

MICROBIOLOGY ENTRANCE 2021

QUESTION Paper with Answers in red

1. Which of the following pairs is correctly matched?

1.	Anaphase I	Homologous Chromosomes are separated
2.	Metaphase I	Pairing of maternal and paternal homologous chromosomes takes place
3.	Interphase	A nuclear envelope encloses each haploid set of chromosomes
4.	Prophase	Non-homologous chromosomes are separated

- 1
- 2
- 3
- 4

2. What should be the complementary strand of 5'....ATGGCTTGA....3'?

- 5'....TCAAGCCAT....3'
- 5'....TACCGAACT....3'
- 3'....TAGGCAAGT....5'
- 5'....TAGGCAAGT....3'

3. You are trying to clone a gene in a vector and want to choose a restriction enzyme to cut the vector. Which of the following type of RE will you choose?

- Type I
- Type II
- Type III
- Type IV

4. Which of the following stabilizes the double helix of DNA in the B-form?

- Covalent bonds between the 3' end of one strand and the 5' end of the other.
- Hydrogen bonding between the phosphate groups of two side-by-side strands.
- Hydrogen bonds between the ribose of each strand.
- Nonspecific base-stacking interaction between two adjacent bases in the same strand.

5. In DNA sequencing by the Sanger (dideoxy) method:

- radioactive dideoxy ATP is included in each of four reaction mixtures before enzymatic synthesis of complementary strands.
- specific enzymes are used to cut the newly synthesized DNA into small pieces, which are then separated by electrophoresis.
- the dideoxynucleotides must be present at high levels to obtain long stretches of DNA sequence.

- the role of the dideoxy CTP is to occasionally terminate enzymatic synthesis of DNA where Gs occur in the template strands.

6. Eukaryotic genetic material

- consists of supercoiled circular DNA molecules complexed with proteins into chromosomes.
- relaxed linear DNA molecules complexed with RNA into a 30 nm fiber.
- is compacted by wrapping the DNA around histone proteins to form nucleosomes.
- is compacted by folding linker regions around non-histone proteins to form a scaffold.

7. Which of the following is not a correct contribution made by Louis Pasteur?

- Disproving the theory of abiogenesis / spontaneous generation
- Proving that fermentation is due to presence of microorganisms
- Development of vaccine for anthrax in animals
- Development of vaccine for tuberculosis

8. Which of the following statements is NOT correct?

- Classification is an orderly arrangement of organisms into groups based on their similarities and differences
- Identification is the process of determining and recording the traits of organisms to enable their placement in an overall classification scheme.
- Nomenclature is the process of assigning scientific names to the various organisms.
- Taxonomy includes classification and nomenclature but not identification

9. The following is true for the term ‘biomagnification’ of pollutants

- A pollutant accumulates in living tissue but is later excreted
- Microorganisms such as bacteria and algae in the lower trophic level in ecosystem have no role in biomagnification
- With each level of food chain the consumers accumulate an increasing amount of the pollutant and this reaches a toxic level in the top consumer level
- It is true only for organic chemicals and not for inorganic pollutants

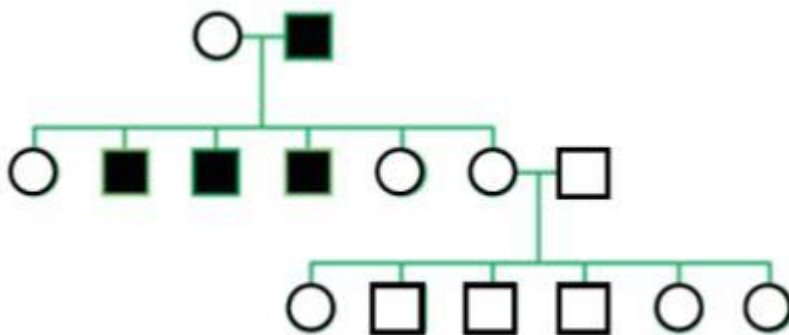
10. Molecule X alone cannot elicit any immune response but upon conjugating it with a carrier protein Y it can induce immune response. X is known as

- Adjuvant
- Supplement
- Inducer
- Hapten

11. A cell with which of the following properties can be a good antigen presenting cell?

- High Cytokine producing
- High adhesion molecule expressing
- highly motile

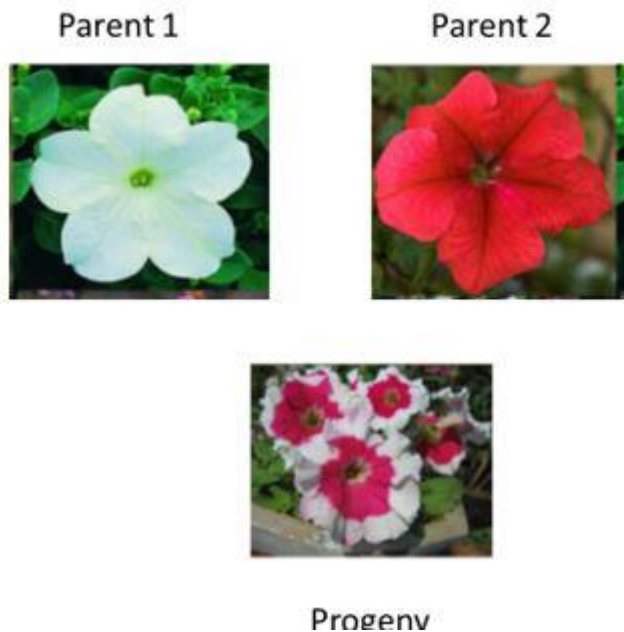
- high phagocytic potential
12. Cancer cells are not killed by host immune response because
- Cancer cells proteins are not strong antigens
 - Tumor secretes immunosuppressive molecules
 - block CD8 T cells
 - All the options are correct
13. Which of the following is an example of subunit vaccine?
- HBV
 - Polio
 - Tetanus
 - BCG
14. When an organ is transplanted and is rejected by the body, the major cells involved are
- T cells
 - B cells
 - Neutrophils
 - Macrophages
15. Sandwich ELISA assay will have following components in its sandwich section
- two antibodies and one antigen
 - one antibody and one antigen
 - two antigens and two antibodies
 - three antigens only
16. Consider the following monohybrid Cross and choose the correct outcome for the next generation: Trait: Seed Shape; Alleles: R – Round; r – Wrinkled; Cross: Round seeds (RR) x Wrinkled seeds (rr)
- All seeds will be wrinkled
 - Round and wrinkled seeds (2:2)
 - Round and wrinkled seeds (3:1)
 - All seeds will be round
17. Look at the pedigree and decide the most likely inheritance pattern for the disease.



- Autosomal dominant

- Autosomal recessive
- X linked Dominant
- **Y linked**

18. A white flowered plant when crossed with a red flowered plant gave progeny with red and white patches as shown in figure. This is an example of



- Dominance
- **Codominance**
- Incomplete dominance
- Incomplete penetrance

19. An X-linked recessive trait is

- more likely to be expressed in females
- **more likely to be expressed in males**
- equally likely to be expressed in males and females
- more likely to be expressed during old age

20. A father with type O blood and mother with type AB blood will give rise to _____ offspring with A type of blood

- 0%
- 25%
- **50%**
- 75%

21. The molecular mass of glucose is 180. Therefore 9 g of glucose is equivalent to _____ moles of glucose.

- **0.05**
- 20.0
- 0.01
- 18.0

22. How much aliquot of 10% Ampicillin stock has to be added to prepare 7 liters of Luria broth containing 50 microgram/ml of Ampicillin?

- 2.5 ml
- 3.0 ml
- 3.5 ml
- 7 ml

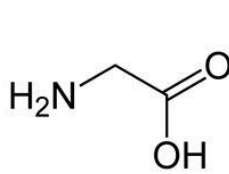
23. A double stranded DNA molecule of 1000 base pairs has 20% Adenine. The number of Cytosine residues in the molecules are –

- 300
- 30
- 60
- 600

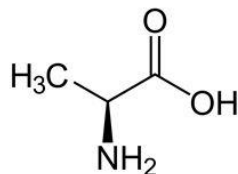
24. Which of the following is an example of a homopolysaccharide linked by beta (1-4) glycosidic linkage?

- Glycogen
- Starch
- Cellulose
- Hyaluronic acid

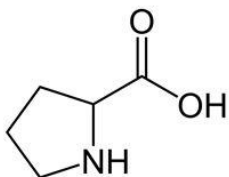
25. Which of the following is an imino acid?



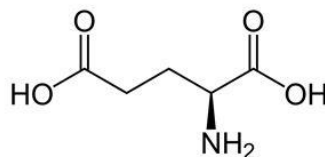
A



B



C



D

A
B
C
D

26. Which of the following antibiotic is a protein synthesis inhibitor?

- Ciprofloxacin
- Bacitracin
- Polymyxin
- Puromycin

27. A bacterial suspension gave 90 colonies on nutrient agar plate when 50 micro liters of 1/10,000 dilution of the suspension was spread on a nutrit agar plate. The original suspension has _____ cells/ml.

A) 9×10^7 B) 9×10^8 C) 1.8×10 D) 1.8×10^7

- A
- B
- C
- **D**

28. Which one of the following characteristic is shared by bacterial endospores and vegetative cells ?

- low metabolic activity
- resistance to drying
- heat resistance
- **presence of DNA**

29. Which of the following is an example of a primary metabolite?

- Erythromycin
- Penicillin
- Tetracycline
- **Ethanol**

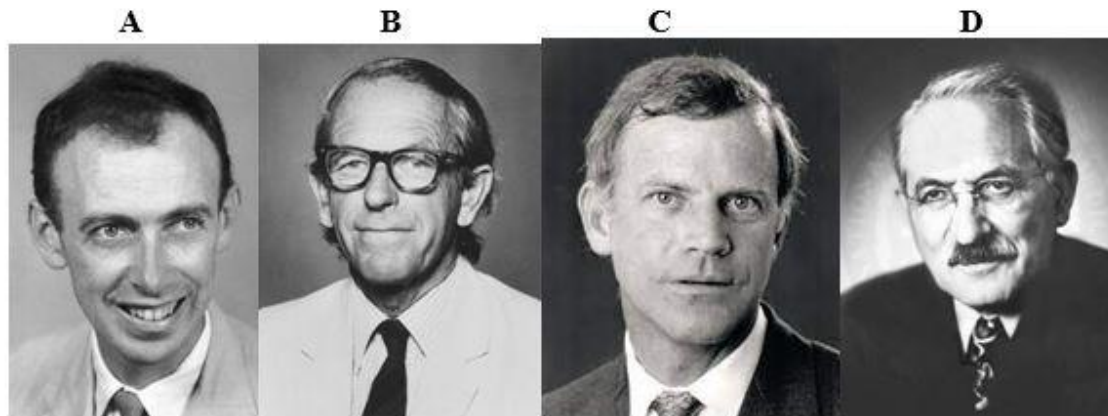
30. Which of the following processes occur in mitochondria?

- DNA synthesis
- ATP synthesis
- Protein synthesis
- **All of the options**

31. Arrange the following terms in the order in which they would be found if you travelled from the cytoplasm to the outside in the external medium, of a Gram negative cell possessing a capsule. 1) Periplasmic space; 2) Phospholipid bilayer of the outer membrane; 3) Cytoplasmic membrane; 4) Capsule

- 4,3,1,2
- **3,1,2,4**
- 2,4,1,3
- 4,2,1,3

32. Polymerase chain reaction was invented by which of the scientists seen in the image?



- A
- B
- C
- D

33. The resolving power of a microscope does not depend on

- Working distance of the objective lens
- Numerical aperture of the objective lens
- Wavelength of light
- It depends on all of the alternatives provided

34. When the Numerical aperture (NA) = 1 and the wavelength of light = 550 nm, Resolution (d) of a microscope is _____

- 275 nm
- 550nm
- 2.75 nm
- None of the alternatives are correct

35. Which of the following enzymes can act on the peptidoglycan structure?

- Lysozyme
- Amidase
- Endopeptidase
- All the enzymes can act on peptidoglycan

36. The bacterium shown in the image is likely to be

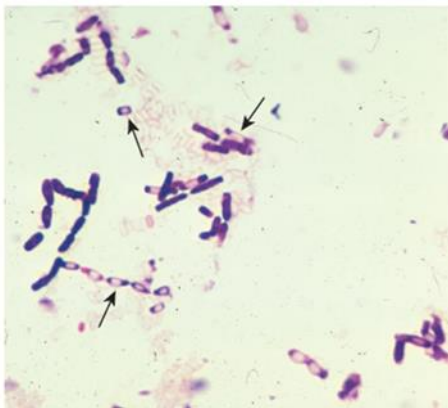


- **Treponema**
- Bacillus
- Clostridium
- Corynebacterium

37. Which of the following scientists used the glassware depicted in the figure?

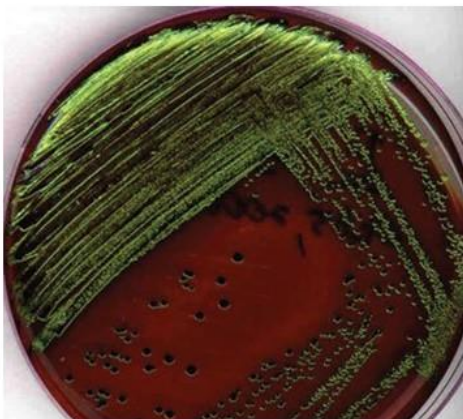
- Robert Koch
- Sergei Winogradsky
- **Louis Pasteur**
- Edward Jenner

38. The figure shows rod shaped bacteria stained with crystal violet. The part of the cell pointed by the arrows are most likely to be



- **Spore**
- Vacuole
- Ribosome
- Inclusion body

39. The plate below shows the growth of Escherichia coli on



- MacConkey agar
- **Eosin methylene blue agar**
- Endo agar

- Blood agar

40. Disinfection of a room containing ten thousand pathogens was carried out. 50% of the pathogens are eliminated in 20 minutes. How many cells will remain alive after another 40 minutes?

- 5000
- 2500
- 1250
- 500

41. Bacterium X grows well at low temperatures ranging from -20 to +10 °C therefore it is called

- Psychrophile
- Psychrotroph
- Psychrotolerant
- All the terms given in the other options are used interchangeably

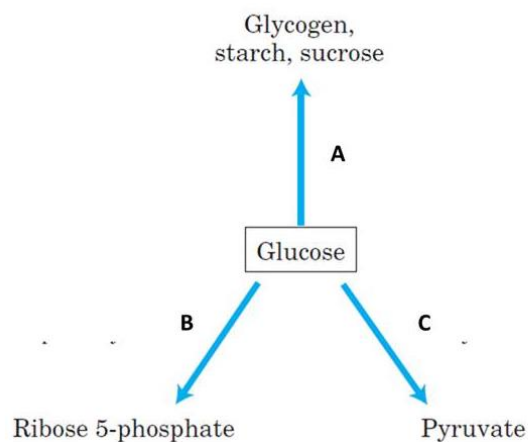
42. Acetic acid is considered to be weak acid because

- It fails to obey the Henderson-Hasselbach equation
- It fails to dissociate completely in water
- It is insoluble in water at standard temperature and pressure
- It has a large negative pKa

43. Which of the following is true about Isoelectric point pI?

- It is the pH at which all the groups of a molecule are uncharged
- At pH above pI, the molecule has overall positive charge
- At pH=pI, the molecule will not migrate under electric field during electrophoresis
- All of the options are correct

44. Observe the diagram and choose the correct match of the pathways A, B and C



- A: Glycolysis
- **B: Pentose Phosphate Pathway**
- C: Tricarboxylic acid cycle
- A: Gluconeogenesis

45. Name the enzyme in glycolysis pathway which carries out phosphorylation of the substrate without use of ATP as the phosphoryl donor

- Hexokinase
- Phosphofructokinase
- Pyruvate kinase
- **Glyceraldehyde 3-phosphate dehydrogenase**

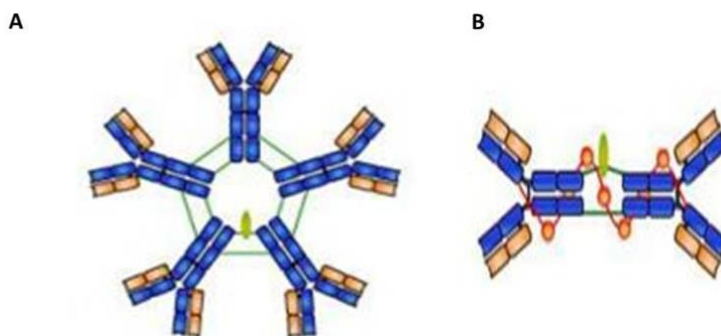
46. A pair of hormones which together counterbalance the concentration of glucose in blood are

- Insulin and cortisol
- Cortisol and glucagon
- Glucagon and epinephrine
- **Insulin and Glucagon**

47. Which is NOT true regarding mitochondria and chloroplasts?

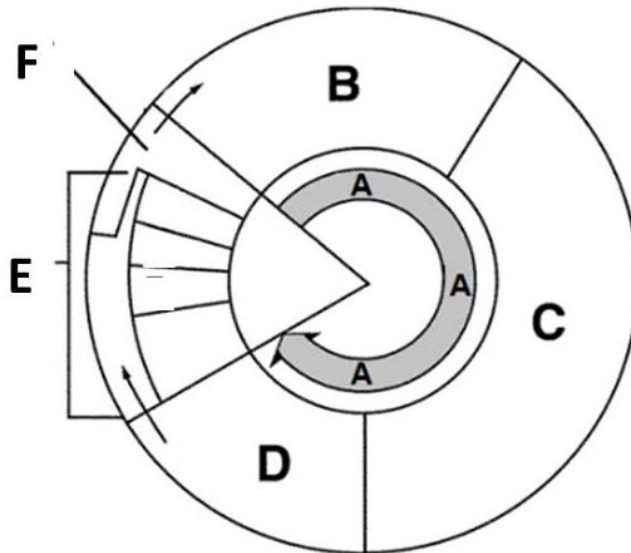
- They have their own DNA
- They have evolved from bacteria
- **They have 80S ribosomes**
- They can replicate autonomously

48. Identify the immunoglobulin types shown in the figure



- A : IgG, B: IgM
- A :IgA, B: IgM
- **A :IgM, B: IgA**
- A :IgE, B: IgD

49. Observe the diagram and point out the correct labelling of the phases of the eukaryotic cell cycle



- A: G1 phase; B: S phase, C: G0 phase; D: M phase; E: G2 phase; F: Cytokinesis
- A: Interphase; B: G1 phase; C: S phase; D: Mitosis, E: G2 phase; F: cytokinesis
- **A: Interphase; B: G1 phase; C: S phase; D: G2 phase, E: Mitosis; F: cytokinesis**
- A: G1 phase; B: S phase, C: G2 phase; D: M phase; E: G0 phase; F: Cytokinesis

50. In PCR the specificity of the amplification depends on

- The quantity of template DNA
- The DNA polymerase enzyme
- **The primer sequences**
- The PCR machine

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