubt that their work was thorough.

Which of the words below is closest in meaning to the underlined word above?

(A) pretty (B) complete (C) sloppy (D) haphazard

Question Number : 118 **Correct : 1 Wrong : -0.33**

Four cards lie on a table. Each card has a number printed on one side and a colour on the other. The faces visible on the cards are 2, 3, red, and blue.

Proposition: If a card has an even value on one side, then its opposite face is red.

The cards which MUST be turned over to verify the above proposition are

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What is the value of x when $81 \times \left(\frac{16}{25}\right)^{x+2} \div \left(\frac{3}{5}\right)^{2x+4} = 144$?

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Question Number : 120 **Correct : 1 Wrong : -0.33**

Two dice are thrown simultaneously. The probability that the product of the numbers appearing on the top faces of the dice is a perfect square is

(A) 1/9 (B) 2/9 (C) 1/3 (D) 4/9

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Bhaichung was observing the pattern of people entering and leaving a car service centre. There was a single window where customers were being served. He saw that people inevitably came out of the centre in the order that they went in. However, the time they spent inside seemed to vary a lot: some people came out in a matter of minutes while for others it took much longer.

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Question Number : 122 **Correct : 2 Wrong : -0.66**

A map shows the elevations of Darjeeling, Gangtok, Kalimpong, Pelling, and Siliguri. Kalimpong is at a lower elevation than Gangtok. Pelling is at a lower elevation than Gangtok. Pelling is at a higher elevation than Siliguri. Darjeeling is at a higher elevation than Gangtok.

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P, Q, R, S, T and U are seated around a circular table. R is seated two places to the right of Q. P is seated three places to the left of R. S is seated opposite U. If P and U now switch seats, which of the following must necessarily be true?

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(C) T is immediately to the left of P or P is immediately to the right of Q
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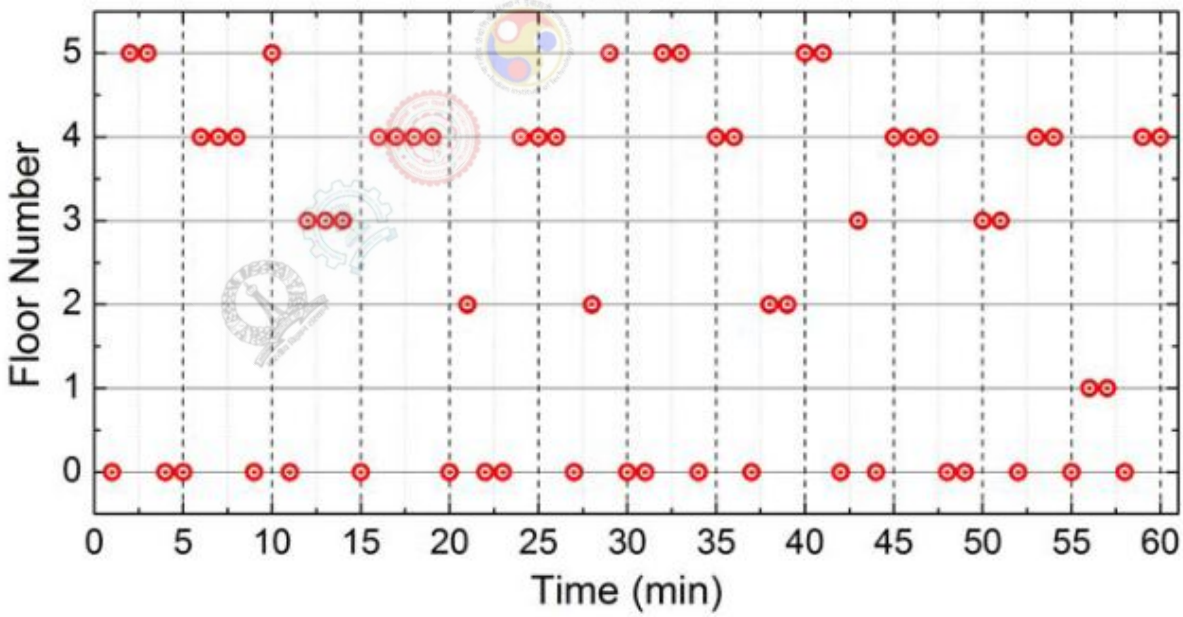
Question Number : 124 Correct : 2 Wrong : -0.66

Budhan covers a distance of 19 km in 2 hours by cycling one fourth of the time and walking the rest. The next day he cycles (at the same speed as before) for half the time and walks the rest (at the same speed as before) and covers 26 km in 2 hours. The speed in km/h at which Budhan walks is

(A) 1 (B) 4 (C) 5 (D) 6

Question Number : 125 Correct : 2 Wrong : -0.66

The points in the graph below represent the halts of a lift for durations of 1 minute, over a period of 1 hour.



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ii. The elevator stays on the fourth floor for the longest duration over the one hour period

(A)) Only i (B) Only ii (C) Both i and ii (D) Neither i nor ii

Food Technology (XL-U)

Question Number : 96 **Correct : 1 Wrong : -0.33**

Indicate the correct group that contains a monosaccharide, a disaccharide and a trisaccharide.

(A) Glucose, sucrose, mannose
(B) Ribose, lactose, raffinose
(C) Mannose, maltose, lactose
(D) Raffinose, stachyose, glucose

Question Number : 97 **Correct : 1 Wrong : -0.33**

In which of the following products, 'must' is used as the substrate for fermentation?

(A) Beer (B) Wine (C) Idli (D) Tempeh

Question Number : 98 **Correct : 1 Wrong : -0.33**

Identify the foodborne illness which is not caused by bacteria.

(A) Botulism (B) Listeriosis (C) Vibriosis (D) Cysticercosis

Question Number : 99 **Correct : 1 Wrong : -0.33**

Nutrient composition of wheat flour changes with extent of extraction from whole wheat grain. Which of the following statements is true if the extraction rate increased from 50% to 90%?

(A) Starch increases, protein increases, fat increases, mineral increases
(B) Starch decreases, protein increases, fat increases, mineral increases
(C) Starch decreases, protein decreases, fat increases, mineral decreases
(D) Starch decreases, protein increases, fat decreases, mineral decreases

Question Number : 100 **Correct : 1 Wrong : 0**

You have two samples of milk, one (X) with 3.8% fat and another (Y) with 0.5% fat. In order to produce a milk with 3.5% fat, 100 ml of Y should be mixed with _____ ml of X.

Question Number : 101 **Correct : 1 Wrong : -0.33**

Match the items in column I with the items in column II in relation to food safety and standards.

Column I	**Column II**
P. HACCP	1. International food standards
Q. FSSAI	2. Quality control protocol
R. CIP	3. Food plant sanitation and hygiene protocol
S. CODEX	4. Indian food standards

(A) P-2, Q-4, R-3, S-1 (B) P-4, Q-3, R-2, S-1
(C) P-1, Q-4, R-2, S-3 (D) P-4, Q-2, R-3, S-1

Question Number : 103 **Correct : 1 Wrong : 0**

A 50% sucrose solution at 20 °C is flowing at a rate of 3.5 m^3/h through a pipe with an inside diameter of 0.0475 m and length of 12 m. The viscosity and the density of the solution are 15.43 cp and 1232 kg/m^3, respectively. The Reynolds number of the flow is _____ .

Question Number : 103 **Correct : 1 Wrong : 0**

In a pineapple juice, fibre particles having mean diameter of 160 µm and density of 1075 kg/m^3 are settling by gravity. If the density and viscosity of the juice are 1015 kg/m^3 and 0.98 cp, respectively, terminal velocity of the fibre particles is_____ mm/s .

Question Number : 104 **Correct : 1 Wrong : -0.33**

Power consumption in liquid mixing is proportional to _____.

(A) Power number × liquid density × (rotational speed)^3 × (impeller diameter)^5
(B) Power number × liquid density × (rotational speed)^2 × (impeller diameter)^3
(C) Liquid density × viscosity of the liquid × (rotational speed)^2 × (impeller diameter)^3
(D) Acceleration due to gravity × liquid density × (rotational speed)^3 × (impeller diameter)^5

Question Number : 105 **Correct : 1 Wrong : -0.33**

In dye-reduction test for estimation of viable microorganisms, the most commonly used dyes are methylene blue, triphenyltetrazolium–chloride and _____.

(A) Malachite green (B) Amaranth (C) Tartrazine (D) Resazurin

Question Number : 106 **Correct : 2 Wrong : -0.66**

Match the following items of group I with the items of group II in relation to the quality of fat.

Group I	**Group II**
P. Saponification number	1. Unsaturation of fatty acid
Q. Iodine number	2. Volatile water soluble fatty acid
R. Reichert Meissl number	3. Hydroxy fatty acid
S. Acetyl value	4. Molecular weight of fatty acid

(A) P-1, Q-2, R-3, S-4
(B) P-1, Q-3, R-4, S-2
(C) P-4, Q-1, R-2, S-3
(D) P-2, Q-1, R-3, S-4

Question Number : 107 **Correct : 2 Wrong : -0.66**

Match the following metabolic product (Column I) that indicates the quality of food (Column II).

Column I	**Column II**
P. Ethanol	1. Canned vegetable
Q. Lactic acid	2. Fish
R. Trimethylamine	3. Butter
S. Volatile fatty acid	4. Apple juice

(A) P-3, Q-2, R-4, S-1
(B) P-4, Q-1, R-2, S-3
(C) P-4, Q-3, R-2, S-1
(D) P-3, Q-4, R-2, S-1

Question Number : 108 **Correct : 2 Wrong : -0.66**

Correlate the vitamins in column I with their role in promoting reaction/process in column II.

Column I	**Column II**
P. Riboflavin	1. Visual cycle
Q. Vitamin D	2. Acyl group transfer
R. Pantothenic acid	3. Regulation of Ca^{2+} metabolism
S. Vitamin A	4. Oxidation-reduction reaction

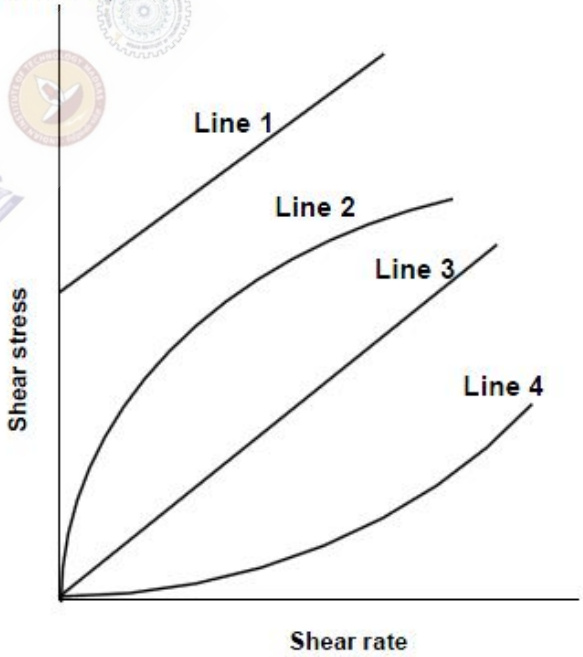
(A) P-1, Q-2, R-4, S-3
(B) P-2, Q-1, R-3, S-4
(C) P-3, Q-4, R-1, S-2
(D) P-4, Q-3, R-2, S-1

Question Number : 109 **Correct : 2 Wrong : 0**

A pure strain with generation time of 60 min is used in a fermentation process. Following inoculation (0 h), the strain takes 2 h for adaptation, 10 h to achieve maximum growth and 12 h to arrive at the point where the death rate is higher than the growth rate. If the inoculation load is 100 cells, the total population at the end of 10 h will be _____.

Question Number : 110 **Correct : 2 Wrong : -0.66**

Refer to the shear stress – shear rate plot shown in the figure below. Match the lines (Column I) with appropriate rheological behavior (Column II).



Column I	Column II
P. Line 1	1. Dilatant
Q. Line 2	2. Newtonian
R. Line 3	3. Pseudoplastic
S. Line 4	4. Bingham plastic

(A) P-2, Q-3, R-4, S-1
(B) P-1, Q-3, R-4, S-2
(C) P-2, Q-4, R-3, S-1
(D) P-4, Q-3, R-2, S-1

Question Number : 111 **Correct : 2 Wrong : 0**

Water flowing at a rate of 1 kg/min is heated from 12 to 80 °C with flue gas supplied at a rate of 3 kg/min. The temperature and specific heat of the flue gas are 180 °C and 1.05 kJ/kg.K, respectively. If specific heat of water is 4.2 kJ/kg.K and the flow is parallel, then the logarithmic mean temperature difference will be _____ °C.

Question Number : 112 **Correct : 2 Wrong : 0**

The Lineweaver-Burk plot of an enzymatic reaction shows V_{max} of 160 µmol/l.min and k_m of 60 µmol/l. For a substrate concentration of 40 µmol/l, the velocity of the reaction is estimated to be ____ µmol/l.min.

Question Number : 113 **Correct : 2 Wrong : 0**

A suspension containing 2×10^4 spores of organism A having a $D_{121.1°C}$ value of 1.5 min and 8×10^5 spores of organism B having a $D_{121.1°C}$ value of 0.8 min is heated at a constant temperature of 121.1 °C. The heating time needed to obtain a probability of spoilage '1 in 1000' is _____ min.

Question Number : 114 **Correct : 2 Wrong : 0**

In an evaporation process, a compressor picks up 0.05 m^3 air in each revolution and compresses 500 kg of air per minute. If the specific volume of air is 0.9 m^3/kg, then the compressor speed is _____ rpm.

Question Number : 115 **Correct : 2 Wrong : 0**

For a soybean oil extraction system, solvent:soy ratio is maintained at 0.5:1 (w/w). Original seed contains 18% oil (w/w). If the meal (soy solid) after final desolventization has 0.01 kg oil per kg oil free meal, then the effectiveness of the solvent (kg oil/ kg solvent) in the extraction process is _____ .

General Aptitude

Question Number : 116 **Correct : 1 Wrong : -0.33**

The event would have been successful if you _____able to come.

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The cards which MUST be turned over to verify the above proposition are

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iv. Siliguri is at a lower elevation than Gangtok

(A) Only ii (B) Only ii and iii (C) Only ii and iv (D) Only iii and iv

Question Number : 123 Correct : 2 Wrong : -0.66

P, Q, R, S, T and U are seated around a circular table. R is seated two places to the right of Q. P is seated three places to the left of R. S is seated opposite U. If P and U now switch seats, which of the following must necessarily be true?

(A) P is immediately to the right of R
(B) T is immediately to the left of P
(C) T is immediately to the left of P or P is immediately to the right of Q
(D) U is immediately to the right of R or P is immediately to the left of T

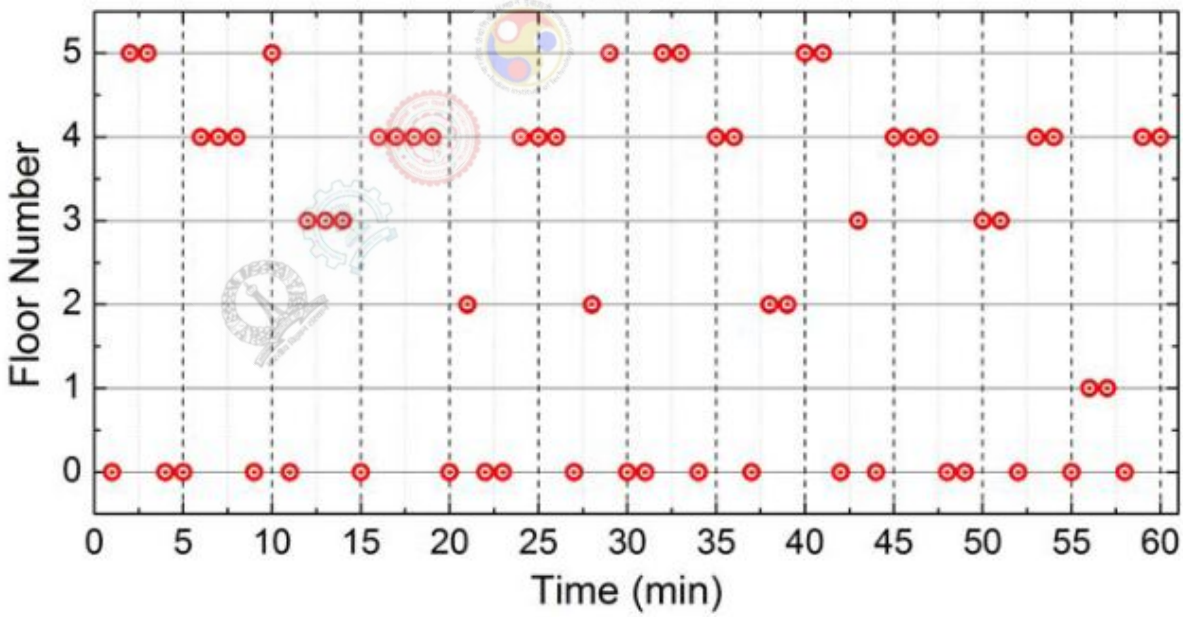
Question Number : 124 Correct : 2 Wrong : -0.66

Budhan covers a distance of 19 km in 2 hours by cycling one fourth of the time and walking the rest. The next day he cycles (at the same speed as before) for half the time and walks the rest (at the same speed as before) and covers 26 km in 2 hours. The speed in km/h at which Budhan walks is

(A) 1 (B) 4 (C) 5 (D) 6

Question Number : 125 Correct : 2 Wrong : -0.66

The points in the graph below represent the halts of a lift for durations of 1 minute, over a period of 1 hour.



Which of the following statements are correct?

i. The elevator never moves directly from any non-ground floor to another non-ground floor over the one hour period
ii. The elevator stays on the fourth floor for the longest duration over the one hour period

(A)) Only i (B) Only ii (C) Both i and ii (D) Neither i nor ii

Q. No.	Type	Section	Key	Marks
1	MCQ	XL-P	A	1
2	MCQ	XL-P	D	1
3	MCQ	XL-P	D	1
4	MCQ	XL-P	B	1
5	MCQ	XL-P	A	1
6	MCQ	XL-P	C	2
7	MCQ	XL-P	B	2
8	MCQ	XL-P	C	2
9	MCQ	XL-P	C	2
10	MCQ	XL-P	B	2
11	MCQ	XL-P	A	2
12	NAT	XL-P	13260 to 13285	2
13	MCQ	XL-P	A	2
14	MCQ	XL-P	C	2
15	MCQ	XL-P	A	2
16	MCQ	XL-Q	A	1
17	MCQ	XL-Q	D	1
18	MCQ	XL-Q	C	1
19	NAT	XL-Q	3.0 to 3.0	1
20	MCQ	XL-Q	B	1
21	MCQ	XL-Q	D	1
22	MCQ	XL-Q	C	1
23	MCQ	XL-Q	A	1
24	MCQ	XL-Q	C	1
25	MCQ	XL-Q	D	1
26	NAT	XL-Q	7575 to 7576	2
27	NAT	XL-Q	722 to 725	2
28	NAT	XL-Q	0.19 to 0.20	2
29	MCQ	XL-Q	D	2
30	NAT	XL-Q	9.0 to 9.0	2
31	MCQ	XL-Q	B	2
32	MCQ	XL-Q	A	2
33	MCQ	XL-Q	A	2
34	MCQ	XL-Q	A	2
35	MCQ	XL-Q	B	2
36	MCQ	XL-R	C	1

37	MCQ	XL-R	B	1
38	MCQ	XL-R	C	1
39	MCQ	XL-R	A	1
40	MCQ	XL-R	D	1
41	MCQ	XL-R	A	1
42	MCQ	XL-R	C	1
43	MCQ	XL-R	D	1
44	MCQ	XL-R	D	1
45	MCQ	XL-R	A	1
46	MCQ	XL-R	A	2
47	MCQ	XL-R	A	2
48	MCQ	XL-R	B	2
49	NAT	XL-R	18.3 to 18.5	2
50	NAT	XL-R	3.2 to 3.2	2
51	MCQ	XL-R	B	2
52	MCQ	XL-R	D	2
53	MCQ	XL-R	C	2
54	MCQ	XL-R	D	2
55	MCQ	XL-R	A	2
56	MCQ	XL-S	A	1
57	MCQ	XL-S	B	1
58	MCQ	XL-S	D	1
59	MCQ	XL-S	C	1
60	MCQ	XL-S	C	1
61	MCQ	XL-S	A	1
62	MCQ	XL-S	A	1
63	MCQ	XL-S	D	1
64	MCQ	XL-S	B	1
65	MCQ	XL-S	C	1
66	MCQ	XL-S	A	2
67	MCQ	XL-S	B	2
68	MCQ	XL-S	A	2
69	MCQ	XL-S	B	2
70	MCQ	XL-S	B	2
71	NAT	XL-S	4550000 to 4650000	2
72	NAT	XL-S	99 to 101	2
73	NAT	XL-S	78000 to 82000	2

74	NAT	XL-S	9990 to 10020	2
75	MCQ	XL-S	A	2
76	MCQ	XL-T	D	1
77	MCQ	XL-T	A	1
78	MCQ	XL-T	C	1
79	MCQ	XL-T	B	1
80	MCQ	XL-T	C	1
81	MCQ	XL-T	A	1
82	MCQ	XL-T	C	1
83	MCQ	XL-T	B	1
84	MCQ	XL-T	D	1
85	MCQ	XL-T	D	1
86	NAT	XL-T	8.0 to 8.0	2
87	NAT	XL-T	7.0 to 7.0	2
88	NAT	XL-T	0.55 to 0.55	2
89	NAT	XL-T	16 to 16	2
90	MCQ	XL-T	D	2
91	MCQ	XL-T	A	2
92	MCQ	XL-T	B or D	2
93	MCQ	XL-T	B	2
94	NAT	XL-T	42.0 to 42.0	2
95	NAT	XL-T	250 to 250	2
96	MCQ	XL-U	B	1
97	MCQ	XL-U	B	1
98	MCQ	XL-U	D	1
99	MCQ	XL-U	B	1
100	NAT	XL-U	1000 to 1000	1
101	MCQ	XL-U	A	1
102	NAT	XL-U	2078 to 2086	1
103	NAT	XL-U	0.80 to 0.90	1
104	MCQ	XL-U	A	1
105	MCQ	XL-U	D	1
106	MCQ	XL-U	C	2
107	MCQ	XL-U	B	2
108	MCQ	XL-U	D	2
109	NAT	XL-U	25550 to 25650	2
110	MCQ	XL-U	D	2

111	NAT	XL-U	53.30 to 55.25	2
112	NAT	XL-U	64.0 to 64.0	2
113	NAT	XL-U	10.80 to 11.20	2
114	NAT	XL-U	9000 to 9000	2
115	NAT	XL-U	0.30 to 0.40	2
116	MCQ	GA	B	1
117	MCQ	GA	B	1
118	MCQ	GA	C	1
119	MCQ	GA	B	1
120	MCQ	GA	B	1
121	MCQ	GA	A	2
122	MCQ	GA	C	2
123	MCQ	GA	C	2
124	MCQ	GA	D	2
125	MCQ	GA	D	2