

CBSE | DEPARTMENT OF SKILL EDUCATION

MEDICAL DIAGNOSTICS (SUBJECT CODE - 828)

MARKING SCHEME FOR CLASS XII (SESSION 2025-2026)

Max. Time: 3 Hours

Max. Marks: 60

General Instructions:

1. Please read the instructions carefully.
2. This Question Paper consists of **24 questions** in two sections – Section A & Section B.
3. Section A has Objective type questions whereas Section B contains Subjective type questions.
4. **Out of the given (6 + 18 =) 24 questions, a candidate has to answer (6 + 11 =) 17 questions in the allotted (maximum) time of 3 hours.**
5. All questions of a particular section must be attempted in the correct order.
6. **SECTION A - OBJECTIVE TYPE QUESTIONS (30 MARKS):**
 - i. This section has 06 questions.
 - ii. There is no negative marking.
 - iii. Do as per the instructions given.
 - iv. Marks allotted are mentioned against each question/part.
7. **SECTION B – SUBJECTIVE TYPE QUESTIONS (30 MARKS):**
 - i. This section contains 18 questions.
 - ii. A candidate has to do 11 questions.
 - iii. Do as per the instructions given.
 - iv. Marks allotted are mentioned against each question/part.

SECTION A: OBJECTIVE TYPE QUESTIONS

Q. No.	QUESTION	Source Material (NCERT/PSSCIVE/ CBSE Study Material)	Unit/ Chap. No.	Page no. of source material	Marks
Q. 1	Answer any 4 out of the given 6 questions on Employability Skills (1 x 4 = 4 marks)				
i.	C - Respecting	Employability skills combined book/Study material Class XII	1 Communication skills	Pg.5	1
ii.	Specific	Employability skills combined book/Study material Class XII	2 Self management Skills	Pg.30	1
iii.	The format of writing any function in Calcis: =function_name(Argument1;Argument2; Argument3;.....	Employability skills combined book/Study material Class XII	3 ICT Skills	Pg.31	1
iv.	Creativity is a process of continually improving ideas and solutions by making gradual alterations and refinements. Entrepreneurs exhibit creativity by applying the process of design thinking, thinking of alternatives, trying unconventional ways to do things and continuously improvise and iterate.	Employability skills combined book/Study material Class XII	4 Entrepreneurship Skills	Pg.46	1

v.	C - PHEVs	Employability skills combined book/Study material Class XII	5 Green Skills	Pg.115	1
vi.	Average function	Employability skills combined book/Study material Class XII	3 ICT Skills	Pg.32	1
Q. 2	Answer any 5 out of the given 7 questions (1 x 5 = 5 marks)				
i.	ANS: b) Complete blood count	CBSE STUDY MATERIAL	1	9	1
ii.	ANS: Trisodium Citrate	CBSE STUDY MATERIAL	1	11	1
iii.	ANS: b) To make RBCs settle on the surface of counting chamber	CBSE STUDY MATERIAL	1	19/97	1
iv.	ANS: a) Mean corpuscular hemoglobin	CBSE STUDY MATERIAL	1	31	1
v.	ANS: b) Thalassemia	CBSE STUDY MATERIAL	1	40	1
vi.	ANS: c) Packed cell volume	CBSE STUDY MATERIAL	1	30	1
vii.	Ans. a) Centrifuge	CBSE STUDY MATERIAL	1	10	1
Q. 3	Answer any 6 out of the given 7 questions (1 x 6 = 6 marks)				
i.	ANS: c) Westergren's Method	CBSE STUDY MATERIAL	1	32	1
ii.	ANS: a) 3.8-4.8 million/cu mm	CBSE STUDY MATERIAL	3	22/97	1
iii.	ANS: c) Gower's Solution	CBSE STUDY MATERIAL	1	19	1
iv.	ANS: b) Production of blood cells	CBSE STUDY MATERIAL	1	40	1
v.	ANS: a) Land Steiner and Wiener	CBSE STUDY MATERIAL	2	74	1
vi.	ANS: a) Red	CBSE STUDY MATERIAL	2	76	1
vii.	Ans. d) Rh negative mother with Rh positive foetus may get alloimmunized with anti D and cause hemolytic disease	CBSE STUDY MATERIAL	2	75/97	1
Q. 4	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)				
i.	ANS: a) Agglutination	CBSE STUDY MATERIAL	2	67	1
ii.	ANS: c) Non hazardous waste	CBSE STUDY MATERIAL	2	50/97	1
iii.	ANS: b) Antibodies	CBSE STUDY MATERIAL	2	67	1
iv.	ANS: b) Thrombocytosis	CBSE STUDY MATERIAL	1	24/97	1
v.	ANS: c) Lu a and Lu b	CBSE STUDY MATERIAL	2	74	1
vi.	ANS: b) Controlled and interrupted flow processes	CBSE STUDY MATERIAL	2	58/97	1

Q. 5	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)				
i.	ANS: c) Sterilization	CBSE STUDY MATERIAL	2	61	1
ii.	ANS: c) Tissue fragments extracted from lesions	CBSE STUDY MATERIAL	2	82/97	1
iii.	ANS: a) AAF fixative	CBSE STUDY MATERIAL	3	90	1
iv.	ANS: c) PAP smear	CBSE STUDY MATERIAL	3	83/97	1
v.	ANS: a) Alcohol	CBSE STUDY MATERIAL	3	89	1
vi.	ANS: b) Study of cells	CBSE STUDY MATERIAL	3	82	1
Q. 6	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)				
i.	ANS: a) Fine needle aspiration cytology	CBSE STUDY MATERIAL	3	87	1
ii.	ANS: a) Endo-cervical brush	CBSE STUDY MATERIAL	3	85	1
iii.	ANS: a) Fixation	CBSE STUDY MATERIAL	3	89	1
iv.	ANS: c) cytopspin	CBSE STUDY MATERIAL	3	91/97	1
v.	ANS: c) Ether alcohol mixture	CBSE STUDY MATERIAL	3	89	1
vi.	ANS: a) fluid aspirates	CBSE STUDY MATERIAL	3	88/97	1

SECTION B: SUBJECTIVE TYPE QUESTIONS

Q. No.	QUESTION	Source Material (NCERT/PSSCIVE / CBSE Study Material)	Unit/ Chap. No.	Page no. of source material	Marks
Answer any 3 out of the given 5 questions on Employability Skills in 20 – 30 words each (2 x 3 = 6 marks)					
Q. 7	CONTACT—connect with the participant who is contributing; eye contact, open posture, and nonverbal responses. ABSORB—take in all aspects of the spoken message, implicit and explicit and nonverbal clues. Do not judge or evaluate. REFLECTIVE FEEDBACK—mirror, reflect, or feedback what you have heard and why the contributor claims to be valid. CONFIRM—receive confirmation from the speaker that you heard the participant's message accurately. If not, start the method over again at the beginning by having the speaker restate their view. Any 2	Employability skills combined book/Study material Class XII	1 Communication skills	Pg.2	2
Q. 8	1. Openness 2. Consciousness 3. Extraversion 4. Agreeableness 5. Neuroticism Any 2	Employability skills textbook Class XII	2 Self management Skills	Pg.24	2
Q. 9	Entrepreneurship is the perfect combination of art and science as it requires specific progression and procedures to be followed and also the skill to digress when required, and yet make the entire activity profitable and growth oriented.	Employability skills textbook Class XII	4 Entrepreneurship Skills	Pg.80	2
Q. 10	• Reusing scrap material For example, in paper mills, damaged rolls are sent back to the beginning of the production line, i.e., they are added as raw material. In manufacture of plastic items, off-cuts and scrap are re-incorporated into new products. • Ensuring quality control If the quality of products is maintained, there will be a decrease in rejected products, thus, reducing waste. Automated monitoring equipment are now being used, which can help identify production problems at an early stage.	Employability skills textbook Class XII	5 Green Skills	Pg.119	2

	• Waste exchange This is where the waste product of one process becomes the raw material for another. It represents the way of reducing waste disposal through re-use. • Managing e-waste With advanced technology, we have also encountered problems in managing e-waste like old mobile phones, laptops and television sets. It is important to have sustainable development and plan judiciously for recycling e-waste. • Use of eco-friendly material Scientists have discovered various material, which are eco-friendly, for example, banana leaf and paper plates that are easily disposable, etc. These must be made easily available and their use needs to be encouraged. Any 2				
Q. 11	• A worksheet is a collection of cells in the form of a grid (a network of lines that intersect each other, making rectangles). When you open a spreadsheet for the first time, you see a blank worksheet with the name 'Sheet1'. • A workbook is a spreadsheet that has one or more worksheets.	Employability skills combined book/Study material Class XII	3 ICT Skills	Pg.42	2
Answer any 3 out of the given 5 questions in 20 – 30 words each (2 x 3 = 6 marks)					
Q. 12	ANS: 1. Adequate sample is ensured (vacuum in the tube controls the amount of blood entering the tube.) 2. Correct ratio of anticoagulant to blood is ensured. 3. This is a closed system and spillage of blood and hence any Bio-hazard is thus avoided. 4. Large amounts of blood (in multiple tubes) can be collected with minimum discomfort to patient. $\frac{1}{2} \times 4 = 2$	CBSE STUDY MATERIAL	1	15	2
Q. 13	Ans- Haemoglobin is converted to acid haematin by the addition of N/10 or 0.1 N hydrochloric acid and the resulting brown colour is compared with standard brown glass reference blocks. The intensity of the brown colour depends on the amount of acid haematin, which in turn, proportional to amount of	CBSE STUDY MATERIAL	1	37	2

	haemoglobin in the blood sample. Protein, lipid, bilirubin, methaemoglobin, carboxy – haemoglobin and sulphaemoglobin influence the depth of colour. Acid haematin is in colloidal suspension and so cannot be used in the photometer or colorimeter which required optically clear solutions.				
Q. 14	ANS: 1. Uniform temperature between 2 degree C – 6 degree C (in AC room) 2. Stainless steel inner chamber and Inside acrylic door to avoid temperature loss 3. Digital temperature indicator cum controller with audio visual alarm 4. Full view glass doors for observation without disturbing the inside conditions. $\frac{1}{2} \times 4=2$	CBSE STUDY MATERIAL	2	59	2
Q. 15	ANS: Sputum Cytology: Sputum specimen can be obtained from the patient either spontaneously or by aerosol – induced method. Morning specimen resulting from overnight accumulation of secretion yields best results. Three to five consecutive days' sputum samples should be examined to ensure maximum diagnostic accuracy. The sputum must be carefully inspected by pouring the specimen into a petri dish and examining on a dark background. Select any bloody, discolored or solid particles, if present, place a small portion of each particle on a micro slide, spread evenly and fix it immediately. Bronchoscopic Specimens: Specimens that are obtained by bronchoscopy are secretions (bronchio-alveolar lavage), direct needle aspirate from suspicious area and bronchial brushing and washings. Post bronchoscopic sputum is one of the most valuable specimens for the detection of pulmonary lesions.	CBSE STUDY MATERIAL	2	58	2

Q. 16	ANS: Endometria aspiration smear: After preliminary visualization and cleaning of 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. 2 x 1=2	CBSE STUDY MATERIAL	3	85	2
Answer any 2 out of the given 3 questions in 30– 50 words each (3 x 2 = 6 marks)					
Q. 17	ANS: Sedimentation is defined as settlement of red cells to the bottom with an upper plasma layer when anti coagulated blood is kept undisturbed for a period of time. There are three stages in which this occurs: 1) The stage of aggregation - This is the first stage when the red cells form rouleaux and is the most important stage in sedimentation. 2) Stage of sedimentation - is the phase of actual falling of the cells, the larger the aggregates formed in stage I, the faster the rate of fall. This is related to both weights to surface area. 3) The stage of packing - is the final one when individual cells and aggregates slow down due to crowding. 3x1=3	CBSE STUDY MATERIAL	1	32	3
Q. 18	Ans- There are different varieties of bags; they are single, double, triple or quadruple. Single bag : does not have any satellite bags double, triple and quadruple bags have one, two and three satellite bags respectively quadruple bags are also called buffy coat bags and are used for separating the buffy coat while preparing the blood components the bags contain the anticoagulant solution : CPD / PCD – A / SAGM.	CBSE STUDY MATERIAL	2	57-58	3
Q. 19	ANS: INDICATIONS: Aspiration is done using disposable needles of 21 gauge (external diameter approximately 0.6-1.0mm) attached to a 20ml syringe. • The FNAC needles are available in a variety of lengths. Lengths of a to 1/2 inches are found to be adequate for most palpable masses.	CBSE STUDY MATERIAL	3	87	3

- The 31/2 inches 22 gauge disposable needle is used for deep seated soft-tissue masses.
- Ultrasound or computerized tomography (CT) guidance can be utilized, whenever indicated.

1

METHODOLOGY:

Taking all aseptic precautions, the lump is palpated and localized, and the site of puncture determined.

- The lump is then 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 predetermined site of the lump until needle tip penetrates the center of the lump.

- The plunger of the needle is then retracted backward to create a negative pressure inside the syringe and needle bore; and without withdrawing the needle through the skin, the syringe is rotated and moved in and out through the lump whilst negative pressure sucks cells into the lumen of the needle.

- In order to obtain sufficient material, particularly from fibrotic lesions, the needle is moved back and forth three or more times and directed into different areas of the tumor.

- Throughout this manipulation, negative pressure is maintained in the syringe by keeping the piston retracted.

- After completion of the aspiration, the pressure in the syringe is allowed to equalize before the needle is withdrawn from the lesion.

- This is achieved by releasing the piston of the syringe. After the needle had been withdrawn, the syringe is disconnected from the needle, filled with air and reconnected.

- The material in the needle is expelled onto a glass slide, care being taken to deposit it as a single drop at one end of the slide.

- The needle tip is then brought into light contact with the slide and the aspirate carefully expressed from it.

2

Answer any 3 out of the given 5 questions in 50– 80 words each (4 x 3 = 12 marks)

Q. 20	ANS: This instrument helps us to examine tiny objects which cannot be visualized with the naked eye. It is a delicate instrument and needs utmost care. a) Cleaning of objective and eyepiece should be done regularly and they should be kept free from dust. The optical part is cleaned to remove grease using soft cloth or lens paper. b) Hold the microscope firmly while moving it to prevent the lenses from dropping down. c) Exposure to sunlight should be avoided and it should be kept at room temperature. d) After one use oil immersion, one must always clean the oil from the objective. 4 x 1=4	CBSE STUDY MATERIAL	2	62	4
Q. 21	ANS: The following steps are followed to measure bleeding time: • BP cuff is placed on the patient's arm about 2 to 3 inches above the elbow joint. Pressure is increased to 40 mm Hg. This pressure is kept for the entire procedure. • An area is selected on the volar surface of the forearm (devoid of any superficial veins) and cleaned with spirit swab. The area is allowed to dry and there will be 2 skin punctures, 5 - 10 cm apart 2.5 mm deep, 1mm wide are made and stop watch started. • Blood is blotted from each puncture site on a piece of filter paper every 15seconds. The filter paper should not touch the wound. (As this may interfere with the process of platelet plug formation). When bleeding stops, the watch is stopped, time noted and BP cuff released. • Bleeding times of the two puncture sites are noted and average of the two results are reported. 4 x 1=4	CBSE STUDY MATERIAL	1	45-46	4
Q. 22	• Hair should be tied back neatly, away from the shoulders. • The lab should be well-ventilated and should strictly follow the regulations governing the acceptable limits of the reagents used.	CBSE STUDY MATERIAL	2	68-70	4

	• If solvents are used during practical sessions, the exhaust fan must be switched on. • Whenever doing staining procedures ensure that protective gowns, gloves and safety glasses are worn. • Inspect centrifuge tubes for cracks. • Never pipette samples with mouth. • A safety data sheet should be maintained for every chemical compound used and it should specify the nature, toxicity, and safety precautions to be taken while handling the compound. • Proper disposal of hazardous wastes is a must. • Every instrument used in the laboratory should meet electrical safety specifications and have written instructions regarding its use. Any 4 points 4*1=4				
Q. 23	Sampling Devices: the collection device may play an important role in sample adequacy. The shape, surface, texture and material of the device may determine how much of the scraped material is deposited on to the glass slide and is available for screening and analysis. Several methods of obtaining cytologic material from the uterine cervix are available. However, use of cotton swab for collection of cervical smear is to be discouraged, in view of the drying artifacts and loss of cells, which are caused by this method. Smears obtained with original Ayre's spatula are often easier to screen. Wooden spatula is preferable to plastic spatula, because of its mildly rough surface that can collect more material. The disadvantages are that the method may occasionally be traumatic to the patient, and the tip of spatula that does not fit the external or may fail to remove some of the valuable material from the squamo-columnar junction. Endo-cervical brush is a small bottlebrush like device with one end having fine bristles made up of nylons. This device is strictly for taking materials from endocervix. Gently insert the brush in endocervix and rotate one turn	CBSE STUDY MATERIAL	3	82	4

	pressing in the upper and lower wall (Figure 3). The cytobrush is similar to that of 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 spatula and endocervical brush, give better results. Triple smear or the vaginal-cervical-endocervical (VCE) technique can provide the best results. However, feasibility and cost factor need to be taken into consideration. In postmenopausal women. The squamo-columnar junction recedes making it difficult to obtain good amount of endocervical cells and cells from TZ. Hence a combination of two devices, spatula plus endocervical brush is preferred. Any 4 sampling devices and one point about them $4 \times 1 = 4$				
Q. 24	ANS: • 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. Carnoy's fixative must be prepared fresh when needed and discarded after each use. It loses its effectiveness on long standing, and chloroform can react with acetic acid to form hydrochloric acid. • AAF Fixative: This is the ideal fixative used for cellblock preparation of fluid specimens. • Saccomanno collection fluid: A green coloured fixative of the collection of sputum. • Cytolyt solution: This is a clear water based buffered fixative for the collection of fluid specimens. A 50:50 ratio of specimen to fixative is appropriate (if this unavailable use 50% alcohol). $4 \times 1 = 4$	CBSE STUDY MATERIAL	3	90-91	4