

DU PhD In Biomedical Sciences

Topic:- BIOSCI PHD

1) Which among the following statements are true (T) or false (F) about the given reactions?

- A. Acetoacetic ester synthesis intramolecular rearrangement leads to decarboxylation
- B. Benzoin condensation an umpolung involves polarity inversion
- C. Haloform synthesis is nucleophilic reaction to form chloroform
- D. Perkin condensation is an aldol condensation to give α,β -unsaturated aromatic compound

[Question ID = 5812]

1. A - T, B - T, C - T, D - T

[Option ID = 23245]

2. A - F, B - F, C - T, D - T

[Option ID = 23246]

3. A - T, B - F, C - T, D - F

[Option ID = 23247]

4. A - T, B - F, C - T, D - F

[Option ID = 23248]

2) Match List I with List II

List I	List II
Name reaction	Product obtained
A. Cannizzaro reaction	I. Benzalacetophenone
B. Claisen-Schmidt Reaction	II. Substituted indole
C. Dieckmann condensation	III. β -ketoester
D. Madelung reaction	IV. Benzylalcohol and benzoic acid

Choose the correct answer from the options given below:

[Question ID = 5813]

1. A - II, B - I, C - IV, D - III [Option ID = 23249]

2. A - II, B - III, C - IV, D - I [Option ID = 23250]

3. A - III, B - I, C - IV, D - II [Option ID = 23251]

4. A - IV, B - I, C - III, D - II [Option ID = 23252]

3) Match List I with List II

List I	List II
Compound Present	Vitamin
A. ASCORBIC ACID	I. VITAMIN B12
B. CYANOCOBALAMIN	II. VITAMIN K
C. PHYLLLOQUINONE	III. VITAMIN B1
D. THIAMINE	IV. VITAMIN C

[Question ID = 5814]

1. A - II, B - I, C - IV, D - III [Option ID = 23253]

2. A - IV, B - III, C - II, D - I [Option ID = 23254]

3. A - IV, B - I, C - II, D - III [Option ID = 23255]

4. A - III, B - I, C - IV, D - II [Option ID = 23256]

4) Identify the true (T) or false (F) in the following statements on protein conformation:

- A. Dihedral angles of side-chains in amino acids are depicted in the Ramachandran plot.
- B. Infrared spectroscopy can be used to deduce H-bonding in peptides.
- C. 3D structures of protein composed of approximately 100 amino acids can be obtained by NMR spectroscopy.
- D. Globular proteins have α -helical and β -sheet components

[Question ID = 5815]

1. A - F, B - T, C - T, D - T

[Option ID = 23257]

2. A - T, B - T, C - T, D - F

[Option ID = 23258]

3. A - T, B - T, C - F, D - F

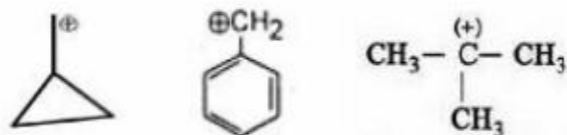
[Option ID = 23259]

4. A - F, B - T, C - F, D - T

[Option ID = 23260]

5)

Which among the following is **CORRECT** statement about the stability of the given carbocations?



[Question ID = 5816]

1. Cyclopropylmethyl > Benzyl > tert-butyl, because s character at the carbanionic carbon decreases

[Option ID = 23261]

2. Cyclopropylmethyl > Benzyl > tert-butyl, because s character at the carbanionic carbon increases

[Option ID = 23262]

3. Cyclopropylmethyl < Benzyl < tert-butyl, because s character at the carbanionic carbon decreases

[Option ID = 23263]

4. Cyclopropylmethyl < Benzyl < tert-butyl, because s character at the carbanionic carbon increases

[Option ID = 23264]

6) Which one of the following is **NOT CORRECT** about Mannich reaction?

[Question ID = 5817]

1. Reactions between aldimines and α -methylene carbonyls

[Option ID = 23265]

2. Amino alkylation of an α -methylene carbonyls with formaldehyde and ammonia

[Option ID = 23266]

3. Formation of β -amino-carbonyl compound

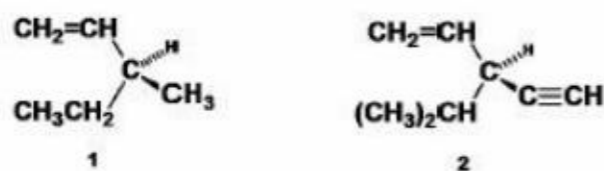
[Option ID = 23267]

4. Reactions between aldehyde and carbonyls

[Option ID = 23268]

7)

The absolute configuration of following compounds is



[Question ID = 5818]

1. 1(S); 2(S)

[Option ID = 23269]

2. 1(S); 2(R)

[Option ID = 23270]

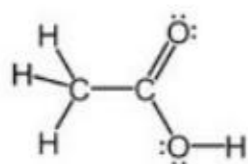
3. 1(R); 2(S)

[Option ID = 23271]

4. 1(R); 2(R)

[Option ID = 23272]

8) The oxidation state of carbons (CH₃ and COOH) in acetic acid are



[Question ID = 5819]

1. +3, +3 [Option ID = 23273]

2. +4, +4 [Option ID = 23274]

3. -3, +3 [Option ID = 23275]

4. +4, -4 [Option ID = 23276]

9) The optical purity of a substance can be measured by comparing the optical rotation of the sample to the known optical rotation of a single enantiomer of that compound. Optical purity is usually measured in percent enantiomeric excess (%ee)

(R)-2-bromobutane has a specific rotation of -23.1° . A mixture of the 2-bromobutanes of measured specific rotation = -9.2° , where the enantiomeric excess is given by $ee = \text{observed specific rotation} / \text{maximum specific rotation} \times 100\%$

What is the percentage of R and S enantiomers in the mixture?

[Question ID = 5820]

1. 60/40

[Option ID = 23277]

2. 70/30

[Option ID = 23278]

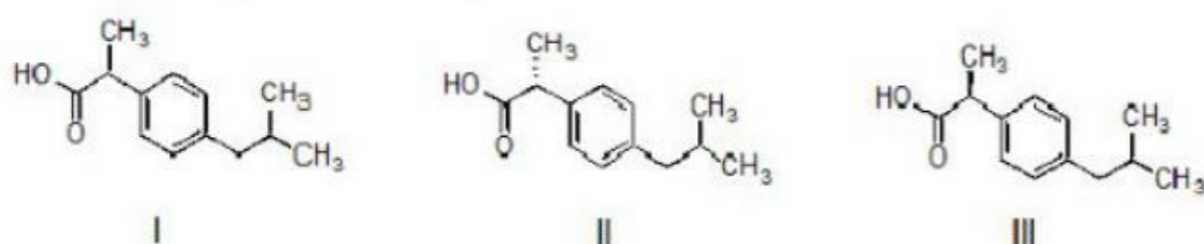
3. 80/20

[Option ID = 23279]

4. 90/10

[Option ID = 23280]

10) Ibuprofen belongs to nonsteroidal anti-inflammatory drug (NSAID) class that is used for treating pain, fever, and inflammation, the active compound possesses (S) stereochemistry, which among the following structure has a stereochemistry to denote Ibuprofen:



[Question ID = 5821]

1. I (R configuration) [Option ID = 23281]

2. II (S configuration) [Option ID = 23282]

3. III (RS configuration) [Option ID = 23283]

4. All of the above [Option ID = 23284]

11) DNA melting temperature (T_m) was found to be 47°C and enthalpy measured at T_m was 0.032kJ . Entropy = Enthalpy/ T_m , where T (Kelvin). What will be the entropy change? [Question ID = 5822]

1. $1 \times 10^{-3}\text{ kJ}$ [Option ID = 23285]

2. $1 \times 10^{-4}\text{ kJ}$ [Option ID = 23286]

3. $3 \times 10^{-2}\text{ kJ}$ [Option ID = 23287]

4. $6 \times 10^{-2}\text{ kJ}$ [Option ID = 23288]

12) When natural cholesterol 0.300 g is dissolved in chloroform (15 ml) and is placed in a 10 cm polarimeter tube, the observed rotation at 20°C (using the D line of sodium) is -0.630° . Given $[\alpha] = \alpha_{\text{obs}}/c (\text{g/ml}) \times l (\text{dm})$. The specific rotation of cholesterol is

[Question ID = 5823]

1. -27.5

[Option ID = 23289]

2. -31.5

[Option ID = 23290]

3. -35.5

[Option ID = 23291]

4. -39.5

[Option ID = 23292]

13) A mixture of anthracene, acetophenone and β -naphthol was analyzed on thin layer chromatography using hexane/ethylacetate (10:2) as mobile phase with r_f values 0.7, 0.5, and 0.3 respectively, the same mixture was separated on HPLC column (Reverse phase C_{18}) in one of the following mobile phase: [Question ID = 5824]

1. Hexane/ethylacetate (10:1) [Option ID = 23293]

2. Hexane /methanol (10:1) [Option ID = 23294]

3. Hexane /ethanol (10:1) [Option ID = 23295]

4. Acetonitrile/water(10:1) [Option ID = 23296]

14) Number of signals in the ^{13}C [^1H] NMR spectrum of Ethanol are: [Question ID = 5825]

1. 3 [Option ID = 23297]

2. 4 [Option ID = 23298]

3. 5 [Option ID = 23299]

4. 6 [Option ID = 23300]

15) Theoretical plates are used to [Question ID = 5826]

1. Estimate the efficiency of a column [Option ID = 23301]

2. Determine the thickness of the stationary phase [Option ID = 23302]

3. Measure the distribution of the analyte between mobile and stationary phases [Option ID = 23303]

4. None of the above [Option ID = 23304]

16) Wang resin is one of the standard peptide synthesis resin used with Fmoc (fluorenylmethoxycarbonyl chloride) chemistry, the structure of the resin is represented as:[Question ID = 5827]

1. 2-alkyl-benzyl alcohol functionalized polyvinyl [Option ID = 23305]
2. 2-alkyl-benzyl alcohol functionalized polystyrene [Option ID = 23306]
3. 4-alkyl-benzyl alcohol functionalized polyvinyl [Option ID = 23307]
4. 4-alkoxybenzyl alcohol functionalized polystyrene [Option ID = 23308]

17) Which is the CORRECT decreasing order of pKa of the following compounds?

i) CHF_2COOH ii) CH_3COOH iii) CH_2FCOOH iv) CH_2ClCOOH

[Question ID = 5828]

1. i, ii, iii, iv

[Option ID = 23309]

2. ii, iv, iii, i

[Option ID = 23310]

3. iii, iv, i, ii

[Option ID = 23311]

4. iv, i, ii, iii

[Option ID = 23312]

18) Which one of the following statements on protein conformation is CORRECT?

[Question ID = 5829]

1. The dihedral angles phi, psi of amino acids in unfolded proteins are exclusively positive

[Option ID = 23313]

2. A peptide rich in proline is likely to adopt alpha helical structure

[Option ID = 23314]

3. A peptide rich in proline is likely to adopt beta turns

[Option ID = 23315]

4. L-amino acids are unable to adopt beta turns when both phi, psi are positive

[Option ID = 23316]

19) The presence of D-amino acids in the crosslinks of the peptidoglycan layer is most likely because[Question ID = 5830]

1. Most peptidases can only cleave L-amino acids [Option ID = 23317]
2. D-amino acids fit the structural constraints of the cell wall better than L-amino acids [Option ID = 23318]
3. Most L-amino acids have already been used for protein synthesis [Option ID = 23319]
4. D-amino acids are easier to crosslink in the absence of ribosomes [Option ID = 23320]

20) A prodrug is a medication or compound that, after administration, is metabolized (i.e., converted within the body) into a pharmacologically active drug. Which of the following is NOT a prodrug?[Question ID = 5831]

1. Levodopa [Option ID = 23321]
2. Enalaprilmaleate [Option ID = 23322]
3. Paracetamol [Option ID = 23323]
4. Ampicillin [Option ID = 23324]

21) Which one of the following statements correctly represent the eudismic ratio?[Question ID = 5832]

1. Difference in the pharmacokinetics of drugs [Option ID = 23325]
2. Potency of eutomer relative to that of the distomer [Option ID = 23326]
3. Isomeric ballast relative to eutomer [Option ID = 23327]
4. Isomeric ballast relative to distomer [Option ID = 23328]

22) A nitrogen mustard medication used for chemotherapy is able to form inter-strand crosslinks in DNA, which prevents DNA replication and DNA transcription. Identify the nitrogen mustard medication from the following [Question ID = 5833]

1. Bleomycin [Option ID = 23329]
2. Carmustine [Option ID = 23330]
3. Ethidium bromide [Option ID = 23331]
4. Hoechst [Option ID = 23332]

23) In pharmacology, potency is a measure of drug activity expressed in terms of the amount required to produce an effect of given intensity. The potency of a drug depends on[Question ID = 5834]

1. The affinity to bind to a receptor [Option ID = 23333]
2. The efficacy to initiate a response [Option ID = 23334]
3. Both a and b [Option ID = 23335]
4. Severity of disease [Option ID = 23336]

24) A regulated course of doses of a therapeutic agent including the time between doses or the time when the dose (s) are to be given at each specific time intended to preserve or restore health is called[Question ID = 5835]

1. Regimen [Option ID = 23337]

2. Therapeutic observation [Option ID = 23338]
3. Health Monitoring [Option ID = 23339]
4. Therapeutic index [Option ID = 23340]

25) GABA_A receptors are the target for attenuating the various CNS disorders, which one of the following drugs DOES NOT mediate the action through GABA receptors?[Question ID = 5836]

1. Vigabatrin [Option ID = 23341]
2. Librium [Option ID = 23342]
3. Enalapril [Option ID = 23343]
4. Phenobarbital [Option ID = 23344]

26) Pupillary muscle groups are controlled by the Autonomic nervous system. Which of the following statements are true (T) or False (F)?

- A. Parasympathetic activation causes pupillary constriction
- B. Parasympathetic activation causes pupillary dilation
- C. Sympathetic activation causes pupillary dilation.
- D. Sympathetic activation causes pupillary dilation.

[Question ID = 5837]

1. A - T, B - T, C - F, D - T

[Option ID = 23345]

2. A - F, B - F, C - T, D - T

[Option ID = 23346]

3. A - T, B - F, C - T, D - F

[Option ID = 23347]

4. A - F, B - T, C - F, D - T

[Option ID = 23348]

27) Which one of the following is the rate determining step in glycolysis?

[Question ID = 5838]

1. Conversion of glucose to glucose-6-phosphate

[Option ID = 23349]

2. Conversion of fructose-6-phosphate to fructose-1,6-bisphosphate

[Option ID = 23350]

3. Conversion of glyceraldehydes-3-phosphate to 1-3-bisphosphoglycerate

[Option ID = 23351]

4. Conversion of 3-phosphoglycerate to 2-phosphoglycerate

[Option ID = 23352]

28) Human olfactory receptors are:

[Question ID = 5839]

1. Ionotropic receptors

[Option ID = 23353]

2. G-protein coupled receptors

[Option ID = 23354]

3. Thermoreceptors

[Option ID = 23355]

4. Fc receptors

[Option ID = 23356]

29) In Southern hybridization:

[Question ID = 5840]

1. DNA is fractionated & probed with labeled oligonucleotides

[Option ID = 23357]

2. RNA is fractionated & probed with labeled oligonucleotides

[Option ID = 23358]

3. Protein is fractionated & probed with labeled oligonucleotides

[Option ID = 23359]

4. Protein is fractionated & probed with antibody

[Option ID = 23360]

30) State whether the following statement is true (T) or false(F) about the complex metal carrying ring system in vitamin B₁₂:

- A. Has a corrin ring system
- B. Has a cobalt metal in pentacoordinate state
- C. Has a cobalt metal in hexacoordinate state
- D. Ring is chemically related to porphyrin

[Question ID = 5841]

1. A - T, B - T, C - F, D - T

[Option ID = 23361]

2. A - T, B - T, C - T, D - F

[Option ID = 23362]

3. A - T, B - F, C - T, D - F

[Option ID = 23363]

4. A - F, B - T, C - T, D - F

[Option ID = 23364]

31) The frequency of a perceived sound depends on:

[Question ID = 5842]

1. The frequency of stereocilia vibration.

[Option ID = 23365]

2. The number of hair cells that are stimulated.

[Option ID = 23366]

3. Region of the cochlear duct is stimulated.

[Option ID = 23367]

4. The movement of perilymph in the cochlear duct.

[Option ID = 23368]

32) Polysomnographic recording consists of all except:

[Question ID = 5843]

1. EEG

[Option ID = 23369]

2. ECG

[Option ID = 23370]

3. EOG

[Option ID = 23371]

4. EMG

[Option ID = 23372]

33) Rigor mortis occurs in a dead person because:

[Question ID = 5844]

1. ATP, which is necessary for the detachment of cross bridges, is not being formed

[Option ID = 23373]

2. ATP, which is necessary for the formation of cross bridges, is not being formed

[Option ID = 23374]

3. Deterioration of muscle proteins prevents detachment of cross bridges

[Option ID = 23375]

4. ATP continues to be formed for several hours after death

[Option ID = 23376]

34) Emphysema is characterized by:

[Question ID = 5845]

1. Loss of peripheral vision

[Option ID = 23377]

2. Shortness of breath

[Option ID = 23378]

3. Chronic Diarrhea

[Option ID = 23379]

4. Slow clotting from wounds

[Option ID = 23380]

35) Resolving power of a light microscope is a function of:

[Question ID = 5846]

1. Wavelength of light used

[Option ID = 23381]

2. Numerical aperture of lens system

[Option ID = 23382]

3. Thermal index

[Option ID = 23383]

4. Both 1 and 2

[Option ID = 23384]

36) In a cloning experiment, alkaline phosphatase is generally used to dephosphorylate a plasmid vector rather than the insert DNA fragments because:[Question ID = 5847]

1. Alkaline phosphatase can only dephosphorylate plasmid vector and not insert DNA fragments [Option ID = 23385]

2. Vector can self-ligate and form colonies upon introduction into host cells [Option ID = 23386]

3. Insert DNA fragments can self-ligate and form colonies upon introduction into host cells [Option ID = 23387]

4. Vector cannot ligate to a dephosphorylated insert DNA fragment [Option ID = 23388]

37) Which of the following plasma membrane receptors activate signaling pathways usually by forming molecular dimers that result in protein phosphorylation reactions upon binding of their specific ligand?[Question ID = 5848]

1. Steroid hormone receptors [Option ID = 23389]

2. Receptor tyrosine kinases [Option ID = 23390]

3. Ligand-gated ion channels [Option ID = 23391]

4. G protein-coupled receptors [Option ID = 23392]

38) RPM1-1640 and DMEM are routinely used:[Question ID = 5849]

1. Bacterial culture media [Option ID = 23393]

2. Mammalian cell culture media [Option ID = 23394]

3. Antibiotic resistant strains of HINI virus [Option ID = 23395]

4. Newly identified Mycobacterial strains [Option ID = 23396]

39) Recently USFDA approved CAR-T treatment is a: [Question ID = 5850]

1. Monoclonal antibody therapy [Option ID = 23397]

2. Cell based therapy [Option ID = 23398]

3. Small molecule therapy [Option ID = 23399]

4. Photoactive agent based therapy [Option ID = 23400]

40) Match List I with List II

List I	List II
Molecules	Mechanism of actions
A. Bradykinin	I. Lipid mediators that play pivotal roles in acute and chronic inflammation and allergic diseases
B. Leukotrienes	II. Long-chain fatty acids involved in activation of the inflammatory response, production of pain, and fever.
C. Prostaglandins	III. An organic nitrogenous compound involved in allergic immune responses, also acting as a neurotransmitter
D. Histamine	IV. A potent endothelium-dependent vasodilator peptide, lowers blood pressure

Choose the CORRECT answer from the options given below:

[Question ID = 5851]

1. A - II, B - I, C - IV, D - III [Option ID = 23401]

2. A - I, B - II, C - III, D - IV [Option ID = 23402]

3. A - IV, B - I, C - II, D - III [Option ID = 23403]

4. A - III, B - IV, C - II, D - I [Option ID = 23404]

41) The corona virus consists of: [Question ID = 5852]

1. 14 non-structural and 6 structural proteins [Option ID = 23405]

2. 18 non-structural and 4 structural proteins [Option ID = 23406]

3. 16 non-structural and 4 structural proteins [Option ID = 23407]

4. 14 non-structural and 8 structural proteins [Option ID = 23408]

42) Automated DNA sequencing is an improvement of Sanger's method where: [Question ID = 5853]

1. Unlabeled ddNTPs are used for chain termination [Option ID = 23409]

2. Fluorescently labeled ddNTPs are used for chain termination [Option ID = 23410]

3. Unlabeled dNTPs are used for chain termination [Option ID = 23411]

4. Fluorescently labeled dNTPs are used for chain termination [Option ID = 23412]

43) In which cancer treatment erb-B antibodies are used:[Question ID = 5854]

1. Breast [Option ID = 23413]

2. Oral [Option ID = 23414]

3. Lung [Option ID = 23415]

4. Prostrate [Option ID = 23416]

44) The biological activity of endotoxin in gram-negative bacteria is associated with:[Question ID = 5855]

1. Steroids [Option ID = 23417]
2. Peptidoglycans [Option ID = 23418]
3. Lipopolysaccharides [Option ID = 23419]
4. Polypeptides [Option ID = 23420]

45) Identify the INCORRECT statement about SARS-CoV-2 virus:

[Question ID = 5856]

1. It is an RNA virus.
[Option ID = 23421]
2. It is a DNA virus.
[Option ID = 23422]
3. It is highly mutation prone.
[Option ID = 23423]
4. Neutralizing vaccines are available against SARS-CoV-2 infection.
[Option ID = 23424]

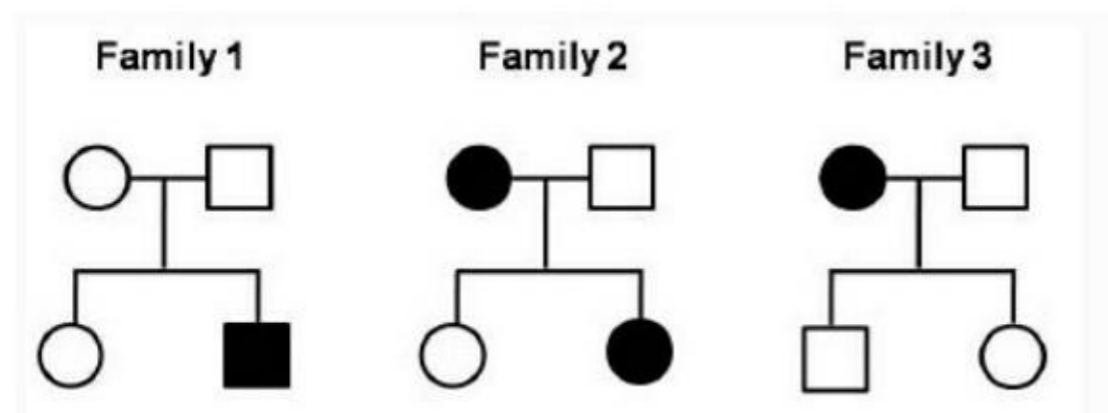
46) Delta virus variant of Coronavirus from India contains following mutations in the spike protein:[Question ID = 5857]

1. E484D and L425A [Option ID = 23425]
2. E484M and L425E [Option ID = 23426]
3. E484Q and L425R [Option ID = 23427]
4. E484 R and L425A [Option ID = 23428]

47) Two siblings who inherit 50% of the genome from the mother and 50% from the father show a lot of phenotypic differences. Which one of the following events during gametogenesis of the parents will maximally contribute to this difference?[Question ID = 5858]

1. Mutation [Option ID = 23429]
2. Recombination [Option ID = 23430]
3. Independent assortment [Option ID = 23431]
4. Environment [Option ID = 23432]

48) The inheritance of a given disorder is recorded in three small family as shown below:



Based on the above limited information, which one of the following inheritance pattern best explains the observations?

[Question ID = 5859]

1. X-linked recessive
[Option ID = 23433]
2. X-linked dominant
[Option ID = 23434]
3. Autosomal recessive
[Option ID = 23435]
4. Autosomal dominant
[Option ID = 23436]

49) Mutation in gene 'X' leads to lethality in a haploid organism. Which one of the following is best suited to analyse the function of gene 'X'?[Question ID = 5860]

1. Pleiotropic mutants [Option ID = 23437]
2. Temperature-sensitive mutants [Option ID = 23438]
3. Recessive mutants [Option ID = 23439]
4. Mutants with low penetrance [Option ID = 23440]

50) Action of parathyroid hormone in the human body: [Question ID = 5861]

1. Decreases blood sodium level [Option ID = 23441]
2. Increases blood sodium level [Option ID = 23442]
3. Decreases blood calcium level [Option ID = 23443]
4. Increases blood calcium level [Option ID = 23444]

