

Class 12 Medical Diagnostics Sample Paper 2021 Term II

SECTION A

Answer any 03 questions out of the given 04 questions 1 x 3 = 3

1 Jyoti wants to be entrepreneur, but she has one specific problem by which she is not able to be successful. What is this barrier?

Ans: Fear of failure.

2 _____ is defined as the drive required to engage in goal-oriented behavior.

Ans: Motivation.

3 They manage terrace top gardens to grow fruits and vegetables in urban areas. They use environment friendly ways to grow fruits and vegetables. What are these people called as?

Ans: Urban growers

4 UNEP stands for _____ .

Ans: United Nations Environment Programme

Answer any 01 question out of the given 02 questions 1 x 2 = 2

5 Why are 'persistence' and commitment' considered as competencies for an entrepreneur?

Ans: Persistence: An entrepreneur is never disheartened by failures and keeps trying, adapting, and iterating to overcome obstacles that come in the way of achieving goals.

Commitment: Entrepreneurs exhibit a high level of commitment towards their work and decisions. For an entrepreneur to succeed, they have to stay committed to their venture and their goal.

6 Abhijit is working as Green Design Professional. What role does he play to protect environment?

Ans:

(a) The green design professionals work in collaboration with green builders. They lay the ideas of how the building will look after its completion

(b) They provide artistic beauty to buildings to make them look innovative and interesting.

SECTION B

Answer any 05 questions out of the given 07 questions 1 x 5 = 5

7 In blood bank the register is used where serial number, date and time of issue, bag serial number, ABO, Rh, total quantity in ml, name and address of the recipient, group of recipient, unit/institution, details of crossmatching report, indication for transfusion, components issued, quantity issued, signature of the issuing person are mentioned in proper way. Which kind of register is this?

Ans: Issue Register

8 Genetics is the study of inheritance – the transmission of characteristics from parents to offspring. In 1865, the scientist did some experiments with garden peas, thereby bringing to light the science of genetics. His studies led to the basic understanding of how genetic traits are passed to each generation. Name the scientist.

Ans: Gregor Johann Mendel

9 It is any substance, either protein or non-protein but when introduced into an animal, causes the production of another specific substance called antibody. The antibody reacts specifically with the substance. Identify the substance.

Ans: Antigen

10 The system contains two antigens Fya and Fyb. Plasmodium vivax infection does not affect red cells lacking Fya and Fyb. Which blood group system is this?

Ans: Duffy system

11 The ideal fixative recommended in most of the laboratories for cytological specimens. It produces optimal nuclear details, but some amount of cell shrinkage. Absolute (100%) ethanol produces a similar effect on cells. But it is much more expensive. Identify the Routine fixative.

Ans: 95% Ethyl Alcohol (Ethanol)

12 _____ is used for CSF, small volume of fluid samples, and occasionally for larger volumes for diagnosis purpose in cytology laboratory.

Ans: Cytospin

13 The lump is immobilized with the left hand in a position favorable for needle aspiration and holding the syringe by the barrel in the right hand; the needle is pushed into the predetermined site of the lump until needle tip penetrates the center of the lump. Identify the procedure.

Ans: Fine needle aspiration cytology

Answer any 03 questions out of the given 05 questions 2 x 3 = 6

14 During agglutination reaction why is it important to wash the cells?

Ans: Need to wash the cells:

- Washing improves reactivity.
- Removes plasma that contains fibrinogen and forms a clot when mixed with serum, giving a false positive.
- Plasma can cause rouleaux's formation.
- Anticoagulants present in plasma are anticomplementary and inhibit complement binding reactions.
- Plasma contains blood group substances that can neutralize that reaction.

15 Blood grouping is very important procedure in medical field. Why is it important.

Ans: The importance of blood grouping:

- 1. Safe blood transfusion
- 2. Organ transplant, especially liver, heart, and kidney
- 3. Medicolegal and forensic paternity disputes
- 4. Immunology and genetics

16 How can the FNAC process play important role in diagnostic purpose?

Ans: Fine needle aspiration cytology includes aspiration done by the pathologist or the clinician as well as guided aspiration done by the radiologists and aspirations. It is a diagnostic procedure used to investigate pathological lesions in organs that do not shed cells spontaneously. In this technique, a thin, hollow needle is inserted into the lesion (usually a lump or a swelling) to obtain cells and tissue fragments, which, after being stained, are examined under a microscope.

17 How can the endometrial aspiration smear can be made?

Ans: After preliminary visualization and cleaning of the cervix, a sterile cannula is introduced into the uterine cavity, and aspiration is then carried out with a syringe. The specimen is squirted on a clean glass slide, gently spread, and rapidly fixed.

18 As a laboratory technician how can you deal with the hemorrhagic fluids in cytopathology laboratory?

Ans:

- Frankly, hemorrhagic fluids are centrifuged like all fluids, and fish-tailed smears are made from the sediment of the centrifuged deposit.
- Alternatively, if very hemorrhagic, smears can be air dried and then flooded with normal saline for 30 seconds. This causes layers of red cells, smears are then air dried or wet fixed and stained by pap and Giemsa stains respectively.

Answer any 02 questions out of the given 04 questions 3 x 2 = 6

19 During antigen-antibody interaction, which factors are depending on reaction condition and how?

Ans: Factors depending on reaction condition:

- 1. Incubation time: Up to 60 minutes is adequate for all blood groups.
- 2. Incubation temperature: depends on type of antibody.
- 3. Centrifugation: should be adequate to produce a cell button with a clear supernatant but without packing cells tightly so that they are difficult to dislodge. Overcentrifugation leads to false positives.
- 4. Ionic strength: low ionic strength, i.e., low concentration of dissolved salts, increases the amount of body binding to the cell.
- 5. pH: Normal blood pH is about 7.42.
- 6. antigen-antibody ratio: The ratio of antigen and antibody in the mixture should be optimum.
- 7. Zeta potential: Erythrocytes have a genitive electrical charge. The electrical activity of this ionic cloud is called the Zeta potential.

20 How does Rhesus blood group system play important role in medical field? Why is it important to measure Rh antibody titers?

Ans: Rh antigens are found only on red cells. The Rh antibodies usually develop only in the absence of the Rh antigen, by a known stimulus, e.g., transfusion or pregnancy. Rho (D) is the most immunogenic factor and therefore, unless specified, Rh positive and negative denote D positive or D negative. The incidence of Rh-negative amongst India's is approximately 5%. The Rhesus system is comparatively more complex. Wiener postulated that there are multiple allelic genes.

An Rh-negative mother with an Rh-positive fetus may get alloimmunized with anti-D and cause hemolytic disease of the newborn. Rh antibody titers are done in the antenatal period to rule out such a condition.

21 In human body, what are the common sites for Exfoliative cytology?

Ans: Common sites for exfoliative cytology

- 1. Body Fluids (a) Pleural (b) Pericardial (c) Peritoneal (d) Synovial (e) Cerebrospinal
- 2. Surface Epithelia (a) Female genital tract (b) Respiratory tract (c) Nasopharynx (d) Larynx (e) Gastrointestinal tract (f) Urinary tract (g) Nipple discharge
- 3. Buccal Smear

22 What do you mean by cytological fixatives, and mention the properties of good cytological fixative?

Ans: It is critical to fix cytology specimens immediately after collection for proper preservation of the cellular components. It is important that no air-drying occurs before fixation. If a smear is already air-dried, it should not be put in an alcohol fixative.

Please note on the requisition if the slide (s) being submitted are fixed or air-dried.

Properties of a good cytological fixative:

- It should not cause excessive shrinkage or swelling of cells.
- It should not distort or dissolve cellular components.
- It should help preserve nuclear details.
- It should improve optical differentiation and enhance the staining properties of the tissues and cell components.

SECTION C (COMPETENCY BASED QUESTIONS)

Answer any 02 questions out of the given 03 questions

23 The presence of antibody in serum is not always because of exposure to antigenic stimulus by red cells. Some foreign substances like bacteria and plants (containing red cell like substances) can cause antibody production, and these antibodies are called naturally occurring antibodies. These are commonly of IgM type, occur in serum without any specific antigenic stimulus, e.g., anti-A, anti-B, and anti-Wra. These antibodies are present in individuals who lack that antigen. Immune antibodies are IgG. They develop due to immunization following pregnancy, previous transfusion, or deliberate injection of immunogenic material. In some instances, immunogenic event is unknown. The antigen-antibody reactions in vitro

1. Agglutination

2. Hemolysis

3. Precipitation

4. Enzyme-linked immunosorbent assay (ELISA)

(a) If you have to detect any patient is suffering from HIV or not, which procedure of Ag-Ab reaction will be followed among above and how?

(b) What is the difference between Agglutination and Hemolysis?

Ans:

- (a) To detect the presence of HIV in the human body, ELISA is used. Here, an enzyme label is used, and a color reaction that takes place in the presence of a substrate denotes the presence of an antigen/ antibody. This is the principle used in Transfusion-transmitted disease tests.
- (b) Agglutination: It is defined as the clumping of particles that have an antigen on their surface and is brought about by antibodies. This forms the basis of blood grouping tests.
- Hemolysis: Rupture of red cells with release of intracellular hemoglobin can occur if the Antibody has the property of hemolysin. It requires the presence of a complement.

24 A B antigens are inherited as codominant fashion. Everyone inherits two ABO genes from each parent, and they determine the ABO antigen present on their red cells. O is an amorph and does not produce A or B substance. The serological typing reveals the phenotype, and the family studies help to reveal the genotype.

The A,B antigens are glycoproteins. Each molecule of a precursor is made up of a peptide and a sugar. The blood group specificity is determined by the terminal sugar.

In 1952 Bhende, Bhatia, and Deshpande identified a new blood group called Bombay group. The red cells appear to be group O, but their serum contains a powerful antibody reacting with all other red cells except those of the same group. The cells do not contain H antigen.

Describe the role of (a) Transferases and (b) Secretor states in the biochemistry of ABO system.

Ans:

- (a) Transferases: enzymes that assemble individual sugars into chains forming the antigen. As each sugar is added on a new structure is formed, which acts as a substrate for another transferase. The A gene specifies a transferase that adds N-acetyl galactosamine, the B gene transferase adds N-acetyl galactose to the H gene. The H gene transferase is the L fucosyl transferase. In the AB individual, 2 different sugars are added to different chains of the same red cells.
- (b) Secretor states: The A, B, and H substances on erythrocyte surfaces are lipopolysaccharides, not water soluble, but they can be dissolved in fat solvents, such as alcohol and chloroform. They are most clearly detectable in saliva and identified in some other body fluids. These people are referred to as secretors. The secretor characteristic is inherited classically by a dominant gene designated se. Its alleles have no effect. Hence, non secretors are sese while SeSe and Sese are secretors. The gene is independent of ABO and Hh.

25 The cytological specimens collected from FGT include cervical smear, vaginal smear, aspiration from posterior fornix of vagina (vaginal pool smear) and endometrial smear.

Cervical smear: Cancer of the uterine cervix is the commonest cancer in the FGT.

Almost all invasive cancers of the cervix are preceded by a phase of preinvasive disease, which demonstrates microscopically a continuing spectrum of events progressing from cervical intraepithelial neoplasia (CIN) grade I to III including carcinoma in-situ before progressing to squamous cell carcinoma. This progressive course takes about 10 to 20 years. Early detection even at the preinvasive stage is possible by doing cervical smear (Pap Smear Test). This can identify patients who are likely to develop cancer, and appropriate interventions may be carried out.

(a) What are the advantages of Pap Smear?

(b) How can the Endo-cervical brush be used to obtain the sample?

Ans:

- (a) Advantages of Pap Smear:
 - It is painless and simple
 - Does not cause bleeding
 - Does not need anesthesia

- Can detect cancer and precancer
- Can identify non-specific and specific inflammations
- Can be carried out as an outpatient procedure
- (b) Endo-cervical brush is a small bottlebrush-like device with one end having fine bristles made up of nylon. This device is strictly for taking materials from the endocervix. Gently insert the brush in the endocervix and rotate one turn, pressing on the upper and lower walls. The cytobrush is similar to that of an endocervical brush except that the projected tip is without bristles. This can be used for obtaining cells from the whole cervix. Single sampling devices and methods have their limitations in obtaining adequate smears from the cervix. A combination of two devices, usually a spatula and an endocervical brush, gives better results. Triple smear or the vaginal-cervical-endocervical (VCE) technique can provide the best results.

BioSmartNotes