DU PhD in Genetics

Topic:- DU_J19_PHD_GENETICS

1) Pairs of homologous chromosomes: [Question ID = 25623]

1. separate in meiosis II [Option ID = 42490]
2. have genes for the same characters at the same loci [Option ID = 42488]
3. are found in gametes [Option ID = 42489]
4. have identical DNA sequences in their genes [Option ID = 42487]

Correct Answer :-

- have identical DNA sequences in their genes [Option ID = 42487]

2) Sedimentation of a fraction during differential centrifugation depends on: [Question ID = 25615]

1. Size and density [Option ID = 42457]
2. Size only [Option ID = 42455]
3. Solubility only [Option ID = 42458]
4. Density only [Option ID = 42456]

Correct Answer :-

- Size only [Option ID = 42455]

3) Which one of the following techniques can be utilized to examine the distribution pattern of specific mRNA population in cell?

[Question ID = 25607]

1. RNA *in-situ* hybridization [Option ID = 42425]
2. Real time PCR [Option ID = 42426]
3. Northern blot hybridization [Option ID = 42424]
4. Reverse transcription PCR [Option ID = 42423]

Correct Answer :-

- Reverse transcription PCR [Option ID = 42423]

4) In a cloning experiment, you are inserting a gene of interest into the *LacZ* gene in a vector carrying the tetracycline resistant gene. Transformed *E. coli* with ligation mixtures were plated on media containing tetracycline + X-gal, only tetracycline and only X-gal. Which one of the following results would indicate successful cloning of the gene of interest? [Question ID = 25604]

1. Blue colony on the tetracycline + X-gal plates [Option ID = 42412]
2. Blue colony on X-gal plate which does not grow on tetracycline plates [Option ID = 42414]
3. White colony on the tetracycline + X-gal plates [Option ID = 42411]
4. Any colony on the tetracycline + X-gal plates irrespective of color [Option ID = 42413]

Correct Answer :-

- White colony on the tetracycline + X-gal plates [Option ID = 42411]

5) Tapetum is a layer of cells which are found in the anthers of plants. A researcher wants to identify the transcripts present specifically in the tapetal cells for which he needs to isolate these cells. Which one of the following techniques could he used?

[Question ID = 25589]

1. Carry out Laser Diseection Microscopy [Option ID = 42352]
2. Label the transcripts of the tapetal cells using 3H-uridine and isolate the labelled transcripts by fractionation [Option ID = 42353]
3. Make an anther culture and sort out tapetal cells by FACs [Option ID = 42351]
4. Isolate the cells of anther and fractionate them on a sucrose gradient. [Option ID = 42354]

Correct Answer :-

- Make an anther culture and sort out tapetal cells by FACs [Option ID = 42351]

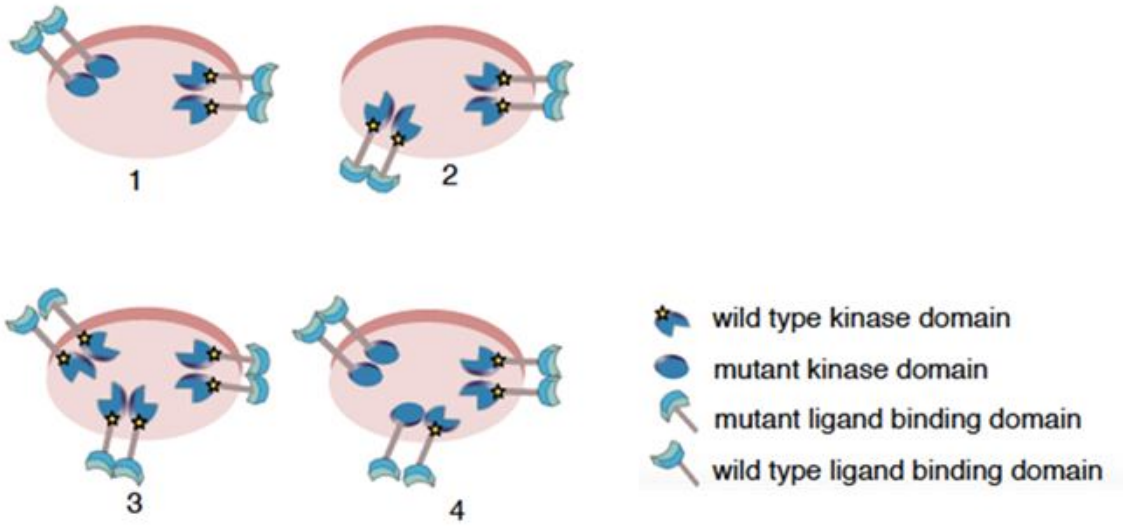
6) Cyclins facilitate progression of cell cycle by: [Question ID = 25619]

1. Inducing synthesis of constitutively active forms of growth cell receptors to trigger signalling cascades [Option ID = 42474]
2. Activating the protein kinases which are critical regulators of cell division [Option ID = 42471]
3. Increasing the production of DNA polymerase so that cells can enter into G2 phase [Option ID = 42473]
4. Directly activating G proteins which in turn affect the protein kinases [Option ID = 42472]

Correct Answer :-

- Activating the protein kinases which are critical regulators of cell division [Option ID = 42471]

7) Two different mutant forms of Receptor Tyrosine Kinase (RTK) gene were developed. One mutant encodes a protein with a non functional kinase domain, and the other lacks a functional ligand binding domain. These are expressed independently in a normal cell which expresses the wild type RTK from their endogenous gene. It is known that the cells used have a large number of RTK receptors on their surface and that ligands bind to monomeric forms of receptor proteins whereas the heterodimer receptors are inactive in signalling. The diagrams below depict four different cell types identified. Each diagram shows the receptor forms observed on the respective cell types in the ratio that they were observed.



Signalling through RTK pathway was studied in these four cell types. The experiments were performed under non-saturating concentrations of ligand. The following statements were made:
(i) In type 1 cells, the mutant receptor with the non-functional kinase domain will interfere with signaling by the cells' normal RTK.
(ii) In type 2 cells, the mutant RTK lacking functional ligand binding domain will be inactive for signaling, but will not interfere with normal signaling mediated by the cells' own receptor tyrosine kinases.
(iii) Equal levels of signaling will be achieved by type 3 and type 4 cells.
(iv) The effects of mutant RTKs of cell type 2 and cell type 3 on levels of signaling by the cells' own normal RTKs will be the same.
Which of the options below has both the correct statements

[Question ID = 25620]

1. (ii) and (iv) only [Option ID = 42478]
2. (ii) and (iii) only [Option ID = 42476]
3. (i) and (ii) only [Option ID = 42475]

4. (i) and (iv) only [Option ID = 42477]

Correct Answer :-

- (i) and (ii) only [Option ID = 42475]

8) In biological systems, which one of the following molecules acts as an electron carrier?

[Question ID = 25609]

1. ATP [Option ID = 42433]
2. CO_2 [Option ID = 42432]
3. NAD^+ [Option ID = 42434]
4. Haemoglobin [Option ID = 42431]

Correct Answer :-

- Haemoglobin [Option ID = 42431]

9) A graduate student was trying to clone gene 'X' which encoded for a toxic product in *E. coli* . The gene 'X' was amplified by PCR and cloned in an appropriate expression vector. After several attempts he got few colonies with the recombinant plasmid. However, on sequencing the insert he observed that the all of them had mutations which disrupted the coding frame of the gene. Which one of the following is the most likely reason for this observation?

[Question ID = 25593]

1. Following cloning, recombination in the gene lead to changes which got selected for. [Option ID = 42370]
2. As the gene encoded a product toxic to *E. coli* , the bacterial cells induced mutations in the gene for its survival. [Option ID = 42367]
3. The colonies were results of mutations in the gene during PCR which got selected for in the process of cloning. [Option ID = 42368]
4. The changes in the gene arose due to spontaneous mutations in the colonies which were identified by screening. [Option ID = 42369]

Correct Answer :-

- As the gene encoded a product toxic to *E. coli*, the bacterial cells induced mutations in the gene for its survival. [Option ID = 42367]

10) Restriction mapping of an unknown plasmid is carried out using the enzymes EcoRI and PstI. The following fragment sizes are observed:
PstI digestion: 5.5 Kb and 4.0 Kb fragment
EcoRI digestion: 5.0 Kb and 4.5 Kb fragment
EcoRI and PstI double digestion : 3.0 Kb , 2.5 Kb and 2.0 Kb fragment
Based on the above the following set of conclusions were made:
i. The 5.5 Kb PstI fragment carries a EcoRI site
ii. The 4.0 Kb PstI fragment carries a EcoRI site
iii. The 4.5 Kb EcoRI fragment carries a PstI site
iv. The 5.0 Kb EcoRI fragment carries a PstI site
Which of the above statements are correct? [Question ID = 25591]

1. Both (iii) and (iv) [Option ID = 42360]
2. Both (i) and (ii) [Option ID = 42359]
3. Both (i) and (iii) [Option ID = 42361]
4. Both (ii) and (iv) [Option ID = 42362]

Correct Answer :-

- Both (i) and (ii) [Option ID = 42359]

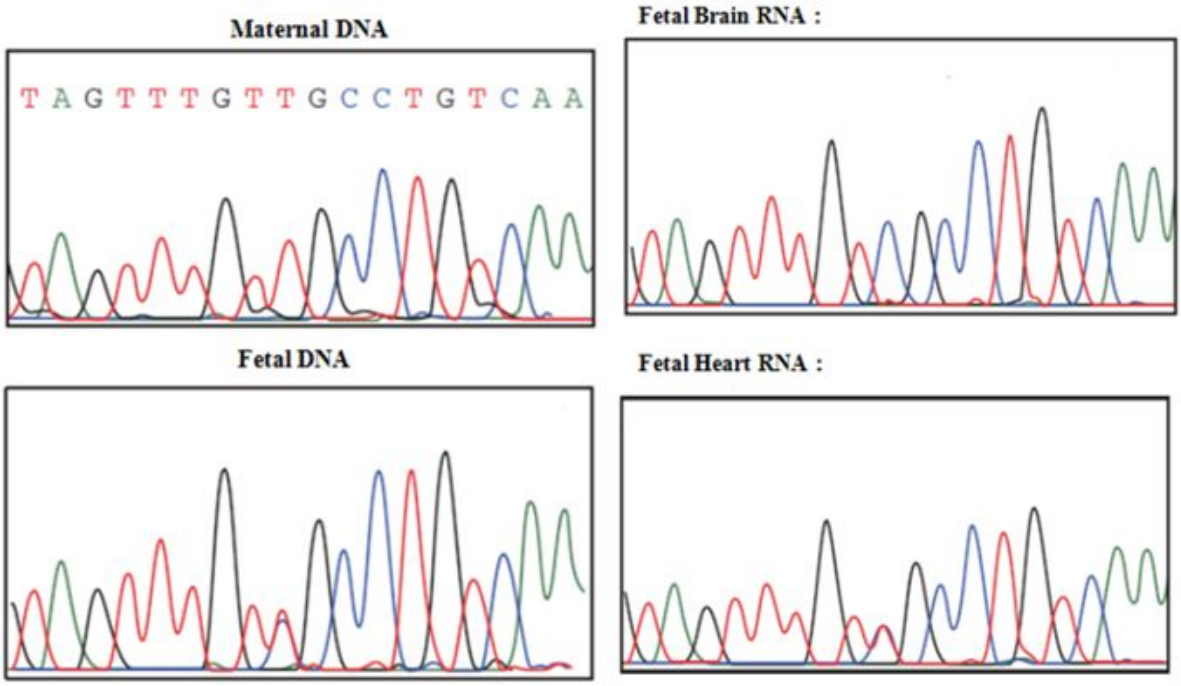
11) A bottle contains 1 mCi of C^{14}- labeled methionine (uniformly labeled) in 2.0 ml of solution. The specific activity of the labeled amino acid is 100 mCi/mmole. Calculate the concentration of methionine in the solution. [Question ID = 25599]

1. 0.5 mM [Option ID = 42392]
2. 0.5 µg/ ml [Option ID = 42394]
3. 0.5 mg/ml [Option ID = 42393]
4. 0.5 M [Option ID = 42391]

Correct Answer :-

- 0.5 M [Option ID = 42391]

12) The figure below shows part of a DNA sequence of an autosomal gene X from her mother and her child (fetal). In addition to the genomic DNA, the sequencing data of cDNA from the child is also represented.



Based on the above observations the following conclusions were drawn:
(i) The father is heterozygous for this region
(ii) In the fetal brain gene X is expressed from the maternal chromosome
(iii) In the fetal heart gene X on the paternal chromsome is expressed
(iv) The mother is homozygous for this region
Which of the above conclusions are correct? [Question ID = 26450]

1. (ii) and (iv) only [Option ID = 45797]
2. (ii), (iii) and (iv) [Option ID = 45796]
3. (i), (ii) and (iii) [Option ID = 45795]
4. (i), (ii), (iii) and (iv) [Option ID = 45798]

Correct Answer :-

- (i), (ii) and (iii) [Option ID = 45795]

13) If a radioactive element has a half-life of 2.7 days, how much of a 96mCi sample will be left after 10.8 days?

[Question ID = 25608]

1. 12 mCi [Option ID = 42428]
2. 24 mCi [Option ID = 42427]
3. 8 mCi [Option ID = 42429]
4. 6 mCi [Option ID = 42430]

Correct Answer :-

- 24 mCi [Option ID = 42427]

14) The only protein that is encoded by the bacteriophage lambda genome when present as a lysogen is the product of the gene: [Question ID = 25596]

1. *cI* [Option ID = 42379]
2. *N* [Option ID = 42381]
3. *cII* [Option ID = 42382]
4. *cro* [Option ID = 42380]

Correct Answer :-

- *cI* [Option ID = 42379]

15) The rotation of the gamma subunit of the mitochondrial F1 ATPase requires the presence of: [Question ID = 25618]

1. NADH [Option ID = 42467]
2. Proton channel in the outer mitochondrial membrane [Option ID = 42469]
3. A proton motive force [Option ID = 42468]
4. Electron carriers [Option ID = 42470]

Correct Answer :-

- NADH [Option ID = 42467]

16) You have a mixture of three proteins having molecular weights 40kDa, 150kDa and 250kDa respectively. You separate them on a size exclusion column packed in such a manner that proteins greater than 200kDa elute in the void volume. What below best describes the elution order of the three proteins? [Question ID = 25581]

1. 40kDa followed by 150kDa followed by 250kDa [Option ID = 42319]
2. 40kDa and 150kDa in the same fraction followed by 250kDa [Option ID = 42322]
3. 250kDa followed by 150kDa followed by 40kDa [Option ID = 42320]
4. 250kDa followed by 40kDa followed by 150kDa [Option ID = 42321]

Correct Answer :-

- 40kDa followed by 150kDa followed by 250kDa [Option ID = 42319]

17) You have five yeast strains each having distinct temperature sensitive allele of *YFG1* named *ts1-ts5* for impaired growth at 42°C. In the laboratory you identify a suppressor to *ts1* named *sup1* which restores growth at 42°C. Using pairwise crossing you combine *ts2-ts5* with *sup1* . It turns out that *sup1* when combined with *ts2-ts5* does not suppress impaired growth at 42°C. Which statement below best describes *sup1* function with respect to *ts1* ? [Question ID = 25578]

1. *sup1* is an interaction suppressor of *ts1* [Option ID = 42308]
2. *sup1* is a either a dosage or bypass suppressor of *ts1* [Option ID = 42310]
3. *sup1* is a dosage suppressor of *ts1* [Option ID = 42307]
4. *sup1* is a bypass suppressor of *ts1* [Option ID = 42309]

Correct Answer :-

- *sup1* is a dosage suppressor of *ts1* [Option ID = 42307]

18) Nitric oxide (NO) is a:

[Question ID = 25613]

1. Molecule that is involved in the break-down of fats [Option ID = 42448]
2. Molecule that is involved in the break-down of purines [Option ID = 42447]
3. Signalling molecule in the nervous, immune and circulatory systems [Option ID = 42449]
4. Signalling molecule in the skin, muscle and respiratory systems [Option ID = 42450]

Correct Answer :-

- Molecule that is involved in the break-down of purines [Option ID = 42447]

19) A plasmid is digested with EcoRI (5′ G/AATTC 3′) to linearize it at a cloning site and a DNA fragment is digested with KpnI (5′ GGTAC/C 3′) for cloning. Both the vector and the DNA fragment is treated with Klenow enzyme and four dNTP substrates to make them blunt ends following which they are ligated. Which one of the following represents the sequnece of the junction fragment (at the point of ligation between blunt-ended EcoRI and KpnI ? [Question ID = 25592]

1. 5′ CTTAACATGG 3′ [Option ID = 42366]
2. 5′ GAATTGTACC 3′ [Option ID = 42365]
3. 5′ GAATTC 3′ [Option ID = 42364]
4. 5′ GGTACC 3′ [Option ID = 42363]

Correct Answer :-

- 5′ GGTACC 3′ [Option ID = 42363]

20) A female is heterozygous for an allele resulting in haemophilia and for an allele resulting in colour blindness when present in homozygous condition. In case both traits are X linked what can be predicted for the progeny if she marries a haemophilic and colour blind man? [Question ID = 25611]

1. All sons and daughters are haemophilia [Option ID = 42440]
2. 50% haemophilic and colour blind sons and 50% normal sons [Option ID = 42442]
3. 50% haemophilic and colour blind sons and daughters [Option ID = 42441]
4. Haemophilic and colour blind daughters [Option ID = 42439]

Correct Answer :-

- Haemophilic and colour blind daughters [Option ID = 42439]

21) Differentiation of shoot in plant tissue culture is controlled by: [Question ID = 25612]

1. High auxin : cytokinin ratio [Option ID = 42443]
2. High gibberellins : cytokinin ratio [Option ID = 42446]
3. High gibberellin : auxin ratio [Option ID = 42445]
4. High cytokinin : auxin ratio [Option ID = 42444]

Correct Answer :-

- High auxin : cytokinin ratio [Option ID = 42443]

22) Matrix assisted laser desorption ionization time of flight (MALDI-TOF) spectrometry is most useful for predicting which of the following? [Question ID = 25580]

1. Molecular mass [Option ID = 42317]
2. Three-dimensional structure [Option ID = 42318]
3. Secondary structure [Option ID = 42316]
4. Isoelectric point [Option ID = 42315]

Correct Answer :-

- Isoelectric point [Option ID = 42315]

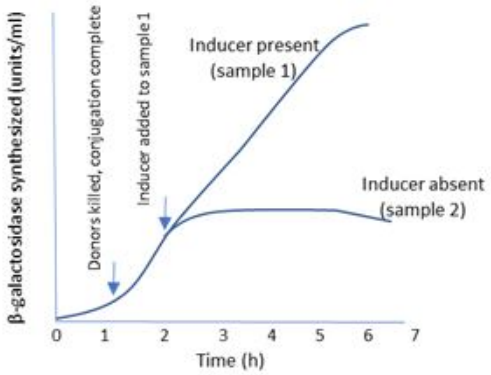
23) The DNA content of a diploid cell is measured in the G1 phase. After meiosis I, the DNA content of one of the two cells produced would be: [Question ID = 25622]

1. one-fourth that of the G1 cell [Option ID = 42486]
2. twice that of the G1 cell [Option ID = 42484]
3. equal to that of the G1 cell [Option ID = 42483]
4. one-half that of the G1 cell [Option ID = 42485]

Correct Answer :-

- equal to that of the G1 cell [Option ID = 42483]

24) In the classic PaJaMo experiment for lac operon, diploid E.coli cells (merozygotes) were formed by conjugation of $I^+ Z^+$ (donor) cells with $I^- Z^-$ (recipient) cells in the absence of an inducer, The levels of β -galactosidase activity in the merozygotes was monitored as a function of time and inducer addition and the following graph was plotted:



Why is an initial of β -galactosidase activity observed in the cells even though it is apparent that it does not sustain without an inducer at later stages?

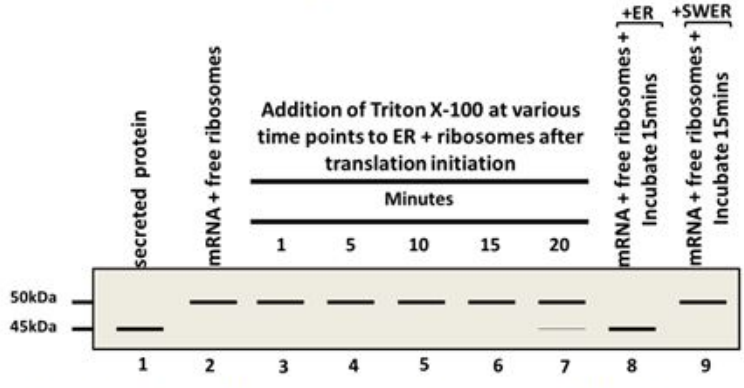
[Question ID = 25602]

1. Bound repressor in donor cells does not allow repression to occur in recipient cells thereby leading to transcription and enzyme activity from recipient cells. [Option ID = 42406]
2. Repressor from the recipient cell detaches from its operator allowing transcription of Z gene in recipient cell [Option ID = 42404]
3. Repressor from the donor cells binds to free operator of recipient cells thereby allowing transcription of Z gene in donor cells [Option ID = 42403]
4. Repressor is inactive in both cells at the early merozygote formation therefore transcription of Z gene occurs in both donor and recipient cells leading to a surge in activity. [Option ID = 42405]

Correct Answer :-

- Repressor from the donor cells binds to free operator of recipient cells thereby allowing transcription of Z gene in donor cells [Option ID = 42403]

25) Shown are results of an in vitro translation experiments using mRNA of a secreted protein with free ribosomes (lane 2), mRNA+ endoplasmic reticulum (ER) + ribosomes followed by addition of Triton X100 at the indicated times after translation initiation (lanes 3-7), mRNA+ free ribosomes followed by addition of ER or salt washed (SW) ER membranes 15 minutes after translation initiation (8,9). As control secreted protein from this specific mRNA is loaded in lane 1. Answer the following question based on this data.



Which statement best describes the protein product encoded by the mRNA ?

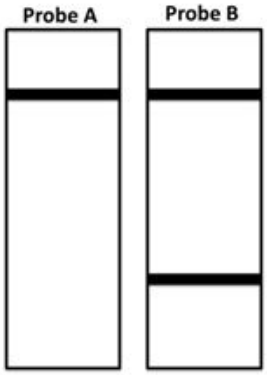
[Question ID = 25575]

1. The mRNA encodes for a precursor protein which is translated in the cytosol and matures within the ER prior to secretion. [Option ID = 42297]
2. The mRNA encodes for a precursor protein which is translated on ER bound ribosomes with maturation taking place co-translationally within the ER. [Option ID = 42298]
3. The mRNA encodes for a protein which is 50kDa in size and requires no processing within the ER [Option ID = 42295]
4. The mRNA encodes for a protein which is 45kDa in size *in vivo* [Option ID = 42296]

Correct Answer :-

- The mRNA encodes for a protein which is 50kDa in size and requires no processing within the ER [Option ID = 42295]

26) The autoradiogram below shows the pattern of hybridization following Southern hybridization of human DNA digested with a restriction enzyme. In the figure the autoradiogram on the left is hybridized to probe A while the one on the right is hybridized to probe B.



If the arrows in the following maps represent the sites of the restriction enzyme, which map best explains the results shown above?

[Question ID = 25583]

1. 

[Option ID = 42328]

2. 

[Option ID = 42329]

3. 

[Option ID = 42327]

4. 

[Option ID = 42330]

Correct Answer :-

- 

[Option ID = 42327]

27)

In a study of histidine biosynthesis in yeast, six mutant haploids requiring supplemented histidine (His1-6) in the culture medium for viability were isolated. The mutant haploids were fused in pairwise combinations to form diploids, whose requirement for histidine was tested. The results of the tests are shown below where (+) indicates diploid combination yielding histidineprototrophs.

	His1	His2	His3	His4	His5	His6
His1	-	+	-	+	+	-
His2	+	-	+	-	-	+
His3	-	+	-	+	+	-
His4	+	-	+	-	-	+
His5	+	-	+	-	-	+
His6	-	+	-	+	+	-

How many different His genes are represented among the six mutants?

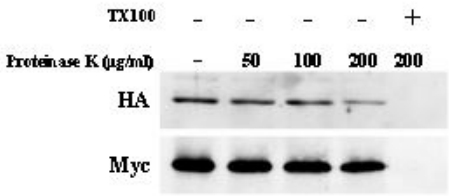
[Question ID = 25577]

1. One [Option ID = 42303]
2. Three [Option ID = 42305]
3. Four [Option ID = 42306]
4. Two [Option ID = 42304]

Correct Answer :-

- One [Option ID = 42303]

28) Shown below are results of protease digestion reaction of sealed membrane vesicles derived from cells expressing membrane bound protein Mtg2p tagged with HA at the N-terminus and with Myc at the C-terminus.



Which statement best describes the localization of Mtg2p?

[Question ID = 25579]

1. N-terminus faces the cytosol and C-terminus faces the lumen of the membrane vesicle [Option ID = 42311]
2. N-terminus and C-terminus both face the cytosol [Option ID = 42314]
3. C-terminus faces the cytosol and N-terminus faces the lumen of the membrane vesicle [Option ID = 42312]
4. N-terminus and C-terminus both face the lumen of the membrane vesicle [Option ID = 42313]

Correct Answer :-

- N-terminus faces the cytosol and C-terminus faces the lumen of the membrane vesicle [Option ID = 42311]

29)

In order to study the affinity of a protein to four different sequences of oligonucleotides (i to iv), a gel retardation assay was carried out. In this assay the protein was incubated with a radiolabelled oligonucleotide either in the presence or absence of unlabelled sheared salmon sperm DNA. Following gel electrophoresis the intensity of the retarded oligonucleotide band was recorded. The results obtained are tabulated below:

	Intensity of the retarded oligonucleotide band (arbitory units)	
	in absence of salmon sperm DNA	in presence of salmon sperm DNA
Oligonucleotide i	100	80
Oligonucleotide ii	400	150
Oligonucleotide iii	150	100
Oligonucleotide iv	200	80

Which one of the above oligonucletides has the highest affinity for the protein?

[Question ID = 25588]

1. Oligonucleotide ii [Option ID = 42348]
2. Oligonucleotide iv [Option ID = 42350]
3. Oligonucleotide i [Option ID = 42347]
4. Oligonucleotide iii [Option ID = 42349]

Correct Answer :-

- Oligonucleotide i [Option ID = 42347]

30)

Deletion analysis of a tapetum specific plant promoter is carried out. Promoter::reporter constructs were developed with different deletions of the 1 Kb promoter as given in the table below. 20 independent transgenic lines were developed with each of these constructs and the expression of the reporter gene was recorded in tapetum and other tissues of the plants. The data is summarized in the table below:

S. No.	Region of the 1 Kb promoter that was deleted	No of plants in which expression was observed in	
		Tapetum	Other tissues
1.	No deletion	19	1
2.	-750 to -1000 bp	12	8
3.	-500 to -1000 bp	20	1
4.	-250 to -1000 bp	1	19

The following interpretations were made to explain the above observations:

(i) The promoter has binding sites for positive regulators in the -750 to -1000 bp and -250bp to -500bp region for its activity in tissues other than tapetum

(ii) The promoter has binding sites for negative regulators in the -500 to -750 bp and 0 to -250bp region for its activity in tapetum tissue

(iii)The promoter has multiple postiveand negative regulators

Which of the above statements are correct?

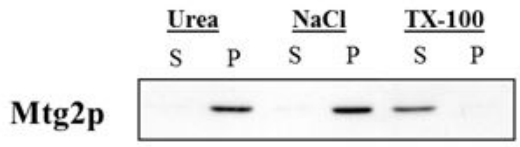
[Question ID = 25584]

1. (i), (ii) and (iii) [Option ID = 42334]
2. (ii) only [Option ID = 42332]
3. (i) and (ii) only [Option ID = 42333]
4. (i) only [Option ID = 42331]

Correct Answer :-

- (i) only [Option ID = 42331]

31) ER membrane fractions were treated with either 6M Urea, 1M NaCl or 1% TX100 (triton X-100). Soluble (S) and pellet (P) fractions were separated by centrifugation and probed for presence of Mtg2p. Shown below are results.



Which statement below best describes the interaction of Mtg2p with the mitochondrial membrane?

[Question ID = 25574]

1. Mtg2p is a tightly associated peripheral membrane protein [Option ID = 42292]

2. Mtg2p is a soluble ER protein [Option ID = 42294]
3. Mtg2p is partially imbedded in the ER membrane [Option ID = 42293]
4. Mtg2p is an integral membrane protein of the ER [Option ID = 42291]

Correct Answer :-

- Mtg2p is an integral membrane protein of the ER [Option ID = 42291]

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32) A DNA strand was being copied *in vitro* using a single stranded template and a primer (as shown below). The reaction also had DNA polymerase, dNTPs and appropriate buffer.

3'ATGCTGGGCTGCATAGGACCCGAGGCGGGGGACCCCATGGATCCAATTAA5'
5'TACGACCCG3'.....

On analysing the copies strands it was observed that the complete sequence could not be copied. Further analysis showed that short stretches were generated, which stopped at any one of the 'A' on the template strand which generated short stretches of copied strands like:
5' TACGACCCGAC3'
5'TACGACCCGACGTATC3'
5'TACGACCCGACGTATCC3'
5'TACGACCCGACGTATCCTGGGC3' etc.
The scientist realized that he had added wrong components in the reaction. The scientist would have added:

[Question ID = 25597]

1. dideoxyGTP (ddGTP) along with dGTP [Option ID = 42383]
2. ddGTP instead of dGTP [Option ID = 42384]
3. ddCTP instead of dCTP [Option ID = 42386]
4. ddCTP along with dCTP [Option ID = 42385]

Correct Answer :-

- dideoxyGTP (ddGTP) along with dGTP [Option ID = 42383]

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33) Acetic acid has a formula weight of 60. Considering that pure glacial acetic acid is 20 M. What is the density of acetic acid? [Question ID = 25590]

1. 0.99 [Option ID = 42358]
2. 2.05 [Option ID = 42356]
3. 1.2 [Option ID = 42357]
4. 3.0 [Option ID = 42355]

Correct Answer :-

- 3.0 [Option ID = 42355]

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34) On comparison of a genomic DNA sequence and its corresponding cDNA it was observed that the genomic DNA did not have an ORF (open reading frame) which was present in the cDNA. The cDNA was also found to have stretches of 'U' whose corresponding 'T' was missing in the genomic DNA sequence. This is probably due to: [Question ID = 25594]

1. Trans-splicing [Option ID = 42371]
2. RNA editing [Option ID = 42372]
3. Errors in transcription [Option ID = 42373]
4. Recoding [Option ID = 42374]

Correct Answer :-

- Trans-splicing [Option ID = 42371]

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35)

Nucleic acids absorb UV light at a wavelength of 260 nm. A researcher isolated genomic DNA and measured its absorbance at 260 nm. Later he realized that the DNA was contaminated with RNA. He then digested the DNA with RNAse and took its absorbance without precipitating the DNA. In comparison to the undigested DNA sample, the absorbance of the RNAse digested sample is expected to: [Question ID = 25598]

1. change (i.e decrease or increase) depending upon the concentration of the contaminating RNA in the sample [Option ID = 42390]
2. remain the same due to the presence of the free ribonucleotides which also absorb at 260 nm [Option ID = 42387]
3. decrease as the free ribonucleotides will not absorb at 260 nm [Option ID = 42388]
4. increase as the free ribonucleotide will absorb more than RNA strands [Option ID = 42389]

Correct Answer :-

- remain the same due to the presence of the free ribonucleotides which also absorb at 260 nm [Option ID = 42387]

36) Which of the following techniques CANNOT be utilized to demonstrate Protein:Protein interaction? [Question ID = 25582]

1. Florescence resonance energy transfer (FRET) [Option ID = 42323]
2. Yeast two hybrid assay [Option ID = 42326]
3. Yeast three hybrid assay [Option ID = 42325]
4. Co-immunoprecipitation [Option ID = 42324]

Correct Answer :-

- Florescence resonance energy transfer (FRET) [Option ID = 42323]

37) Which one of the following is a nuclear receptor protein? [Question ID = 25605]

1. Adhesion receptor [Option ID = 42416]
2. Serpentine receptor [Option ID = 42418]
3. Steroid receptor [Option ID = 42417]
4. Receptor without intrinsic enzyme activity [Option ID = 42415]

Correct Answer :-

- Receptor without intrinsic enzyme activity [Option ID = 42415]

38) Which one of the following statements is FALSE for transcription in bacteria? [Question ID = 25616]

1. Promoter efficiencies in prokaryotes can be increased or decreased by mutation [Option ID = 42461]
2. Promoter recognition in prokaryotes depends upon the consensus sequences [Option ID = 42459]
3. ATP is required for separation of DNA at promoter sequence in order to allow first phosphodiesterase bond formation [Option ID = 42460]
4. Supercoiling is an important feature of transcription [Option ID = 42462]

Correct Answer :-

- Promoter recognition in prokaryotes depends upon the consensus sequences [Option ID = 42459]

39) Which one of the following genetic disorders manifests due to defects in nucleotide excision repair? [Question ID = 25606]

1. Diabetes [Option ID = 42422]
2. Xeroderma pigmentosum (XP) [Option ID = 42420]
3. Hereditary nonpolyposis colorectal cancer (HNPCC) [Option ID = 42419]
4. Lynch syndrome [Option ID = 42421]

Correct Answer :-

- Hereditary nonpolyposis colorectal cancer (HNPCC) [Option ID = 42419]

40) Which one of the following techniques can be utilized to study Protein diffusion within a cell? [Question ID = 25603]

1. Phase display [Option ID = 42409]
2. ChIP-on-chip assay [Option ID = 42410]

3. Yeast three hybrid system [Option ID = 42408]
4. Fluorescence Recovery after photobleaching (FRAP) [Option ID = 42407]

Correct Answer :-

- Fluorescence Recovery after photobleaching (FRAP) [Option ID = 42407]

41) Which one of the following immune response occurs first upon invasion by a virus or bacterium? [Question ID = 25610]

1. Activation of B lymphocytes [Option ID = 42436]
2. Activation of killer T lymphocytes [Option ID = 42435]
3. Mobilization of complement proteins [Option ID = 42438]
4. The inflammatory response [Option ID = 42437]

Correct Answer :-

- Activation of killer T lymphocytes [Option ID = 42435]

42) One of the concerns in commercial usage of transgenic plants is the spread of transgene through pollen flow. Which one of the following methods can be used to circumvent this problem? [Question ID = 25587]

1. Planting of refugia [Option ID = 42346]
2. Chloroplast transformation [Option ID = 42344]
3. Developing male sterile lines [Option ID = 42345]
4. Use of terminator technology [Option ID = 42343]

Correct Answer :-

- Use of terminator technology [Option ID = 42343]

43) DNA double strand breaks in *E. coli* will invoke: [Question ID = 25617]

1. Nucleotide excision repair [Option ID = 42463]
2. Non-homologous end joining [Option ID = 42465]
3. Mismatch repair [Option ID = 42464]
4. Error prone repair [Option ID = 42466]

Correct Answer :-

- Nucleotide excision repair [Option ID = 42463]

44) The translation of an mRNA encoding a secretory protein using a cell free translation system containing microsomes (ER) lacking signal recognition particles (SRP) is initiated. Shortly afterwards SRP molecules in presence of TX100 are added followed by further incubation. Which of the following outcome is the most likely? [Question ID = 25576]

1. The protein will be fully synthesized but not incorporated into microsomes. [Option ID = 42302]
2. The protein will be fully synthesized and incorporated into microsomes. [Option ID = 42300]
3. The protein will be fully synthesized and its signal sequence will be removed without being incorporated into microsomes [Option ID = 42301]
4. Protein synthesis will begin but will be terminated prematurely leading to shorter products. [Option ID = 42299]

Correct Answer :-

- Protein synthesis will begin but will be terminated prematurely leading to shorter products. [Option ID = 42299]

45) Of the following radiations, which one is the most penetrating? [Question ID = 25601]

1. Beta [Option ID = 42400]
2. Alpha [Option ID = 42399]
3. X-rays [Option ID = 42402]
4. Gamma [Option ID = 42401]

Correct Answer :-

- Alpha [Option ID = 42399]

46) A cDNA was cloned under a promoter present in the vector pPKB1. The cDNA was cloned at the *EcoR* I site downstream to the promoter present in the vector. In order to identify a proper clone which will express the cloned cDNA fragment digestions with restriction enzymes were carried out. Which one of the following digestions would be BEST to identify the correct clone.

[Question ID = 25585]

1. Digestion with *EcoR* I alone [Option ID = 42335]
2. Digestion with *EcoR* I and another enzyme whose site is present once in the cDNA fragment. [Option ID = 42336]
3. Digestion with *EcoR* I and another enzyme which has two sites, one present in the cDNA one in the vector pPKB1. [Option ID = 42338]
4. Digestion with an enzyme which has two sites, one present in the cDNA one in the vector pPKB1. [Option ID = 42337]

Correct Answer :-

- Digestion with *EcoR*I alone [Option ID = 42335]

47) Expression of gene 'Hexokinase' was being analysed in heart and muscle of mouse. The gene is a single copy gene in the mouse genome. On carrying out Northern Blot hybridization it was observed that while in heart the transcript encoded by gene 'Hexokinase' was of 3 Kb, in kidney its size was 2.5 Kb. The following reasons were proposed to explain the above observation:
(i) This is due to alternative splicing
(ii) There are two different transcription start sites
(iii) Two alternate promoters are used
Which of the above explanations could be correct? [Question ID = 25595]

1. (i) and (ii) only [Option ID = 42376]
2. (i) and (iii) only [Option ID = 42377]
3. (i) only [Option ID = 42375]
4. (i), (ii) and (iii) [Option ID = 42378]

Correct Answer :-

- (i) only [Option ID = 42375]

48) The *barnase* gene (which encodes an RNase) is used to develop male sterile plants by transgenic approahces. To develop such lines the gene is expressed under a tatpetum specific promoter, in which the clone is made in *E. coli* . It is however difficult to make these constructs in *E. coli* as any leaky expression of the gene kills the cell. Which one of the following approaches is the best choice to ensure that such constructs are easily developed in *E. coli* ?

[Question ID = 25586]

1. Fuse a DNA fragment to the *barnase* gene. The DNA fragment encodes for a peptide which helps in secretion of the protein out of the cell. [Option ID = 42341]
2. Clone a *barstar* gene (which encodes the inhibitor for barnase protein) along with the *barnase* gene. [Option ID = 42340]
3. Clone an intron in the *barnase* gene. [Option ID = 42342]
4. Clone the gene under engineered tapetum specific promoters which have operator sequences to block expression in *E. coli.* [Option ID = 42339]

Correct Answer :-

- Clone the gene under engineered tapetum specific promoters which have operator sequences to block expression in *E. coli.* [Option ID = 42339]

49) The β-galactosidase gene (lac Z) is usually not used as a reporter gene is plants because:

[Question ID = 25600]

1. it is of prokaryotic origin and has a codon usage which leads to low expression in plants. [Option ID = 42395]
2. plants have endogenous β-galactosidase activity. [Option ID = 42397]

3. the lac promoter is non-functional in plants. [Option ID = 42396]
4. The β-galactosidase enzyme is inactivated when expressed in plants. [Option ID = 42398]

Correct Answer :-

- it is of prokaryotic origin and has a codon usage which leads to low expression in plants. [Option ID = 42395]

50) If inheritance of disease to next generation is only possible through females, the probable inheritance is: [Question ID = 25614]

1. Mendelian [Option ID = 42451]
2. Sex-linked [Option ID = 42452]
3. Autosomal [Option ID = 42454]
4. Cytoplasmic [Option ID = 42453]

Correct Answer :-

- Mendelian [Option ID = 42451]