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DU PhD in Biochemistry

Topic:- DU_J18_PHD_BIOCHEM

**1) Transformation efficiency is defined as the number of colonies obtained upon transformation of one microgram of DNA. A student transformed 5 pg of DNA in DH5alpha cells and obtained 500 colonies. The transformation efficiency of DH5alpha cells is: [Question ID = 52891]**

1. 5 x $10^5$ [Option ID = 91557]
2. 1 x $10^8$ [Option ID = 91556]
3. 2.5 x $10^7$ [Option ID = 91559]
4. 2.5 x $10^6$ [Option ID = 91558]

**Correct Answer :-**

- 1 x $10^8$ [Option ID = 91556]

**2) The half-life of $^{32}P$ is 14.3 days. Approximately, how long would it take a solution containing 42,000 d.p.m to decay to 500 d.p.m? [Question ID = 52913]**

1. 2 months [Option ID = 91647]
2. 60 days [Option ID = 91644]
3. 100 days [Option ID = 91646]
4. 90 days [Option ID = 91645]

**Correct Answer :-**

- 90 days [Option ID = 91645]

**3) If the egg white protein, ovalbumin, is denatured in a hard-boiled egg, then which of the following is least affected? [Question ID = 52904]**

1. The secondary structure of ovalbumin [Option ID = 91609]
2. The primary structure of ovalbumin [Option ID = 91608]
3. The quaternary structure of ovalbumin [Option ID = 91611]
4. The tertiary structure of ovalbumin [Option ID = 91610]

**Correct Answer :-**

- The primary structure of ovalbumin [Option ID = 91608]

**4) Which of the following statements about heme structure is true?**

**[Question ID = 52907]**

1. Heme contains a tetrapyrrole ring with four methyl, four vinyl, and four propionate side chains. [Option ID = 91620]
2. The axial coordination positions of heme are occupied by tyrosine residues in myoglobin. [Option ID = 91623]
3. The iron atom is coplanar with the tetrapyrrole ring in deoxyhemoglobin. [Option ID = 91622]
4. The iron atom in heme may be present in ferrous or the ferric state. [Option ID = 91621]

**Correct Answer :-**

- The iron atom in heme may be present in ferrous or the ferric state. [Option ID = 91621]

**5) A graduate student was trying to clone an insert digested with BssHII (G/CGCGC) and EcoRI enzyme (G/AATTC) in EcoRV (GAT/ATC) digested vector. Which of the following is the correct method for treatment of the insert to ensure its cloning into the vector? [Question ID = 52895]**

1. Treatment with T4 Polynucleotide kinase in presence of deoxynucleotides. [Option ID = 91575]
2. Treatment with DpnI enzyme in the presence of deoxynucleotides. [Option ID = 91573]
3. Treatment with T4 DNA polymerase in the presence of deoxynucleotides. [Option ID = 91574]
4. Treatment with T4 DNA ligase in the presence of deoxynucleotides. [Option ID = 91572]

**Correct Answer :-**

- Treatment with T4 DNA polymerase in the presence of deoxynucleotides. [Option ID = 91574]

**6) Length of a gene is 999 bases including the initiator and terminator codon. The number of amino acids in the protein encoded by this gene would be: [Question ID = 52890]**

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1. 331 [Option ID = 91553]
2. 332 [Option ID = 91554]
3. 333 [Option ID = 91555]
4. 330 [Option ID = 91552]

**Correct Answer :-**

- 332 [Option ID = 91554]

**7) Glutathione does all of the following except [Question ID = 52906]**

1. Decrease the solubility of erythrocyte membrane [Option ID = 91619]
2. Form conjugates with some drugs to increase water solubility [Option ID = 91618]
3. Participate in the transport of amino acids across some cell membrane [Option ID = 91616]
4. Scavenges peroxides [Option ID = 91617]

**Correct Answer :-**

- Decrease the solubility of erythrocyte membrane [Option ID = 91619]

**8) Many biosynthetic pathways are regulated by feedback inhibition of enzymes. In a particular type of feedback inhibition, two end-products individually do not inhibit an enzyme upstream in the pathway at all, but when both are present they inhibit the same enzyme significantly. What type of feedback inhibition do these inhibitors represent? [Question ID = 52917]**

1. Additive inhibition [Option ID = 91663]
2. Concerted inhibition [Option ID = 91661]
3. Cumulative inhibition [Option ID = 91662]
4. Synergistic inhibition [Option ID = 91660]

**Correct Answer :-**

- Concerted inhibition [Option ID = 91661]

**9) Griscelli syndrome is caused by mutation in : [Question ID = 52934]**

1. Rab27 protein involved in docking of transport vesicles [Option ID = 91728]
2. Rab29 protein involved in formation of exocysts [Option ID = 91729]
3. Sec12 protein involved in vesicle formation [Option ID = 91730]
4. Atg 8 protein involved in autophagy [Option ID = 91731]

**Correct Answer :-**

- Rab27 protein involved in docking of transport vesicles [Option ID = 91728]

**10) A mRNA coding for secretory protein, when translated using free ribosome under in vitro conditions, resulted in 40KDa protein. The same mRNA when translated using the rough ER resulted in a 36KDa protein. The difference in the molecular weight of the two polypeptides is due to the loss of a**

**[Question ID = 52909]**

1. 4kDa peptide from the C-terminus [Option ID = 91631]
2. 4kDa peptide from the N-terminus [Option ID = 91630]
3. 2kDa protein from N-terminus and a 2kDa peptide from the C-terminus [Option ID = 91628]
4. 1kDa peptide from N-terminus and a 3KDa peptide from the C-terminus [Option ID = 91629]

**Correct Answer :-**

- 4kDa peptide from the N-terminus [Option ID = 91630]

**11) In the creation of a knockout mouse using homologous recombination, a viral thymidine kinase gene is often included in the vector outside of the region of homology between the vector and targeted chromosome. What is the purpose of using this gene ? [Question ID = 52903]**

1. To allow positive selection of cells in which integration of the targeting sequence has occurred by random insertion into the genome. [Option ID = 91607]
2. To allow positive selection of cells in which integration of the targeting sequence has occurred by homologous recombination. [Option ID = 91606]
3. To allow negative selection of cells in which integration of the targeting sequence has occurred by random insertion into the genome. [Option ID = 91605]
4. To allow negative selection of cells in which integration of the targeting sequence has occurred by homologous recombination. [Option ID = 91604]

**Correct Answer :-**

- To allow negative selection of cells in which integration of the targeting sequence has occurred by random insertion into the genome. [Option ID = 91605]

**12) In a purification protocol, the target protein along with a mixture of contaminating proteins was provided in 20mM Tris buffer of pH 8. The target protein, with a pI of 6.0, did not have any kind of affinity tag. To obtain pure form of the target protein, it was necessary to**

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**employ three different modes of common liquid chromatographic techniques. Moreover, after the third step was completed, the purified protein (single band on SDS-PAGE) did not have any trace of salt in it and was obtained in the original buffer it was provided in. Based on this information, a three-step purification strategy can be designed such that dialysis is avoided at any time in the process. The logical steps would include: [Question ID = 52914]**

1. Affinity, ion-exchange and gel filtration chromatography [Option ID = 91649]
2. Ion-exchange, hydrophobic interaction and gel filtration chromatography [Option ID = 91648]
3. Ion-exchange, affinity and gel filtration chromatography [Option ID = 91651]
4. Gel filtration, hydrophobic interaction and ion-exchange chromatography [Option ID = 91650]

**Correct Answer :-**

- Ion-exchange, hydrophobic interaction and gel filtration chromatography [Option ID = 91648]

**13) Pure plasmid DNA was isolated from a bacterium. Restriction enzyme digestion of this plasmid with BamHI or EcoRI resulted in two DNA fragments. A double digestion of the same plasmid with both these enzymes resulted in three DNA fragments. From this we can conclude that the isolated plasmid DNA is [Question ID = 52908]**

1. single stranded and linear [Option ID = 91626]
2. single stranded and circular [Option ID = 91627]
3. double stranded and circular [Option ID = 91625]
4. double stranded and linear [Option ID = 91624]

**Correct Answer :-**

- double stranded and linear [Option ID = 91624]

**14) New Zealand white rabbits were immunized with protein ABC. After completion of the immunization schedule, the antisera was obtained and incubated with protein ABC linked to magnetic beads, followed by the separation of beads. The supernatant (i.e. depleted anti-sera was subjected to electrophoresis along with the untreated anti-sera. Which band of proteins is likely to be missing from the depleted anti-sera vis-à-vis untreated anti-sera?**

**[Question ID = 52899]**

1. Albumin [Option ID = 91588]
2. Gamma globulins [Option ID = 91591]
3. Alpha globulins [Option ID = 91589]
4. Beta globulins [Option ID = 91590]

**Correct Answer :-**

- Gamma globulins [Option ID = 91591]

**15) The classical Sanger's sequencing based on the use of dideoxynucleotides is a routinely employed method for sequencing DNA molecules. Which of the following is true for this classical method? [Question ID = 52896]**

1. The concentration of dideoxynucleotides should be lower than the deoxynucleotides. [Option ID = 91576]
2. The concentration of dideoxynucleotides should be higher than the deoxynucleotides. [Option ID = 91577]
3. The concentration of dideoxynucleotides and deoxynucleotides should be exactly equal. [Option ID = 91578]
4. The reaction should not contain even trace amounts of deoxynucleotides. [Option ID = 91579]

**Correct Answer :-**

- The concentration of dideoxynucleotides should be lower than the deoxynucleotides. [Option ID = 91576]

**16) Endoplasmic reticulum lumenal proteins have the following sequence at their C-terminus [Question ID = 52897]**

1. KELD [Option ID = 91583]
2. KDEL [Option ID = 91581]
3. KDEE [Option ID = 91580]
4. KLDE [Option ID = 91582]

**Correct Answer :-**

- KDEL [Option ID = 91581]

**17) Which technique is commonly used for gene knock-out in mice? [Question ID = 52902]**

1. Cre/loxP system [Option ID = 91602]
2. RNA interference (RNAi) [Option ID = 91601]
3. Microinjection of GFP [Option ID = 91600]
4. Gal4/UAS system [Option ID = 91603]

**Correct Answer :-**

- Cre/loxP system [Option ID = 91602]

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**18) A mandatory requirement in FRET studies is : [Question ID = 52920]**

1. the excitation wavelength of the acceptor should overlap with the emission wavelength of the donor [Option ID = 91672]
2. the excitation wavelength of the acceptor should overlap with the excitation wavelength of the donor [Option ID = 91674]
3. the emission wavelength of the acceptor should overlap with the excitation wavelength of the donor [Option ID = 91673]
4. the emission wavelength of the acceptor should overlap with the emission wavelength of the donor [Option ID = 91675]

**Correct Answer :-**

- the excitation wavelength of the acceptor should overlap with the emission wavelength of the donor [Option ID = 91672]

**19) In which type of elution technique, there is no change in gradient with respect to time? [Question ID = 52928]**

1. Exponential elution technique [Option ID = 91707]
2. Isocratic elution technique [Option ID = 91704]
3. Stepwise elution technique [Option ID = 91705]
4. Linear elution technique [Option ID = 91706]

**Correct Answer :-**

- Isocratic elution technique [Option ID = 91704]

**20) The multienzyme complex of TCA cycle is [Question ID = 52905]**

1. Isocitrate dehydrogenase [Option ID = 91613]
2. alpha Ketoglutarate dehydrogenase [Option ID = 91612]
3. Malate dehydrogenase [Option ID = 91615]
4. Pyruvate dehydrogenase [Option ID = 91614]

**Correct Answer :-**

- alpha Ketoglutarate dehydrogenase [Option ID = 91612]

**21) What is the role of smooth Endoplasmic reticulum? [Question ID = 52936]**

1. Involved in lipid metabolism [Option ID = 91736]
2. Involved in protein processing [Option ID = 91738]
3. Involved in processing of membrane proteins [Option ID = 91739]
4. Involved in O-linked glycosylation [Option ID = 91737]

**Correct Answer :-**

- Involved in lipid metabolism [Option ID = 91736]

**22) All the membrane proteins known as G proteins: [Question ID = 52927]**

1. Mediate the effects of insulin on cells [Option ID = 91703]
2. Hydrolyze GTP [Option ID = 91701]
3. Are gated ion channels [Option ID = 91702]
4. Have a subunit that activates adenylate cyclase [Option ID = 91700]

**Correct Answer :-**

- Hydrolyze GTP [Option ID = 91701]

**23) If lactose and glucose are provided in the growth medium of a culture of E.coli, [Question ID = 52937]**

1. Lactose metabolism is favoured [Option ID = 91740]
2. Lactose operon is not transcribed [Option ID = 91741]
3. Both lactose and glucose are metabolised at the same rate [Option ID = 91742]
4. Adenylate cyclase is activated [Option ID = 91743]

**Correct Answer :-**

- Lactose operon is not transcribed [Option ID = 91741]

**24) Liver tissue was homogenised and centrifuged to separate soluble and insoluble proteins. The protein X was found in the insoluble fraction. The insoluble fraction was treated with 0.5 M NaCl and now protein X was found in soluble fraction. What does this indicate about the nature of the protein X? [Question ID = 52898]**

1. It is a soluble cytosolic protein [Option ID = 91586]
2. It is a soluble mitochondrial protein [Option ID = 91587]
3. It is an integral membrane protein [Option ID = 91584]
4. It is a peripheral membrane protein [Option ID = 91585]

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**Correct Answer :-**

- It is a peripheral membrane protein [Option ID = 91585]

**25) The subunit molecular weight as well as the number of subunits in the quaternary structure of a protein can be determined by [Question ID = 52900]**

1. gel filtration chromatography [Option ID = 91593]
2. Combining information from SDS-PAGE and gel filtration [Option ID = 91594]
3. SDS-PAGE electrophoresis [Option ID = 91592]
4. Isoelectric focusing [Option ID = 91595]

**Correct Answer :-**

- Combining information from SDS-PAGE and gel filtration [Option ID = 91594]

**26) In general, which of the following Coomassie Brilliant Blue Dye is used to stain polyacrylamide gels? [Question ID = 52912]**

1. Y-250 [Option ID = 91643]
2. R-250 [Option ID = 91640]
3. B-250 [Option ID = 91642]
4. G-250 [Option ID = 91641]

**Correct Answer :-**

- G-250 [Option ID = 91641]

**27) A protein molecule contains 3 disulphide bonds, which are necessary for its folding. Which of the following strategy is least suitable for obtaining correctly folded protein? [Question ID = 52894]**

1. Refolding in presence of iodoacetamide. [Option ID = 91571]
2. Expression in HEK293 cells. [Option ID = 91570]
3. Expression in the cytosol of E. coli strain Origami [Option ID = 91568]
4. Expression in the periplasm of E. coli BL21 (DE3) [Option ID = 91569]

**Correct Answer :-**

- Refolding in presence of iodoacetamide. [Option ID = 91571]

**28) Tunicamycin inhibits the biosynthesis of: [Question ID = 52929]**

1. Glycolipids [Option ID = 91708]
2. Polysaccharides [Option ID = 91710]
3. Mucopolysaccharides [Option ID = 91711]
4. Glycoproteins [Option ID = 91709]

**Correct Answer :-**

- Glycoproteins [Option ID = 91709]

**29) A DNA molecule is subjected to a mutation. Density gradient centrifugation of a mixture of wild type and mutant DNA results in two distinct bands with mutant DNA occupying the lower position. Based on this observation, what is the kind of mutation that occurred in the wild type DNA? [Question ID = 52892]**

1. Missense mutation [Option ID = 91563]
2. Point mutation [Option ID = 91562]
3. Insertion [Option ID = 91560]
4. Deletion [Option ID = 91561]

**Correct Answer :-**

- Insertion [Option ID = 91560]

**30) Alkaline phosphatase is an enzyme required for the dephosphorylation of proteins. This enzyme requires the formation of disulfide bonds for its optimum activity. You are trying to express the gene encoding for alkaline phosphatase in E.coli cells. Which expression vector will be chosen for its most active state expression: [Question ID = 52921]**

1. vector with 6x histidine tag [Option ID = 91676]
2. vector with a secretory signal sequence [Option ID = 91677]
3. vector with a glutathione S-transferase tag [Option ID = 91679]
4. vector with a pelB signal sequence [Option ID = 91678]

**Correct Answer :-**

- vector with a pelB signal sequence [Option ID = 91678]

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**31) Glycophorin A containing 131 amino acids is a glycoprotein that extends across the red blood cell membrane. The portion of the polypeptide that extends across the membrane bilayer contains nineteen amino acid residues and is folded into an alpha helix. What is the width of the bilayer that could be spanned by this helix? [Question ID = 52918]**

1. 19 Å [Option ID = 91665]
2. 28.5 Å [Option ID = 91664]
3. 25 Å [Option ID = 91666]
4. 38 Å [Option ID = 91667]

**Correct Answer :-**

- 28.5 Å [Option ID = 91664]

**32)** If labeled amino acids are added to an *in vitro* system synthesizing protein under the direction of a single mRNA species and samples are withdrawn at different times, the following labeling patterns in the completed polypeptide chains would be observed. The dash (-) represents unlabelled amino acids, the X represents labeled amino acids, and A and B represent the ends of the intact protein.

| | |
|---|---|
| Time 1 (early) | A ----------XXB |
| Time 2 | A ----------XXXXB |
| Time 3 | A -------XXXXXXXB |
| Time 4 (late) | A --XXXXXXXXXXB |

Which of the following statement about these proteins is correct?

**[Question ID = 52915]**

1. The amino acid terminus of the protein is unambiguous [Option ID = 91655]
2. The labeled amino acids are added in the A-to-B direction [Option ID = 91652]
3. The labeled amino acids are added in the B-to-A direction [Option ID = 91653]
4. B is the amino terminus of the protein [Option ID = 91654]

**Correct Answer :-**

- The labeled amino acids are added in the A-to-B direction [Option ID = 91652]

**33)** A student has to perform anion exchange chromatography for purification of a protein. Before doing the chromatography, he carried out an experiment for the determination of the binding capacity of the resin so that he can decide how much protein to be employed for the chromatography. 0.5ml of the anion exchange resin was taken with 10mg, 20mg, 40mg, 50mg and 100mg of BSA separately and incubated for 30 minutes followed by centrifugation. The protein content in the supernatant was measured and the binding capacity was calculated.

| Amount taken | Amount remaining in the supernatant |
|---|---|
| 10mg | - |
| 20mg | - |
| 40mg | 10mg |
| 50mg | 20mg |
| 100mg | 70mg |

What is the binding capacity:

**[Question ID = 52922]**

1. 60mg/ml [Option ID = 91682]
2. 20mg/ml [Option ID = 91681]
3. 30mg/ml [Option ID = 91680]
4. 40mg/ml [Option ID = 91683]

**Correct Answer :-**

- 60mg/ml [Option ID = 91682]

**34) If a toxic protein is to be expressed using the pET system in E.coli, which strain will be more appropriate to use: [Question ID = 52925]**

1. BL21(λDE3) [Option ID = 91693]

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2. BL21 [Option ID = 91692]
3. BL21 (λDE3) plysS [Option ID = 91694]
4. XL-1Blue [Option ID = 91695]

**Correct Answer :-**

- BL21 (λDE3) plysS [Option ID = 91694]

**35) For the hypothetical reversible reaction where S is converted to P, the rate constant for the forward reaction is $10^5$ $s^{-1}$ while that of the backward reaction is $10^1$ $s^{-1}$. If the reaction is catalyzed by an enzyme, the rate constant for the forward reaction increases 100-fold. What will be the equilibrium constant of the enzyme catalyzed reaction?**

**[Question ID = 52910]**

1. $10^5$ [Option ID = 91634]
2. $10^4$ [Option ID = 91633]
3. $10^6$ [Option ID = 91635]
4. $10^3$ [Option ID = 91632]

**Correct Answer :-**

- $10^4$ [Option ID = 91633]

**36) A buffer of pH 4 is _____ than a buffer of pH 6. [Question ID = 52911]**

1. 10 times more acidic [Option ID = 91638]
2. 2 times more acidic [Option ID = 91637]
3. 1.5 times more acidic [Option ID = 91636]
4. 100 times more acidic [Option ID = 91639]

**Correct Answer :-**

- 100 times more acidic [Option ID = 91639]

**37) Which of the following combinations of biophysical methods would provide information about secondary structure of globular proteins in aqueous solution? [Question ID = 52916]**

1. Circular Dichroism and NMR spectroscopy [Option ID = 91659]
2. X-ray crystallography and Circular Dichroism spectroscopy [Option ID = 91657]
3. NMR spectroscopy and X-ray crystallography [Option ID = 91658]
4. Absorbance and Fluorescence spectroscopy [Option ID = 91656]

**Correct Answer :-**

- Circular Dichroism and NMR spectroscopy [Option ID = 91659]

**38) Which of the following statements best describe the "Protein Folding Problem"? [Question ID = 52919]**

1. Once a protein is translated in vivo, it faces competitive reactions like aggregation, misfolding and proteolysis, which pose problems for the proteins to fold [Option ID = 91670]
2. When a protein folds, non-stabilizing forces like chain entropy and isomerization of amino acid side chains oppose the folding process [Option ID = 91669]
3. Given a protein sequence, we cannot predict its three-dimensional structure precisely and with confidence [Option ID = 91668]
4. Protein misfolding causes several neurodegenerative diseases [Option ID = 91671]

**Correct Answer :-**

- Given a protein sequence, we cannot predict its three-dimensional structure precisely and with confidence [Option ID = 91668]

**39) Which of the following mechanisms will remove uracil and incorporate the correct base? [Question ID = 52935]**

1. Base excision repair [Option ID = 91734]
2. Mismatch repair [Option ID = 91732]
3. Nucleotide excision repair [Option ID = 91735]
4. Direct repair [Option ID = 91733]

**Correct Answer :-**

- Base excision repair [Option ID = 91734]

**40) Which of the following is true? [Question ID = 52938]**

1. The disulfide bridges formed by oxidation of sulfhydryl groups on cysteine stabilizes protein tertiary structure [Option ID = 91746]
2. The disulfide bridges formed by oxidation of sulfhydryl groups on cysteine destabilizes protein tertiary structure [Option ID = 91745]
3. The disulfide bridges formed by reduction of sulfhydryl groups on cysteine destabilizes protein tertiary structure [Option ID = 91747]

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4. The disulfide bridges formed by reduction of sulfhydryl groups on cysteine stabilizes protein tertiary structure [Option ID = 91744]

**Correct Answer :-**

- The disulfide bridges formed by oxidation of sulfhydryl groups on cysteine stabilizes protein tertiary structure [Option ID = 91746]

**41) Which one of the following radioisotopes does not emit β rays? [Question ID = 52931]**

1. $^{14}C$ [Option ID = 91716]
2. $^{32}P$ [Option ID = 91718]
3. $^{3}H$ [Option ID = 91717]
4. $^{125}I$ [Option ID = 91719]

**Correct Answer :-**

- $^{125}I$ [Option ID = 91719]

**42) Molarity of a solution is the number of: [Question ID = 52930]**

1. Gram equivalents of solute/no of litres of solute [Option ID = 91712]
2. Gram equivalents/100 ml of solution [Option ID = 91715]
3. Moles of solute/litre of solution [Option ID = 91713]
4. Moles of solute/100 ml of solution [Option ID = 91714]

**Correct Answer :-**

- Moles of solute/litre of solution [Option ID = 91713]

**43) Inhibition of an enzyme by blocking its active site is: [Question ID = 52932]**

1. Non-competitive inhibition [Option ID = 91722]
2. Competitive Inhibition [Option ID = 91721]
3. Allosteric inhibition [Option ID = 91723]
4. Feedback inhibition [Option ID = 91720]

**Correct Answer :-**

- Competitive Inhibition [Option ID = 91721]

**44) Bicoid and Nanos are examples of genes that show: [Question ID = 52926]**

1. Complementarity [Option ID = 91698]
2. Maternal effect [Option ID = 91697]
3. Maternal inheritance [Option ID = 91696]
4. Paternal inheritance [Option ID = 91699]

**Correct Answer :-**

- Maternal effect [Option ID = 91697]

**45) If ARF1 is activated to its GTP bound form and further activates GGA and AP1, which signalling cascade are we talking about? [Question ID = 52933]**

1. Vescile fusion by SNARE proteins [Option ID = 91727]
2. Clathrin coated vesicle formation [Option ID = 91724]
3. Exocytosis [Option ID = 91726]
4. Autophagy [Option ID = 91725]

**Correct Answer :-**

- Clathrin coated vesicle formation [Option ID = 91724]

**46) The pET system is a widely used expression system for high-level heterologous protein expression in E. coli host BL21 (DE3). This system has following features:**
**I. Target genes are cloned in pET vectors under the control of strong bacteriophage T7 promoter.**
**II. Expression is induced by T7 RNA polymerase encoded by the pET vector under the control of lacUV5 promoter.**
**III. Expression host BL21 (DE3) contains a chromosomal copy of the T7 lysozyme gene under lacUV5 control to reduce basal level background expression.**
**IV. The expression can be induced with both IPTG and lactose.**
**Which of the above statements about the expression system are true? [Question ID = 52889]**

1. I, IV [Option ID = 91551]
2. I, III, IV [Option ID = 91550]
3. I, II, III, IV [Option ID = 91548]
4. I, II, IV [Option ID = 91549]

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**Correct Answer :-**

- I, IV [Option ID = 91551]

**47) Which is true for ion exchange chromatography? [Question ID = 52923]**

1. Length of the column affects the resolution of separation of proteins [Option ID = 91684]
2. Presence of sugar in the sample affects the binding of proteins to the column [Option ID = 91685]
3. Presence of salt in the sample affects the binding of proteins to the column [Option ID = 91686]
4. Sample volume affects the resolution of separation of proteins [Option ID = 91687]

**Correct Answer :-**

- Presence of salt in the sample affects the binding of proteins to the column [Option ID = 91686]

**48) Which is correct for yeast two-hybrid system? [Question ID = 52924]**

1. GAL4 activation domain and DNA binding domain cannot be used unless modified by mutagenesis [Option ID = 91691]
2. GAL4 activation domain and DNA binding domain interact only with help of other interacting proteins [Option ID = 91689]
3. GAL4 activation domain and DNA binding domain interact spontaneously [Option ID = 91688]
4. GAL4 activation domain and DNA binding domain interact only if the two interacting partners are less than 50kDa [Option ID = 91690]

**Correct Answer :-**

- GAL4 activation domain and DNA binding domain interact only with help of other interacting proteins [Option ID = 91689]

**49) A biochemist wants to separate two proteins, namely protein A (Mol wt. = 30.2 kDa; pI = 6.5) and protein B (Mol. wt. = 30.9 kDa; pI = 3.5). Based on the information provided, which of the following would be the correct method for separating the two proteins? [Question ID = 52893]**

1. Anion exchange chromatography at pH = 2.5 with salt gradient based elution. [Option ID = 91565]
2. Nickel-affinity chromatography [Option ID = 91567]
3. Gel-filtration chromatography in presence of salt. [Option ID = 91566]
4. Cation exchange chromatography at pH = 5.0 with salt gradient based elution. [Option ID = 91564]

**Correct Answer :-**

- Cation exchange chromatography at pH = 5.0 with salt gradient based elution. [Option ID = 91564]

**50) While investigating a protein-DNA interaction using EMSA, if we add a specific antibody against the target protein before adding the DNA, which of the following do we expect to observe in the gel? [Question ID = 52901]**

1. A faster migrating band [Option ID = 91599]
2. No band [Option ID = 91597]
3. A supershifted band [Option ID = 91598]
4. A smear of bands [Option ID = 91596]

**Correct Answer :-**

- A supershifted band [Option ID = 91598]

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