

**JNUEE: Question Papers (2010-2012) Rs.30/-**

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**ENTRANCE EXAMINATION, 2012**  
**Pre-Ph.D./Ph.D. in MOLECULAR MEDICINE**  
**[ Field of Study Code : CMMP (169) ]**

Time Allowed : 3 hours

Maximum Marks : 70

**INSTRUCTIONS FOR CANDIDATES**

Candidates must read carefully the following instructions before attempting the Question Paper :

- (i) Write your Name and Registration Number in the space provided for the purpose on the top of this Question Paper and in the Answer Sheet.
- (ii) Please darken the appropriate Circle of Question Paper Series Code on the Answer Sheet.
- (iii) The Question Paper is divided into two Parts : Part—A and Part—B. Both Parts have multiple-choice questions. All answers are to be entered in the Answer Sheet provided with the Question Paper for the purpose by darkening the correct choice, i.e., (a) or (b) or (c) or (d) with BALLPOINT PEN only against each question in the corresponding Circle.
- (iv) Part—A consists of 30 questions and all are compulsory.
- (v) Part—B contains 60 questions. Answer any 40 questions.  
In case any candidate answers more than the required 40 questions, the first 40 questions attempted will be evaluated.
- (vi) Each correct answer carries 1 mark. There will be negative marking and ½ mark will be deducted for each wrong answer.
- (vii) Answer written by the candidates inside the Question Paper will not be evaluated.
- (viii) Calculators and Log Tables may be used.
- (ix) Pages at the end have been provided for Rough Work.
- (x) Return the Question Paper and Answer Sheet to the Invigilator at the end of the Entrance Examination.  
**DO NOT FOLD THE ANSWER SHEET.**

**INSTRUCTIONS FOR MARKING ANSWERS**

1. Use only Blue/Black Ballpoint Pen (do not use pencil) to darken the appropriate Circle.
2. Please darken the whole Circle.
3. Darken ONLY ONE CIRCLE for each question as shown in example below :

Wrong	Wrong	Wrong	Wrong	Correct
<input type="radio"/> (b) <input type="radio"/> (c) <input type="radio"/>	<input type="radio"/> (b) <input type="radio"/> (c) <input type="radio"/> (d)	<input type="radio"/> (b) <input type="radio"/> (c) <input type="radio"/> (d)	<input type="radio"/> (b) <input type="radio"/> (c) <input type="radio"/>	<input type="radio"/> (a) <input type="radio"/> (b) <input type="radio"/> (c) <input type="radio"/>


4. Once marked, no change in the answer is allowed.
5. Please do not make any stray marks on the Answer Sheet.
6. Please do not do any rough work on the Answer Sheet.
7. Mark your answer only in the appropriate space against the number corresponding to the question.
8. Ensure that you have darkened the appropriate Circle of Question Paper Series Code on the Answer Sheet.

**PART—A**

Answer **all** questions

1. What comes next in the sequence  $2a + 5$ ,  $4a + 9$ ,  $8a + 17$ ,  $16a + 33$ , .....?
  - (a)  $17a + 35$
  - (b)  $22a + 45$
  - (c)  $30a + 61$
  - (d)  $32a + 65$
  
2. The molecular weight of a dry chemical is 254.4. How many grams should be used to make a 10 ml solution of 0.15 molar?
  - (a) 0.76 g
  - (b) 1.52 g
  - (c) 0.38 g
  - (d) 3.05 g
  
3. When the structural and functional aspects of promoters for prokaryotic and eukaryotic cells are compared, it is apparent that
  - (a) eukaryotic promoters require binding of multiple transcription factors to assemble a functional transcription complex
  - (b) eukaryotic promoters have TATA box
  - (c) eukaryotic promoters are more complex than the prokaryotic promoters
  - (d) All of the above
  
4. A container contains equal volume of two solutions which are separated by a membrane that allows free passage of water but restricts the passage of solute molecules. Solution A is 100 mM glucose (molecular weight 180) and solution B is 100 mM sucrose (molecular weight 342). Into which compartment will water flow?
  - (a) From solution A to solution B
  - (b) From solution B to solution A
  - (c) There will be no net movement of water
  - (d) None of the above
  
5. The ESR test is a nonspecific measure of inflammation. What does it measure?
  - (a) Rate at which red blood cells sediment
  - (b) Rate at which eosinophils sediment
  - (c) Rate at which lymphocytes sediment
  - (d) Rate at which neutrophils sediment

6. Mitochondrion is an organelle with a double membrane. The inner membrane of this organelle is folded inwards the matrix to form
- (a) mesosomes
  - (b) pinosome
  - (c) glyoxysome
  - (d) cristae
7. The best way to determine whether a protein has an alpha-helical conformation in solution is by using
- (a) ultraviolet-visible absorbance spectroscopy
  - (b) fluorescence spectroscopy
  - (c) electron microscopy
  - (d) circular dichroism
8. In an experiment with mammalian cells, all the cells need to be arrested at the G1/S phase of the cell cycle. This can be achieved by
- (a) addition of thymidine
  - (b) double thymidine block
  - (c) addition of serum
  - (d) complete elimination of serum
9. Which current is used when performing polyacrylamide gel electrophoresis?
- (a) Static current
  - (b) Alternating current
  - (c) Direct current
  - (d) Connecting with a three-pin plug point with 5 amperes current
10. A French doctor who identified the malaria parasite in human blood and awarded Nobel prize in 1907 was
- (a) Charles Alphonse Laveran
  - (b) Ronald Ross
  - (c) Patrick Manson
  - (d) Pierre-Joseph Pelletier
11. In SI units of measurement, nanometer (nm) is equivalent to
- (a)  $10^{-5}$  cm
  - (b)  $10^{-7}$  cm
  - (c)  $10^{-9}$  cm
  - (d)  $10^{-11}$  cm

12. Starting from the innermost, which zone of a candle flame is the hottest?
- (a) The innermost dark flame zone
  - (b) The middle orange flame zone
  - (c) The middle yellow flame zone
  - (d) The outermost blue flame zone
13. A polypeptide contains six glutamine, five aspartic acid, four arginine, two glutamic acid, three histidine and two lysine residues. The overall charge would be
- (a) five (-)
  - (b) two (+)
  - (c) three (+)
  - (d) four (-)
14. The following picture stands for
- 

The diagram shows a Y-shaped molecule with a central black dot. From this dot, two lines extend upwards and outwards, forming the top arms of the Y. From the junction of these two arms, two lines extend downwards and outwards, forming the bottom arms of the Y. At the end of each of these four arms, there is a small black dot, representing an antigen-binding site. There are a total of six dots: one at the center and five at the ends of the arms.
- (a) IgG
  - (b) IgM
  - (c) IgE
  - (d) IgA
15. In sickle cell anemia with abnormal hemoglobin causing deformation of RBC results in resistance from
- (a) *Plasmodium falciparum*
  - (b) *Leishmania donovani*
  - (c) *Toxoplasma gondii*
  - (d) *Entamoeba histolytica*
16. Which of the following is most acidic?
- (a)  $C_2H_5OH$
  - (b)  $CH_3CHOHCH_3$
  - (c) Ethanol
  - (d)  $CH_3OH$

17. In an immunoprecipitation experiment followed by Western blot from a cell lysate using specific antibodies against a protein resulted in a band of expected size and an extra band on top, the extra band could be due to which of the following modifications of the protein?
- (a) Phosphorylation
  - (b) Mono-ubiquitination
  - (c) Sumoylation
  - (d) All of the above
18. Antigenic variation/switching in a pathogen may lead to
- (a) immune evasion from the host
  - (b) difficulties in vaccine development against the pathogen
  - (c) longer retention in the host if untreated
  - (d) All of the above
19. Which of the following is a zwitterion?
- (a)  $(\text{CH}_3)_3\text{—NH}^+$
  - (b)  $^+\text{H}_3\text{N—CH}_2\text{—COO}^-$
  - (c)  $^- \text{OOC—CH}_2\text{—COO}^-$
  - (d)  $\text{H}_2\text{N—CH}_2\text{—COO}^-$
20. In a Western blotting protocol to detect the protein actin, the blot is first probed with a polyclonal antibody against actin raised in rabbit. In order to visualize actin on the blot, the HRP-conjugated secondary antibody should be
- (a) anti-mouse HRP raised in rabbit
  - (b) anti-rabbit HRP raised in goat
  - (c) anti-goat HRP raised in sheep
  - (d) anti-sheep HRP raised in goat
21. When a body is challenged by the antigen for the first time, the first immunoglobulin formed is
- (a) immunoglobulin A (IgA)
  - (b) immunoglobulin D (IgD)
  - (c) immunoglobulin G (IgG)
  - (d) immunoglobulin M (IgM)

- 22.** In a screening analysis of a library of drug candidates, the best and only positive candidate was 3rd from the top of the list and 125th from the bottom of the list. How many drug candidates were screened in this library?
- (a) 128
  - (b) 127
  - (c) 125
  - (d) None of the above
- 23.** Ratan is stronger than Dipak. Ramu is stronger than Chirag. Chirag is stronger than Manish. In order to determine the strongest among the five, which of the following information is required?
- (a) Ramu is stronger than Dipak
  - (b) Manish is stronger than Ratan
  - (c) Ratan is stronger than Chirag
  - (d) Ratan is stronger than Manish and Chirag
- 24.** A 100 ml of aqueous solution contains 11.0 gm of calcium chloride. The molarity of the solution is
- (a)  $6.022 \times 10^{23}$
  - (b) 11.0 molar
  - (c) 1.0 molar
  - (d) 1.1 molar
- 25.** Rotavirus is a common cause of
- (a) diarrhoea
  - (b) whooping cough
  - (c) viral fever
  - (d) AIDS
- 26.** Two proteins have the same molecular mass but different post-translational modifications that confer different net charges on these proteins. They can still be separated easily by
- (a) chromatography
  - (b) spectroscopy
  - (c) SDS-PAGE
  - (d) None of the above

- 27.** In animal cell culture, serum is used in the media in order to
- (a) control contamination
  - (b) supply growth factors
  - (c) balance the pH
  - (d) provide isotonic environment
- 28.** The liposomes used to internalize foreign DNA into mammalian cells are predominantly
- (a) cationic
  - (b) anionic
  - (c) Both of the above
  - (d) None of the above
- 29.** Histone acetyl transferase (HAT) enzyme preferentially targets which of the following residues?
- (a) Lysine
  - (b) Arginine
  - (c) Asparagine
  - (d) None of the above
- 30.** Solubility of a solute X in water is 20 gm/liter while that in benzene is 5 gm/liter. If you add 0.4 gm of the solute in a mixture containing equal volume of the solvents (1 : 1 by volume), how many milligrams (mg) of the solute X will remain in the water layer?
- (a) 280 mg
  - (b) 310 mg
  - (c) 250 mg
  - (d) 320 mg

**PART—B**

Answer *any forty* questions

- 31.** Dysplasia refers to
- (a) excessive cell proliferation in premalignant cells
  - (b) excessive cell proliferation in malignant cells
  - (c) excessive cell proliferation in both premalignant and malignant cells
  - (d) None of the above
- 32.** In the DNA sequence 5'CGA TCG GCT 3', a transition mutation would look like
- (a) 5' CGA CCG GCT 3'
  - (b) 5' CGA TGG CT 3'
  - (c) 5' CGA TCG CCT 3'
  - (d) 5' CGA TCG GCA 3'
- 33.** Hensen's node in a chick embryo is functionally similar to
- (a) animal pole of a frog embryo
  - (b) blastopore dorsal lip of a frog embryo
  - (c) ectoderm of a bird embryo
  - (d) vegetal pole of a frog embryo
- 34.** Single nucleotide polymorphisms (SNPs) in both alleles that produce the same polypeptide are called
- (a) replacement polymorphisms
  - (b) synonymous polymorphisms
  - (c) missense polymorphisms
  - (d) nonsense polymorphisms
- 35.** Drugs that stabilize or depolymerize microtubules are frequently used in chemotherapy, because
- (a) they stimulate the immune system
  - (b) they prevent chromatin condensation
  - (c) they prevent metastasis of tumor cells
  - (d) they interfere with mitosis



36. In order to exhibit its luminescence, luminol requires activation by the addition of
- (a) oxidizing agent
  - (b) reducing agent
  - (c) detergent
  - (d) salt
37. Repeated infection of which of the following can cause rheumatic heart disease?
- (a) Staphylococcal bacteria
  - (b) Streptococcal bacteria
  - (c) Pneumococcal bacteria
  - (d) All of the above
38. The  $T_m$  value of the 5' GCGTGACGATAGGACACTGA 3' PCR primer in 0.1M NaCl solution will be
- (a) 58 degree celsius
  - (b) 60 degree celsius
  - (c) 62 degree celsius
  - (d) 64 degree celsius
39. You are given a solution containing the human basic fibroblast growth factor ( $pI = 8.2$ ). Only sodium phosphate buffer ( $pH = 7.2$ ) is available in the laboratory. What type of resin would you use to purify this protein?
- (a) A weak anion exchange resin
  - (b) A strong anion exchange resin
  - (c) A weak cation exchange resin
  - (d) A strong cation exchange resin
40. In a PCR experiment,  $1 \times 10^{-9}$  moles of a duplex DNA template is amplified by a standard PCR reaction of 22 cycles. At the end of the experiment, how many moles of the parent oligonucleotides would be expected?
- (a)  $1 \times 10^{-9}$  moles each
  - (b)  $22 \times 10^{-9}$  moles each
  - (c)  $19 \times 10^{-3}$  moles each
  - (d)  $22 \times 10^{-3}$  moles each

41. In an *in vitro* mutagenesis experiment, the coding sequence of the  $\beta$ -galactosidase gene is used to insert a new fragment of DNA, carrying the ampicillin-resistant marker at appropriate restriction sites. The resulting colonies are plated on an LB plate containing ampicillin and X-gal. Which of the following would represent successful mutagenesis?
- (a) All ampicillin-resistant colonies
  - (b) Blue ampicillin-resistant colonies
  - (c) White ampicillin-resistant colonies
  - (d) None of the above

42. In an experiment, mRNA was synthesized from a DNA sample and both were purified subsequently. After analysis, the base composition was obtained as followed including experimental deviations :

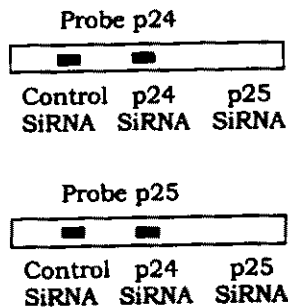
	A	G	C	T	U
DNA strand 1	20.3	19.1	26.0	33.2	0
DNA strand 2	33.0	25.8	18.9	20.1	0
mRNA	20.7	18.6	25.9	0	32.8

Which DNA strand is the coding strand?

- (a) Strand 1
  - (b) Strand 2
  - (c) Both strands 1 and 2
  - (d) None of the above
43. When a sample of cultured mammalian cells is placed in a buffer containing 8% sodium chloride, the cells quickly shrink because the solution is
- (a) osmotic
  - (b) hypotonic
  - (c) hypertonic
  - (d) isotonic
44. Alzheimer's disease is characterized by progressive dementia. One of the underlying protein defects that contributes to the disease is
- (a) hypophosphorylation of Tau
  - (b) hyperphosphorylation of Tau
  - (c) glycosylation of Tau
  - (d) ubiquitination of Tau

- 45.** Which of the following about HU protein is true?
- (a) It is a bacterial histone
  - (b) It is a helicase
  - (c) It is negatively charged
  - (d) It is a primase
- 46.** *S. cerevisiae cdc28ts* temperature-sensitive cells form colonies at 25 °C but not at 37 °C. Which of the following statements is incorrect?
- (a) CDC28 protein is properly folded at 25 °C
  - (b) CDC28 protein is misfolded at 37 °C
  - (c) CDC28 gene is not expressed at 37 °C
  - (d) CDC28 protein cannot bind to *clb* at 37 °C
- 47.** The hydropathy index of an amino acid indicates whether it is
- (a) hydrophobic
  - (b) hydrophilic
  - (c) neutral
  - (d) hydrolyzed
- 48.** Proteins encoded in the nucleus and transported to the organelle like mitochondria should primarily contain
- (a) signal peptide for targeting
  - (b) transit peptide for crossing the membrane
  - (c) protease site to get rid of the signal peptide
  - (d) All of the above
- 49.** Which one of the following is not a typical mechanism by which a proto-oncogene is converted to an oncogene?
- (a) Amplification of the proto-oncogene
  - (b) A chromosomal translocation resulting in the up-regulation of the proto-oncogene
  - (c) A point mutation in the proto-oncogene
  - (d) Complete deletion of the proto-oncogene
- 50.** The refractive index of air is 1.0 and that of immersion oil is 1.5. If the resolution is 390 nm in case of air during microscopy, the same for oil will be
- (a) 260 nm
  - (b) 540 nm
  - (c) 130 nm
  - (d) None of the above

- 51.** Two SiRNA specific to p24 and p25 cell surface-specific proteins of cultured mouse cells were transfected to test the efficacy of RNAi in mouse cells. Northern blot analysis following RNAi using p24 cDNA and p25 cDNA as probe yielded the following results :



- Which of the following statements is correct?
- (a) p24 SiRNA is not specific
  - (b) p25 SiRNA is specific
  - (c) Control SiRNA does not cross-react
  - (d) All of the above
- 52.** Hydroxyurea blocks DNA replication by
- (a) inhibiting DNA polymerase
  - (b) inhibiting ribonucleotide reductase
  - (c) inhibiting lagging strand DNA synthesis
  - (d) inhibiting replicative helicase
- 53.** Which of the following statements is incorrect for GPI anchor?
- (a) It attaches proteins to the cytosolic face of the plasma membrane
  - (b) It can be cleaved to release proteins
  - (c) It contains phosphoethanolamine
  - (d) It contains sugar and lipid components
- 54.** The tumor suppressor gene p53 contains
- (a) DNA-binding property within the core domain
  - (b) oligomerization property at the C-terminal domain
  - (c) DNA-binding property within the core domain and oligomerization property at the C-terminal domain
  - (d) DNA-binding property at the C-terminal domain and oligomerization property at the core domain

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- 55.** In a cell cycle experiment, cells were synchronized at the G1 phase and subsequently a drug was added that arrested most of the cells in S phase. This can be explained best by the fact that
- (a) the drug inhibited the DNA polymerase
  - (b) the drug induced apoptosis and DNA fragmentation
  - (c) the drug inhibited a kinase responsible for transition into G2/M phase
  - (d) the drug induced a G1/S phase checkpoint
- 56.** Which one of the following pairs of transition metal is redox-active?
- (a) Nickel and iron
  - (b) Iron and zinc
  - (c) Zinc and copper
  - (d) Copper and iron
- 57.** A graduate student detected decreased level of protein X after 4 hours of lipopolysaccharide (LPS) treatment to macrophages by immunoblot analysis. However, no alteration was detected at the transcript level. This result suggests that decrease of X may be either due to decreased translation or increased degradation of the protein. The student was further advised to perform <sup>35</sup>S-methionine labeling experiment. To determine whether X was actually degraded, when should he start the labeling experiments before performing immunoprecipitation and autoradiography?
- (a) Two hours before LPS treatment and then substitute with normal medium
  - (b) Two hours after LPS treatment and perform the experiment at 4 hours
  - (c) Anytime before or after LPS treatment
  - (d) LPS treatment and <sup>35</sup>S-labeled methionine addition together
- 58.** Stem-loop structures in untranslated regions of RNA that facilitate binding of protein to control gene expression. Presence of such an element on the 5'-untranslated region makes it more sensitive to be regulated by
- (a) post-transcriptional mRNA stability mechanism
  - (b) translational mechanism
  - (c) transcriptional mechanism
  - (d) both transcriptional and translational mechanisms

59. What is the ideal length of matured miRNA?
- (a) 16–18 nucleotides
  - (b) 18–20 nucleotides
  - (c) 21–23 nucleotides
  - (d) 24–26 nucleotides
60. LC3 is a marker for
- (a) autophagy
  - (b) apoptosis
  - (c) necrosis
  - (d) aging
61. The possible metabolic fate of pyruvate is formation of
- (a) lactate
  - (b) ethanol
  - (c) acetyl CoA
  - (d) All of the above
62. The total number of ATP molecules generated following complete oxidation of glucose in muscle and liver respectively are
- (a) 38 and 36
  - (b) 36 and 38
  - (c) 38 and 38
  - (d) 36 and 36
63. Beta-mercaptoethanol (ME) is often used in research laboratory for oxidation of disulfide bonds. Which one of the following is the correct formula of ME?
- (a)  $\text{CH}_3\text{—S—CH}_2\text{—OH}$
  - (b)  $\text{CH}_3\text{—O—CH}_2\text{—SH}$
  - (c)  $\text{SH—CH}_2\text{—CH}_2\text{—OH}$
  - (d)  $\text{SH—CH=CH—OH}$
64. Hemolytic anemia is caused due to the deficiency of NADPH and is related to
- (a) pentose phosphate pathway
  - (b) TCA cycle
  - (c) iron deficiency
  - (d) abnormal lactose metabolism

- 65.** One of the symptoms of the protein deficiency disease Kwashiorkor is depigmentation of skin and hair. The biochemical basis for this symptom is
- (a) the presence of extra melanin
  - (b) the less availability of tyrosine
  - (c) the absence of vitamin K
  - (d) the higher level of urea
- 66.** An amino acid mixture consisting of lysine, histidine, leucine and glutamic acid is to be separated by ion-exchange chromatography using a cation-exchange resin at pH with the eluting buffer of the same pH. Which of the following amino acids will be eluted from the column first?
- (a) Leucine
  - (b) Histidine
  - (c) Glutamic acid
  - (d) Lysine
- 67.** Which of the following lipids are not found in animal membranes?
- (a) Phosphoglycerides
  - (b) Glycolipids
  - (c) Sphingolipids
  - (d) Triacylglycerols
- 68.** Schizophrenia is a mental illness that usually strikes in late adolescence or early adulthood, but can strike at anytime in life. Studies have shown that schizophrenia is due to excess presence of a chemical in the brain. The chemical identified is
- (a) phenylalanine
  - (b) dopamine
  - (c) keratin
  - (d) norepinephrine
- 69.** Which of the two essential vitamins has two forms known as 'cholecalciferol' and 'ergocalciferol'?
- (a) Vitamin D
  - (b) Vitamin C
  - (c) Vitamin B
  - (d) Vitamin A
- 70.** Which of the following is not a ligand-modulated transcription factor?
- (a) Estrogen receptor
  - (b) EGF receptor
  - (c) Androgen receptor
  - (d) Glucocorticoid receptor

- 71.** In 2009, Venkatraman Ramakrishnan, an Indian born American scientist, was awarded Nobel Prize (jointly with Thomas A. Steitz and Ada E. Yonath) for
- (a) the discovery of ribosomal protein synthesis
  - (b) generating 3D models that showed how different antibiotics bind to ribosomes
  - (c) the discovery of how chromosomes are protected by telomeres and the enzyme telomerase
  - (d) development of *in vitro* fertilization
- 72.** Steroids act via proteinaceous cognate receptors. When bound to their cognate ligands, these receptors interact with hormone response elements on DNA through
- (a) histidine-cysteine residues
  - (b) leucine zipper
  - (c) helix-turn-helix
  - (d) two zinc finger motifs
- 73.** Human immunodeficiency virus (HIV) is a lentivirus (a member of the retrovirus family) that causes acquired immunodeficiency syndrome (AIDS), a condition in humans in which progressive failure of the immune system allows life-threatening opportunistic infections. Human immunodeficiency virus (HIV) attacks
- (a) red blood cells
  - (b) B-cells
  - (c) T-helper cells
  - (d) T-memory cells
- 74.** Testicular cells that are critical for 'nursing and supporting' the germ cells are
- (a) Leydig's cells
  - (b) interstitial cells
  - (c) Sertoli's cells
  - (d) spermatogonia
- 75.** Epigenetics is the study of heritable changes in gene expression or cellular phenotype caused by mechanisms other than changes in the underlying DNA sequence. Which of the following modifications to the genome serve as epigenetic marks to alter gene expression without altering the gene sequence?
- (a) Acetylation and methylation
  - (b) Acetylation and glycosylation
  - (c) Phosphorylation and nitration
  - (d) None of the above



- 76.** Identify the polypeptide hormone that stimulates testosterone synthesis in the Leydig's cells of the testes, stimulates ovulation, formation of corpus luteum, and estrogen and progesterone synthesis in ovaries
- (a) Corticotropin-releasing hormone (CRH)
  - (b) Leuteinizing hormone (LH)
  - (c) Human chorionic gonadotropin (HCG)
  - (d) Parathyroid hormone (PTH)
- 77.** Which of the following statements about *Mycoplasma* is true?
- (a) It is the smallest known cell having a 0.1 micron diameter
  - (b) It refers to the genus of bacteria that lacks a cell wall
  - (c) It remains unaffected to many common antibiotics
  - (d) All of the above
- 78.** Hematopoietic stem cells (HSC) are
- (a) unipotent
  - (b) multipotent
  - (c) pluripotent
  - (d) totipotent
- 79.** BamHI and BstYI restriction enzymes generate compatible cohesive ends for ligation. In one cloning experiment you have inserted a DNA fragment having BstYI ends in-between BamHI sites of the vector DNA and successfully prepared the recombinant plasmid. What will happen if you digest the recombinant plasmid with BamHI and BstYI separately?
- (a) No digestion
  - (b) BamHI will digest but not BstYI
  - (c) BstYI will digest but not BamHI
  - (d) Both the enzymes will digest the recombinant plasmid
- 80.** Basal metabolic rate (BMR) is the amount of daily energy spent by humans and other animals at rest. BMR is higher in
- (a) winters
  - (b) summers
  - (c) males
  - (d) old age

- 81.** Which of the following is not an anesthetic?
- (a) Cocaine
  - (b) Lignocaine
  - (c) Cyclomethycaine
  - (d) Alcohol
- 82.** The glucose transporter in myocyte stimulated by insulin is
- (a) GLUT 1
  - (b) GLUT 2
  - (c) GLUT 3
  - (d) GLUT 4
- 83.** A common etiological agent of bacterial vaginosis is
- (a) Lactobacillus
  - (b) Gardnerella
  - (c) Bifidobacterium
  - (d) None of the above
- 84.** Bluetongue disease is caused by
- (a) Reoviridae
  - (b) Shigella
  - (c) Candida
  - (d) Blueviron
- 85.** Which of the following is example of analgesic?
- (a) Paracetamol and NSAIDs
  - (b) COX-2 inhibitors
  - (c) Opiates and morphinomimetics
  - (d) All of the above

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86. In the innate immunology paradigm, pattern recognition receptors recognize
- (a) pattern recognition molecules
  - (b) pathogen-associated molecular patterns
  - (c) bacterial antigens
  - (d) None of the above
87. Glycolysis is a definite sequence of ten reactions involving ten intermediate compounds related predominantly with metabolism of sugar. However, which of the following glycolysis intermediates may also play role in metabolism of fat?
- (a) Adenosine hexaphosphate
  - (b) Dihydroxyacetone phosphate
  - (c) Embden-Meyerhof pentaphosphate
  - (d) None of the above
88. Freund's adjuvant mixed with antigen is used to generate antibodies. Theoretically, which of the following combinations may be used for the same purpose?
- (a) Mixture of paracetamol and the antigen
  - (b) Mixture of the antigen and live *Mycobacterium tuberculosis*
  - (c) Mixture of the antigen in sunflower oil
  - (d) None of the above
89. If 2 kb linear DNA molecules having compatible cohesive ends are ligated in the presence of ethidium bromide and the dye is removed following ligation, the products will contain
- (a) negative supercoiled circular DNA
  - (b) positive supercoiled circular DNA
  - (c) nicked circular DNA
  - (d) both negative and positive supercoiled circular DNA
90. You have radiolabeled 100 ng of a 200 bp DNA fragment with 20  $\mu\text{Ci}$  of  $\alpha - \text{p}^{32}$  dATP (specific activity 10 mCi/mmole) by Klenow fragment. Specific activity of the labeled DNA fragment was determined and found to be  $3.5 \times 10^7$  CPM/ $\mu\text{g}$ . What would be the specific activity of the same labeled DNA after two months? [Half-life of  $\text{p}^{32}$  is about 14 days]
- (a)  $8.1 \times 10^3$  CPM/ng
  - (b)  $8.8 \times 10^3$  CPM/ng
  - (c)  $3.5 \times 10^2$  CPM/ng
  - (d)  $2.5 \times 10^3$  CPM/ng

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