Class 12 Medical Diagnostics 2023 Solved Paper

SECTION - A

(Objective Type Questions)

1. Answer any 4 out of the given 6 questions on Employability Skills. 4 x 1 = 4

(i) Ranjit is never interested to attend any social gathering. He also keeps distance from people. He seems to be indifferent. Identify the personality disorder faced by him.

(a) Schizoid

(b) Borderline

(c) Narcissistic

(d) Extremely nervous

(ii) Pressing key opens the Start menu. 1

(a) Windows

(b) Alt + Windows

(c) Ctrl + Windows

(d) Control Panel

(iii) Mehul is working in a reputed hospital. He has completed one data in computer. Then his supervisor came and asked for one hard copy of that specific data. Which key on the keyboard will Mehul use to get the print of that data?

(a) Ctrl+A

(b) Ctrl+C

(c) Ctrl+P

(d) Menu bar

(iv) What is the quality of a successful entrepreneur to work in adverse conditions?

(a) Perseverance

(b) Anger

(c) Confusion

(d) Fear

(v) Rimika is a hardworking, organized, and dependable employee of her company. According to trait theory, what kind of personality does she have?

(a) Extraversion

(b) Conscientiousness

(c) Agreeableness

(d) Introversion

(vi) This means dealing with relationships. It is between two or more persons. These skills mean the competencies required to work with other people. Identify the specific skill one should possess to maintain good relationship with others.

(a) Interpersonal skills

(b) Creativity skill

(c) Thinking skills

(d) Organisation skill

2. Answer any 5 out of the given 7 questions. 5 x 1=5

(i) Match the following:

A. Basophilia	i. Decrease in Eosinophil count
B. Eosinophilia	ii. Increase in Basophil count
C. Neutropenia	iii. Increase in Eosinophil count
D. Eosinopenia	iv. Decrease in Neutrophil count

	A.	B.	C.	D.
(a)	iii	i.	iv.	ii.
(b)	**ii**	**iii**	**iv**	**i**
(c)	iv	ii	iii	i
(d)	i	iii	iv	ii

(ii) Prothrombin time is very important to diagnose the clinical conditions related to coagulation disorders. Mention the normal value of PT.

(a) 10 12 seconds

(b) 18-25 seconds

(c) 2640 seconds

(d) 5-10 seconds

(iii) This instrument plays important role in the blood bank. This instrument is used to magnify the image of an object. Identify the instrument.

(a) Autoclave

(b) Microscope

(c) Incubator

(d) Hemo cytometer

(iv) One may resort to _____ in cases of pyrexia of unknown origin, thrombocytopenia, leukemia storage disease, Refractory anemia, Paraproteinemia (rule out Myeloma), Leukemia, staging of neoplasm including lymphoma.

(a) Body fluid examination
(b) Bone marrow examination
(c) Urine examination
(d) C.S.F. examination

(v) Instrument A is provided with a metallic basket that can hold the plasma bags upright so that the ports are maintained above the water level. Side-to-side movement is maintained, and the speed is adjustable. The temperature is maintained at 37 °C with the help of a thermostat. The water bath is provided with a see-through fibre glass lid. Identify Instrument A.
(a) Plasma thawing bath
(b) Platelet agitator and incubator
(c) Cryoprecipitate bath
(d) Centrifuge

(vi) _____ are a combination of ammonium (3 parts) and potassium oxalate (2 parts).
(a) Heparin
(b) EDTA
(c) Double oxalates
(d) Trisodium citrate

(vii) Name the temperature-controlled and well-insulated chambers which are widely used in the blood bank.
(a) Autoclaves
(b) Microscopes
(c) Incubators
(d) Centrifuge

3. Answer any 6 out of the given 7 questions. 6 × 1 = 6
(i) The cytological specimens collected from FGT include cervical smear, vaginal smear, aspiration from posterior fornix of vagina and endometrial smear. The aspiration taken from posterior fornix of vagina is called as
(a) Vaginal pool smear
(b) Endocervical smear
(c) Endocervical pool smear
(d) Endometrial smear

(ii) In which of the following clinical conditions, Eosinophilia and Eosinopenia can be seen?
(A) Eosinophilia (i) Allergic reactions

(ii) Shock
(B) Eosinopenia (iii) Parasitic infections
(iv) Hyperadrenalism

(a) (A) - (ii) and (iii), (B) – (i) and (iv)
(b) (A) - (i) and (iv), (B) – (ii) and (iii)
(c) (A) - (i) and (iii), (B) (ii) and (iv)
(d) (A) - (ii) and (iv), (B) – (i) and (iii)

(iii) The instruments are constructed of double walls, the exterior is made of sheet steel, and finished with acrylic enamel paint. The inner chamber is prepared by stainless steel.

- The unit is mounted on castor wheels for ease of mobility.
- These are specially designed and suitable for blood bank research laboratories.
- These are high-tech units incorporating a revolutionary cooling system, giving advantage to the users of rapid pull-down of temperature.

Identify the instrument used in the blood bank.
(a) Cryoprecipitate bath
(b) Ultra-low freezers
(c) Autoclave
(d) Incubator

(iv) This procedure is very important before blood collection procedure. The application should never be left for more than one minute. If you have to use the procedure for long period of time then reapply it after the site has been cleaned and just prior to insertion of needle. What procedure is performed here?
(a) Injection push
(b) Tourniquet application
(c) Disinfection
(d) Venipuncture

(v) These fixatives cause slightly more cell shrinkage than ether-ethanol or methanol. By using a lower percentage of these alcohols, the shrinkage is balanced by the swelling effect of water on cells. Identify the routine fixative.
(a) 80% Propanol and Isopropanol
(b) Denatured alcohol
(c) Methyl alcohol
(d) Formalin

(vi) Prolonged Clotting time decreased clotting time can be seen in
(a) Prolonged Clotting Time Patient with hemophilia, Decreased clotting time - Hypercoagulable state.

(b) Prolonged Clotting Time — Hypercoagulable state, Decreased clotting time – DIC.
(c) Prolonged Clotting Time — Hypercoagulable state, Decreased clotting time – Hemophilia.
(d) Antithrombin deficiency.

(vii) One patient is facing problem in respiratory tract. Doctor is suspecting Respiratory malignancy for that patient. What kinds of specimens to be analyzed to detect the problem?
(a) Sputum Cytology and Bronchoscopic material
(b) Endometrial aspiration smear and Sputum sample
(c) Endometrial aspiration smear and Bronchoscopic material
(d) FNAC

4. Answer any 5 out of the given 6 questions. 5x1=5
(i) One laboratory technologist will process the frankly haemorrhagic fluid for further processing. After the centrifugation, what kind of smear can be made from sediment of centrifuged deposit?
(a) Tongue-shaped smear
(b) Fish-tailed smear
(c) Round smear
(d) Feather-like smear

(ii) What is not true of Evacuated Tube System?
(a) Adequate sample is ensured.
(b) Correct Ratio of anticoagulant to blood is ensured.
(c) This is closed system and spillage of blood and hence any bio-hazard is thus avoided.
(d) Small Amounts of Blood can be collected with minimum discomfort to patient.

(iii) Which device is used to take the sample materials from endocervix?
(a) Endocervical brush
(b) Genital brush
(c) Genital swab
(d) Endocellular brush

(iv) EDTA acts by chelating _____ molecules in blood.
(a) Calcium
(b) Magnesium
(c) Manganese
(d) Potassium

(v) This device is used to connect ends of two different segments in a sterile manner. Widely used for separation of small volumes of blood for pediatric transfusion, buffy coat pooling and lab side leukodepletion. Which device is this?
(a) Plasma expressor
(b) Sterile connecting device
(c) Dynamic break
(d) Cell separator

(vi) Haematocrit is defined as the ____ in a given sample of blood and is expressed as a percentage of the total volume of blood.
(a) Mean cell volume
(b) Packed cell volume
(c) Mean corpuscular haemoglobin
(d) Haemolysis

5. Answer any 5 out of the given 6 questions. 5 × 1 = 5
(i) When a lady is suffering from cervical cancer, then to diagnose the clinical condition, sometimes the Triple smear can be made by advanced method. Identify the procedure.
(a) Vaginal-cervical-endocervical Technique
(b) Vaginal Technique
(c) Cervical Technique
(d) Endocervical Technique

(ii) Name the instrument where 70% of the air in recirculated through filters. So that the working area is bathed in clean (almost sterile) air. The air flow carries along any aerosols/particles produced in the course of the work, and these are removed by the filters. Some of the air (30%) is exhausted to atmosphere and is replaced by a curtain of room air which enters at the working face. This cabinet is fitted with a UV lamp. The filters need to be cleaned periodically and swabbed every day with disinfectant.
(a) Laminar flow cabinet
(b) Hot air oven
(c) Autoclave
(d) Incubator

(iii) These fixatives cause slightly more cell shrinkage than ether-ethanol or methanol. By using lower percentage of these alcohols, the shrinkage is balanced by the swelling effect of water on cells. Identify the routine fixative.
(a) 60% Ethanol and propanol
(b) 30% Ethyl Alcohol and Methanol
(c) 80% Propanol and Isopropanol

(d) AAF Fixative

(iv) 0.15 gms of powdered Leishman's stain is dissolved in 100 ml of
(a) Acetone-free methyl alcohol
(b) Acetone-free ethyl alcohol
(c) Acetate-free methyl alcohol
(d) Denatured alcohol

(v) In the blood bank, one special instrument is used that is a well-insulated, temperature-controlled chamber, and this instrument is important to determine enzyme reaction, growing microorganisms on culture media, and antigen-antibody reaction. Which instrument is this?
(a) Microscope
(b) Incubator
(c) Hot air oven
(d) Autoclave

(vi) One laboratory technician will process the fluid for cytological examination. For processing the fluid, it should be centrifuged. 5 to 10 ml of the fluid (depending on the volume received) is taken in a test tube and centrifuged at
(a) 1500 rpm for 5 minutes
(b) 2500 rpm for 15 minutes
(c) 2000 rpm for 5 minutes.
(d) 3000 rpm for 10 minutes

6. Answer any 5 out of the given 6 questions. 5 × 1 = 5
(i) It is ethanol that has been changed by the addition of additives in order to render it unsuitable for human consumption. This can be used at a concentration of 95% or 100%. One formula is 90 parts of 95% ethanol + 5 parts of 100% methanol + 5 parts of 100% isopropanol. Identify the Routine fixative.
(a) Denatured Alcohol
(b) Methyl Alcohol
(c) Ethyl Alcohol
(d) Formalin

(ii) In blood bank which reagent is used for cross-matching of blood?
(a) ABO Grouping reagent
(b) ELISA reader
(c) RIA reader
(d) AHG

(iii) This blood cell is the largest among the normal blood cells in adults, 14-20 µm in size, contain single nucleus, partially lobulated, deeply indented or horse shoe shaped, round or oval with delicate lacy chromatin surrounded by ground glass/gray blue cytoplasm and contains fine red to purple granules. Constitute 2-10% of WBCs. Identify the blood cell.
(a) Eosinophil
(b) Basophil
(c) Monocyte
(d) Lymphocyte

(iv) Aliya is working in a blood bank, she is using this instrument for clamping the segment of the blood bag after it is collected. Identify the instrument.
(a) Blood Collection monitor
(b) Tube sealer
(c) Blood donor couch
(d) Centrifuge

(v) How much amount of anticoagulant is used in 450 ml of blood bag?
(a) 53 ml
(b) 63 ml
(c) 73 ml
(d) 50 ml

(vi) What is not true of Pap smear?
(a) to detect HPV
(b) Women under 20
(c) Women between 30 - 65 years
(d) Rescheduling if menstruating

SECTION-B

(Subjective Type Questions)

Answer any 3 out of the given 5 questions on Employability Skills. Answer each question in 20-30 words. 3x2=6

7. How can personality be shaped in one person?
Ans: Personality development occurs by the ongoing interaction of temperament, character, and environment. Culture also plays an important role in shaping personalities.

8. Why is self-motivation important?
Ans: Self-motivation includes activities for which there is no apparent rewar,d but one derives enjoyment and satisfaction in doing them. It occurs when people are internally motivated to do

something because it brings them pleasure. They think it is important or feel that what they are learning is significant.

9. Write any two advantages of spreadsheet.
Ans: It is used to store data in a systematic way and perform calculations.

10. What are the key problems an Entrepreneur may face while running a business?
Ans: While running a business, one problem or the other may arise every day. The entrepreneur has to be vigilant so as to identify the problems and solve them as early as possible. This requires hard work on the part of the entrepreneur. In some situations, the person may even have to work for the whole night.

11. Explain interpersonal skills for an entrepreneur.
Ans: Interpersonal means dealing with relationships. It is between two or more persons. Interpersonal skills, thus, mean the competencies required to work with other people. Interpersonal skills include listening to people, exhibiting the right body language, and showing a positive attitude, etc.

Answer any 3 out of the given 5 questions in 20-30 words each. 3x2=6
12. Enumerate the basic importance of blood grouping.
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

13. During Agglutination reaction, why is it important to wash the cells?
Ans: Need to wash the cells.

- 1. Washing improves reactivity.
- 2. Removes plasma that contains fibrinogen and forms clot when mixed with serum, giving a false positive.
- 3. Plasma can cause rouleaux formation.
- 4. Anticoagulant present in plasma is anticomplementary and inhibits complement binding reactions.
- 5. Plasma contains blood group substances that can neutralize that reaction.

14. Enumerate two methods of Venipuncture.
Ans: The most common technique used to obtain a blood specimen is venipuncture. There are two ways to collect blood.
1. Syringe method.

2. Evacuated tube collection system.
The patient is first identified by name, OP/IP number or any other unique ID number.
The veins of the antecubital fossa are usually selected for routine venipuncture.

15. In which conditions can increased and decreased osmotic fragility be seen?
Ans: Increased Osmotic fragility is seen in conditions such as hereditary spherocytosis.
Decreased Osmotic fragility is seen in conditions seen as iron deficiency and thalassemia.

16. Enumerate the common sites for exfoliative cytology in case of sample collection of Surface Epithelia.
Ans: Surface Epithelia

- (a) Female genital tract
- (b) Respiratory tract
- (c) Nasopharynx
- (d) Larynx
- (e) Gastrointestinal tract
- (f) Urinary tract
- (g) Nipple discharge

Answer any 2 out of the given 3 questions in 30-50 words each. 2x3=6
17. In which conditions can prolonged bleeding time be seen?
Ans: 1. Low Platelet Count- in conditions like ITP (Idiopathic Thrombocytopenic Purpura)
2. Platelet functional disorders like thrombasthenia, uraemia, and myeloproliferative disorders.
3. Vascular Abnormalities like Ehler-Danlos Syndrome.

18. Briefly discuss about blood group system.
Ans: The main blood grouping system is the ABO system based on the presence of antigen A and antigen B. Based on their presence or absence, there are four blood groups.

- A: It has antigen A in its RBC and antibody B in plasma.
- B: It has antigen B in RBC and antibody-A in the plasma.
- AB: It has both A and B antigens in the RBC but no antibodies in the plasma.
- O: This group has no antigens but has both A and B antibodies in the plasma.

Apart from this, there is a Rh factor (Rhesus factor), the presence or absence of which makes the blood group positive or negative. A person having an Rh antigen has Rh-positive blood, and those who lack this will have Rh-negative blood.

19. Briefly describe the following special-purpose fixatives :
(a) 50% Alcohol
(b) Carnoy's fixative

Ans: 50% Alcohol: This is a clear fixative for the collection of fluid specimens. A 50:50 ratio of the specimen to fixative is considered appropriate.
Carnoy's fixative: This is a special-purpose fixative for haemorrhagic samples. The acetic acid in the fixative haemolyses the red blood cells. It is an excellent nuclear fixative as well as preservative for glycogen, but results in considerable shrinkage of cells.

Answer any 3 out of the given 5 questions in 50-80 words each. 3 x 4 = 12

20. How can you measure the efficiency of all stages of intrinsic pathway of coagulation by performing screening test?

Ans: APTT (Activated Partial Thromboplastin Time), on the other hand, measures the integrity of the intrinsic pathway.
Normal values: 26 - 40 seconds.
A prolonged or abnormal APTT is seen in patients with liver disease, disseminated intravascular coagulation, on anticoagulant therapy, and patients having a deficiency of any coagulation factor except factor VII.

21. How can you use coating fixatives in Laboratory?

Ans: Coating fixatives are either aerosols applied by spraying or a liquid base, which is poured onto the slide. They are composed of an alcohol base, which fixes the cells, and a wax-like substance, which forms a thin protective coating over the cells, e.g., Carbowax (Polyethylene Glycol) fixative. Diaphine fixative Spray coating fixative (Hairspray) with high alcohol content and a minimum of lanolin or oil is also an effective fixative.
10 to 12 inches is the optimum distance recommended for aerosol fixative.
Aerosol sprays are not recommended for bloody smears because they cause clumping of erythrocytes.

22. Mrs. Nagma has A Blood group, she has been married to Mr. Faizal, who has an O+ blood group. During her first pregnancy, she delivered a baby boy, Ashfaq, who has an O+ blood group. When she got pregnant for the second time then the doctor advised her to go for the Rh Antibody Titres Test.
(a) What sample and reagents are needed for this test?
(b) How can you interpret the result of the Rh Antibody Titre Test? 4

Ans: (a) 4 to 5 ml clotted blood.; Reagents: Saline, AGH, Pooled Cells.
(b) Interpretation: If there is clumping in the first row of test tubes, it indicates the presence of saline antibodies or IgM.
If there is clumping in the second row of test tubes, it indicates the presence of IgG antibodies.
The tube which shows minimum clumping shows the titration value; for eg, if the third tube shows clumping, then the titration value is 1 in 8 dilution positive.

23. Briefly discuss about following blood group system :

(i) I blood group system
(ii) LEWIS system
(iii) Duffy system
(iv) Kidd blood group system
Ans: (i) I blood group system: It was discovered in 1956. All adult red cells have the I antigen, and cord blood has the I antigen. By the time the infant is 18 months old, the red cells have I antigens.
(ii) LEWIS System: Two main antigens are Le a, and Le b and the phenotypes are

- Le (a+b+), Le (a-b+), Le (a+b-), Le (a-b-).
- Secretors are either Le a+b+ or Le a-b+
- Non-secretors do not have the Le b antigen

(iii) Duffy system: The Duffy system contains two antigens, Fya and Fyb. Plasmodium vivax infection does not affect red cells lacking Fya and Fyb. antiFya and Fyb antibodies are IgG and react at 37 deg c and cause hemolytic reaction and hemolytic disease of the newborn (HTR and HDN).
(iv) Kidd blood group system: Two antigens Jka and Jkb. The antibodies may be either IgG or IgM and may cause HTR or HDN

24. Mr. Harish is suffering from a breathing problem and some dysfunction in the respiratory tract. When he visited the doctor, the doctor advised him to test for the Sputum analysis. Respiratory tract malignancies can be detected mainly by sputum cytology or by bronchoscopic material. When Mr. Harish visited the hospital to perform the test as per the advice of the doctor, the sample was collected from four main sites.
While working in the Cytology Laboratory, during the specimen collection from the Respiratory tract, which sites can be chosen for the sample collection?
Ans: **Oral lesions**: Scrape the lesion with a tongue depressor, spread material on a clean slide and fix it immediately.
Nasopharynx: Cotton cotton-tipped applicator is used to obtain material for cytological examination.
Larynx: A cotton swab smear of the larynx may be a useful adjunct to clinical diagnosis if biopsy is not contemplated.