Compiler

Dr. Muhammad Attique
M.Phil. (Thesis in process)
Senior Demonstrator
Physiology
Avicenna Medical College

PRACTICAL PHYSIOLOGY

PART I
Original version dedicated to
Avicenna Medical College

1		BLEEDING TIME
2		CLOTTING TIME

3	HEMOGLOBIN
4	ERYTHROCYTE SEDIMENTATION RATE
5	ERYTHROCYTE OSMOTIC FRAGILITY
6	HEMATOCRIT
7	BLOOD GROUP
8	MICROSCOPE
9	HEMOCYTOMETRE
10	TOTAL RED CELL COUNT
11	TOTAL WHITE CELL COUNT
12	TOTAL PLATELET COUNT
13	BLOOD SMEAR
14	DIFFERENTIAL LEUKOCYTE COUNT
15	BLOOD INDICES
16	EXAMINATION OF RESPIRATORY SYSTEM
17	SPIROMETRY
18	STETHOGRAPHY
19	PRECORDIUM
20	PULSE
21	ARTERIAL PRESSURE
22	EFFECT OF POSTURE ON ARTERIAL PRESSURE
23	EFFECT OF EXERCISE ON ARTERIAL PRESSURE
24	ELECTROCARDIOGRAM
25	CARDIOPULMONARY RESUSCITATION i
26	CARDIOPULMONARY RESUSCITATION ii

27 SPECIMEN PAPER /KEY

1A

PRACTICAL= DETERMINATION OF BLEEDING TIME

PRINCIPLE==Bleeding time is the time required for a small prick made in the capillary bed of the finger or ear lobe to stop bleeding ,this is a clinical test done to assess platelet function.

NEEDS=spirit swab , disposable lancet , filter paper , stopwatch ,

PROCEDURE= Aseptic dermal prick on distal pulp of left ring finger.

Touch the filter paper at the point of ooze.

Start stopwatch.

Keep on obtaining spots every 30 seconds until there is no more spot.

Stop stopwatch.

PRECAUTIONS= avoid too deep prick.

RESULT= bleeding time =---------- minutes.

1B

OSPE / VIVA / FAQ BLEEDING TIME

Q.1.Define bleeding time

A. Bleeding time is the time required for a small prick made in the capillary bed of the finger or ear lobe to stop bleeding .

Q.2.What is the normal range of Bleeding time?

A.2 to 5 minutes.

Q.3.On what factors does the Bleeding time depend on?

A. Bleeding time is affected by platelet function, certain vascular disorders and von Willebrand Disease.

Q.4.What are the functions of platelets?

A. Hemostasis Clot retraction Procoagulant Inflammation Cytokine signalling

Q.5.Define Hemostasis.

A. a process which causes bleeding to stop

Q.6.Describe the stages of hemostasis.

A. 1) vasoconstriction, 2) platelet plug, and 3) blood coagulation,4)clot retraction

Q.7.What is the normal range of platelet count.

A.150 000 to 400 000 per mm^3.

Q.8.What are the causes of decreased platelet count?

A.Thrombocytopenia , disseminated intravascular coagulation , liver failure , dengue

Q.9.What are the causes of increased bleeding time

A. Diseases that cause prolonged bleeding time include thrombocytopeni a, disseminated intravascula r coagulation (DIC), Bernard-Soulier disease, and Glanzmann's thrombasthenia. Aspirin and other cyclooxygenase inhibitors can prolong bleeding time significantly

It is also prolonged in hypofibrinogenemia

Q.10.On what occasions is the bleeding time test required in clinical practice.

A.Before major / minor surgery.

2A

PRACTICAL = DETERMINATION OF CLOTTING TIME

PRINCIPLE=In order for blood to clot, the enzyme thrombin must be generated from the plasma precursor prothrombin. Thrombin then converts soluble fibrinogen into insoluble fibrin. The time taken

for blood to clot mainly reflects the time required for the generation of thrombin

NEEDS= spirit swab , disposable lancet , capillary tube , stopwatch ,

PROCEDURE= Aseptic dermal prick on distal pulp of left ring finger.

Start the stopwatch.

Transfer the ooze to a capillary tube.

Break off a small portion of the capillary tube every 60 seconds.

See any evidence of formation of clot/thread.

Stop the stopwatch when thread is seen.

PRECAUTIONS=avoid too deep prick.

RESULT=Clotting time =---------- minutes.

2B OSPE / VIVA / FAQ CLOTTING TIME

Q.1.Define clotting time.

A. The time required by a sample of blood to coagulate in vitro.

Q.2.What is the normal range of clotting time?

A. 5 to 8 minutes.

Q.3.What are the causes of increased clotting time?

A. If the plasma concentration of prothrombin or of some of the other factors is low (or if the factor is absent, or functionally inactive), clotting time will be prolonged.

Q..4.On what occasions is the clotting time test required in clinical practice?

A.Before major / minor surgery.

Q.5.On which factors does clotting time depend ?

A. Generation of thrombin involves the sequential activation of other plasma clotting^{++} factor, this process is also being assisted by Ca and by factors released by platelets and damaged tissues.

Q.6.Compare various forms of Hemoophilia.

Hemophilia A	Hemophilia B(Christmas disease)	Hemophilia C
Factor VIII ↓	Factor IX ↓	Factor XI ↓
X linked recessive	X linked recessive	Autosomal recessive

Q.7.Describe Von Willebrand disease.

A.Von Willebrand disease (which behaves more like a platelet disorder except in severe cases), is the most common hereditary bleeding disorder and is characterized as being inherited autosomal recessive or dominant. In this disease, there is a defect in von Willebrand factor (vWF), which mediates the binding of glycoprotein Ib (GPIb) to collagen. This binding helps mediate the activation of platelets and formation of primary hemostasis.

Q.8.. Describe clinical significance of thrombosis..

A.In liver failure (acute and chronic forms), there is insufficient production of coagulation factors by the liver; this may increase bleeding risk.

Deficiency of Vitamin K may also contribute to bleeding disorders because clotting factor maturation depends on Vitamin K.

Thrombosis is the pathological development of blood clots. These clots may break free and become mobile, forming an embolus or grow to such a size that occludes the vessel in which it developed.

3A PRACTICAL=QUANTITATIVE ESTIMATION OF HEMOGLOBIN

PRINCIPLE= Acid + Hemoglobin ⇉ Acid hematin (brown)

NEEDS=Sahli's Hemoglobinometer , N/10 HCl , Hemoglobin pipette , stirrer , disposable lancet , spirit swab , distilled water , dropper

PROCEDURE= N/10 HCl in graduated tube up to the mark 20.

Aseptic dermal prick , blood sucked up to the mark 20 in

hemoglobin pipette.

Blood transferred to HCl in tube.

Stir gently for thorough mixing of blood and acid..

Allow 5 minutes for complete chemical reaction between acid and hemoglobin..

Add distilled water dropwise and keep stirring.

Take the stirrer out and place the graduated tube in the hemoglobinometer.

At the point of exact colour match , note the reading.

PRECAUTIONS=Avoid mixing tissue fluid with the blood.

RESULT=Hemoglobin level= ----------gram per deciliter. =---------

--%

3B

Q.1.What is the oxygen carrying capacity of hemoglobin?

A.1.34 ml of oxygen can be carried by one gram of Hemoglobin.

Q.2.What is the oxygen carrying capacity of blood?

A.1.34 x Hemoglobin level.(e.g.1.34 x 15=20 ml per 100 ml)

Q.3.What is the normal Hemoglobin level in blood?

A.15 grams per 100 ml

Q.4.Define Anemia.

A.The capacity of the blood to transport Oxygen to the tissues is reduced , either because of too few red blood cells or because of too little Hemoglobin. Q.5.Name a few types of anemia.

A.Iron deficiency anemia , Hemolytic anemia, Aplastic anemia , hemoglobinopathies

Q.6.What type of protein is Hemoglobin?

A.metalloprotein globulin

Q.7.State some functions of hemoglobin.

A.transport of oxygen from lungs to tissues Transport of carbondioxide from tissues to lungs. Buffer.

Q.8.Name the cells that contain hemoglobin.

A.red cells,Progenitors of red cells, A9 dopaminergic neurons in substantianigra,Macrophages,

Q.9.Name the types of normal hemoglobin.

A.HbA =two alpha and two beta subunits , HbF =two alpha and two gamma subunits

Q.10. Name the types of abnormal hemoglobin.

		β β		***Condition***
		2		***Adult***
				Fetal
		4		***Thallesemia***
				thallesemia
		2(S type)		***Sickle cell***
		2(C type)		***Mild chronic hemolytic anemia***

4A

PRACTICAL=DETERMINATION OF ERYTHROCYTE SEDIMENTATION RATE PRINCIPLE=

red blood cells fall (settle or sediment)when anticoagulated blood is placed in an upright tube.

NEEDS=Westergren tube , stand , spirit swab , disposable syringe , anticoagulant

PROCEDURE=Aseptic phlebotomy.

3 ml venous blood sample drawn.

Anticoagulant mixed.

Sample transferred to Westergren ESR tube and fixed in stand.

Note the time.

Take the reading after exactly one hour.

PRECAUTIONS=Avoid air bubbles.

Fill the tube to the exact mark.

Take reading after exactly one hour.

RESULT=

ESR= --------mm after 1 hour

4B OSPE / VIVA / FAQ ESR

Q.1.What is the significance of ESR?

A.ESR is a non specific indicator of inflammation (injury to tissues)

Q.2.What favours sedimentation of RBCs?

A.fibrinogen.

Q.3.What opposes sedimentation of RBCs?

A.Negative charge on the surface of erythrocytes (zeta potential)

Q.4.What is rouleaux?

A.Sticking of RBCs to each other to form stacks (or piles or columns)

Q.5.Name physiological causes of raised ESR.

A.menstruation , pregnancy

Q.6.Name pathological causes of raised ESR.

A.anemia , Rheumatoid arthritis , kidney cancer , tuberculosis.

Q.7.Describe the clinical significance of ESR.

A.ESR aids in

Diagnosis / differential diagnosis

Assessment of disease severity

Monitoring response to therapy

Prognosis (progress)

Q.8.What is the normal value of ESR?

A. 3mm after one hour in males

7mm after one hour in females

Q.9.What factors can influence ESR?

A.age,.gender , race

5A ERYTHROCYTE OSMOTIC FRAGILITY

PRINCIPLE=Normal rbc can remain suspended in normal saline , (0.9 % NaCl) for hours ,(isotonic)

When rbc are placed in hypotonic solutions , they take in water and eventually burst.

NEEDS=15 small test tubes , rack , dropper , 0.5 % NaCl , distilled water , 2ml disposable syringe ,

PROCEDURE=Mark 15 test tubes , set in the rack , as A,B,C,……In each test tube , add 0.5%NaCl , distilled water (according to the table below) , a drop of anticoagulant mixed blood ,(1 drop=0.04ml) , shake gently and keep them for one hour.After one hour , check for hemolysis by noting the colour of

the mixture.Note down the concentration of saline in which red colour just appears and concentration of saline in which intensity of colour becomes maximum.Just beginning of colour indicates beginning of hemolysis and maximum intensity of colour indicates completion of hemolysis.

No hemolysis (>0.47%)	Rbc at bottom	Clear saline above
Some hemolysis (0.45%)	Some rbc at bottom	Red tinged saline
↓↓NaCl concentration	↑↑hemolysis	↑↑redness
Complete hemolysis (0.35%)	No rbc at bottom	Maximally uniformly red

No.	label	Drops 0.5% NaCl=a	Drops of distilled water=b	a+b	Saline concentration a x 0.04 x 0.5 %
1	A	0	25	25	0 x 0.04 x 0,5=0
2	B	12	13	25	12x 0.04 x 0,5=0.24
3	C	13	12	25	13x 0.04 x 0,5=0.26
4	D	14	11	25	14x 0.04 x 0,5=0.28
5	E	15	10	25	15x 0.04 x 0,5=0.30
6	F	16	9	25	16x 0.04 x 0,5=0.32
7	G	17	8	25	17x 0.04 x 0,5=0.34
8	H	18	7	25	18x 0.04 x 0,5=0.36
9	I	19	6	25	19x 0.04 x 0,5=0.38
10	J	20	5	25	20x 0.04 x 0,5=0.40
11	K	21	4	25	21x 0.04 x 0,5=0.42
12	L	22	3	25	22x 0.04 x 0,5=0.44
13	M	23	2	25	23x 0.04 x 0,5=0.46
14	N	24	1	25	24x 0.04 x 0,5=0.48
15	O	25	0	25	25x 0.04 x 0,5=0.50

PRECAUTIONS=Do not shake too vigorously.

RESULT=

Hemolysis	Colour	% saline solution
Beginning	Red tinge	
Completion	Intense red	

5B. ERYTHROCYTE OSMOTIC FRAGILITY

Q.1.Name some conditions of increased rbc membrane fragility.

A.Hereditary spherocytosis , G6PD deficiency , intrinsic / acquired rbc membrane fragility disorders.

Poisoning , burns

Q.2.What is meant by rbc fragility?

A. Erythrocyte fragility refers to the propensity of erythrocytes (red blood cells, RBC) to hemolyse

(rupture) under osmotic stress.(immersed in hypotonic solution) Q.3.What factors affect osmotic fragility.

A. Osmotic fragility is affected by various factors, including membrane composition and integrity as well as the cells' sizes or surface-area-to-volume ratios.

Q.4.When is osmotic fragility performed in clinical practice.

A. The osmotic fragility test is common in hematology, and is often performed to aid with diagnosis of diseases associated with RBC membrane abnormalities.

Q.5.Name some conditions of decreased osmotic fragility.

A. some linked to *decreased* osmotic fragility include chronic liver disease, iron deficiency anemia, thalassemia, hyponatremia, polycythemia vera, and sickle cell anemia after splenectomy.

Q.6.When is this test considered positive?

A. If your red blood cells are more fragile than normal, the test is considered positive.

Q.7.1 drop = ------ml?

A. 1 drop = 0.04 ml.

Q.8. At which point does hemolysis normally begin?

A.Hemolysis begins 0.45%.

Q.9. At which point does hemolysis normally complete?

A. hemolysis complete 0.35%.

6A PRACTICAL= DETERMINATION OF HEMATOCRIT

PRINCIPLE=The volume of packed red cells divided by the total volume of the blood sample gives the PCV.

NEEDS=microhematocrit tube ,centrifuge , disposable lancet , spirit swab PROCEDURE=

Aseptic dermal prick.

Transfer blood directly from the ooze in to the heparinized capillary tube.

Centrifuge at 10000 RPM for 5 minutes. Measure

the lengths of

a)red cell layer

b)whole blood column

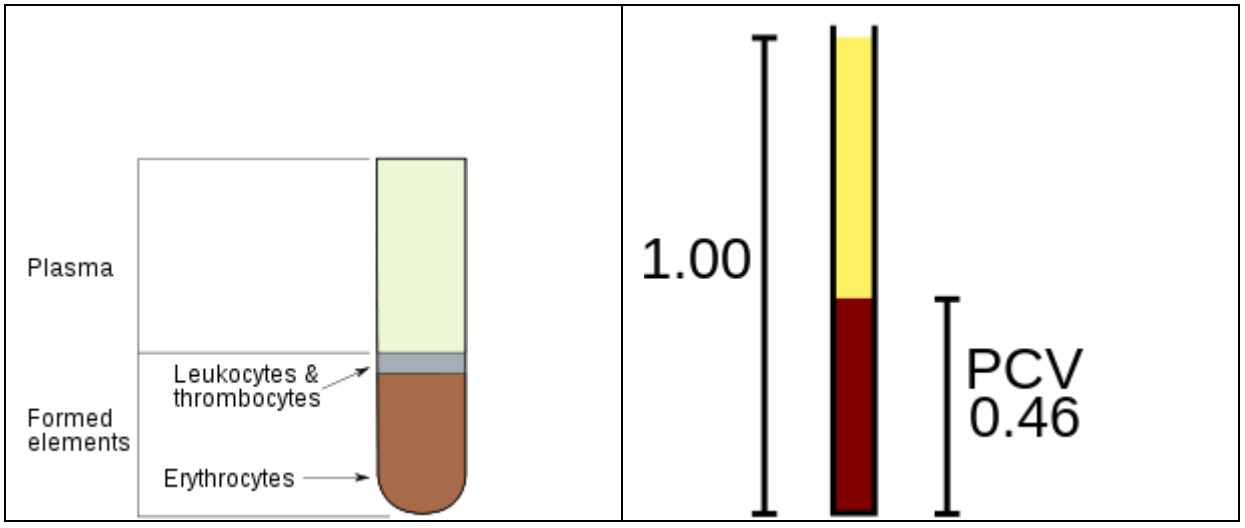
PRECAUTIONS=

Avoid too deep prick.

Avoid air bubbles.

Fill the tube exactly up to the mark.

RESULT=



Hematocrit= -------

6B OSPE / VIVA / FAQ PCV Q.1.Define Hematocrit.

A.The volume percentage of rbc in blood.

Q..2.What is the normal value of PCV?

A.45% for men , 40 % for women

Q.3.When is the PCV elevated?

A.In Dengue fever , a high hematocrit is a danger sign of an increased risk of dengue shock syndrome. polycythemia vera , hypoxic lung diseases anabolic androgenic steroids dehydration

Q.4.When is the PCV lowered?

A.infants without adequate iron intake

Growing children

Women in childbearing years with a greater need for iron due to menstrual loss

Pregnant woman

Chronic kidney disease (lack of erythropoietin)

Q.5.On what two factors does the hematocrit depend?

A. This measurement depends on the number of red blood cells and the size of red blood cells.

7A

PRACTICAL=DETERMINATION OF BLOOD GROUP

PRINCIPLE=blood group is a classification of blood based on presence or absence of inherited antigenic substances on the surface of red blood cells.

NEEDS=Antisera A,B,C, slide

PROCEDURE=

Take a clean dry glass slide.

Put one drop each of anti-A , anti B , anti-C serum on the slide separately.

Aseptic dermal prick.

Put one drop of blood in each of the three antisera.

Observe agglutination(clumping)

PRECAUTIONS

There should be no mixing of antisera.

Ensure thorough mixing of blood and antisera.

Observe for clumping after 5 minutes.

RESULT

Blood group -------

7B OSPE / VIVA , FAQ BLOOD GROUPS

Q.1.What is agglutinogen?

A. An antigen that stimulates the production of an agglutinin.

Q.2.What is agglutinin?

A. An agglutinin is a substance that causes particles to coagulate to form a thickened mass [1].

Agglutinins can be antibodies that cause antigens to aggregate by binding to the antigen-binding sites of antibodies.

Q.3.What is agglutination?

A. When an agglutinin is added to a uniform suspension of particles such as bacteria or blood, agglutinin binds to the agglutinin-specific structure on the particle causing the particles to aggregate and fall to the bottom leaving a clear suspension. This phenomenon known as agglutination is of great importance to the medical world as it serves as a diagnostic tool. Q.4.Compare the blood groups.

Group	A	B	AB	O
antigen	A	B	A and B	None

Group	A	B	AB	O
antibody	Anti-B	Anti-A	none	Anti-A and anti-B

Group	A	B	AB	O
genotype	AA /AO	BB / BO	AB	OO

Group	Rh+	Rh -
antigen	Rh	None

Group	Rh+	Rh-
antibody	none	None (unless sensitized)

Group	Rh+	Rh-
Genotype	RR/Rr	Rr

Q.5.When do we need blood typing.

A.blood transfusion , hemolytic disease of the newborn , blood products,forensic evidence , antenatal examination

8A PRACTICAL= STUDY OF COMPOUND MICROSCOPE

PRINCIPLE=An instrument used to see objects that are too small for the naked eye.

NEEDS=microscope , slides , cover slips , prepared slides

PROCEURE=Turn the revolving nosepiece so that the lowest power objective lens is clicked into position , this is also the shortest objective lens.

Place the slide on the stage and fasten it with clips.

Turn the coarse focus knob so that the objective lens moves downward or the stage goes upward , move it as far as it will go without actual contact of the lens and the slide.

Now look through the eyepiece and adjust the illuminator for the maximum light.

Slowly turn the coarse adjustment so that the objective lens moves up away from slide continue until the image comes into focus .

Use the fine adjustment for fine focusing.

Move the slide around so that the image is in the centre of field of view. Readjust the illuminator for the clearest image.

Change to the next objective lenses with only minimal use of focusing adjustment.

PRECAUTIONS=When moving your microscope , always carry it with both hands grasping the arm with one hand and placing the other hand under the base for support.

Do not allow the objective lens to touch the slide.

Do not touch the glass part of the lenses with your fingers

When finished,raise the tube,lower the stage ,set the low power lens and remove the slide.

Always keep your microscopes covered when not in use (dust is the number 1 enemy).

RESULT Study of compound microscope completed.

8 B OSPE / VIVA / FAQ MICROSCOPE

Q,1.Name various types of microscopes.

A.light microscope , electron microscope , fluorescence microscope , phase contrast microscope , digital microscope , acoustic microscope , X ray microscope , laser microscope

Q.2.Objectives usually have a colour ring inscribed .What do these colours signify?

4x / 5x	Red
10x	Yellow
20x	Green
40x /50x / 60x	Blue
100x	White

Q.3.What is an oil immersion lens and qhat is its advantage?

A.An objective lens requiring a drop of oil between the lens and smear , oil and glass behave as a single medium not allowing any bending of light rays improving the resolution.

Q.4.What is meant by resolving power of an objective and how is that distinguished from resolution?

A .Resolving power of an objective refers to the ability of that objective to yield an image which clearly separates points or lines lying close together in the specimen.The shorter the distance between the points or lines the better the resolving power of the objective.Resolving power is related to the numerical aperture of the objective,the higher the numerical aperture ,the better the resolving power.Resolution is the actual separation achieved by microscope system .

Q.5. What is total magnification?

A. eyepiece magnification x objective magnification

Q.6.Define magnification.

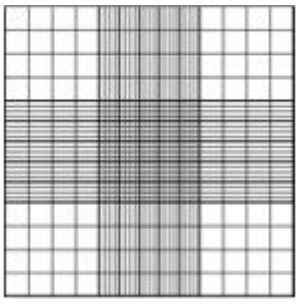
A.The apparent enlargement of an object by an optical instrument.

Q.7.Describe the functions of different parts of microscope.

Eyepiece lens	**10x power to look through**
Tube	**Connects the eyepiece to the objective lens**
Arm	**Supports the tube and connects it to the base**
Base	**Bottom support**
Illuminator	**Steady light source**
Stage	**Flat platform for slides**
Stage knobs	**Right/left , up/down movement of stage**
Revolving nosepiece or turret	**Holds objective lenses**
Objective lenses	**4x ,10x , 40x , 100x**
Condenser lens	**Focus light onto the specimen**
Diaphragm or iris	**To vary the intensity /size of cone of light**
Coarse focus	**To move the objective lens toward or away from specimen**
Fine focus	**Fine tune focus on specimen/part of specimen**

9A STUDY OF HEMOCYTOMETRE (NEUBAEUR CHAMBER)

A hemocytometer is a square chamber carved into a piece of thick glass that has a specific depth. This big square has other little squares inside, following the pattern below:



Take your hemocytometer, place a glass slide on top (making sure that it does not move;

Carefully introduce it in the space between the slide and the hemocytometer (it will go in by capillarity).

Place the hemocytometer under the microscope, in such a way that you see the first small square of the top big square in the middle of your field of view:

Start counting your cells.

$$Measured\ cell\ density = \frac{Average\ cells\ per\ small\ square \cdot Dilution\ factor}{Volume\ of\ a\ small\ square\ (mL)}$$

The current hemocytometer is composed of nine equally sized bigger squares. The central one is different from the other ones because it is divided into 25 smaller squares, while the ones in the corners are divided into 16 smaller squares. The rest of squares are not used. In addition, the smaller squares inside the central square are subdivided into 16 even smaller squares each.

For the corner squares, each of the 16 smaller squares will be 1 mm/4 = 0.25 mm in width and 0.25 mm x 0.25 mm = 0.0625 mm2 in area (or 1 mm2/16 = 0.0625 mm2). Therefore, cells that are 10 µm or more should be counted in these corner squares

For example, white blood cells (leukocytes) satisfy this criterion.

For the central square, each of the 25 smaller squares will be 1 mm/5 = 0.2 mm in width and 0.2 mm x 0.2 mm = 0.04 mm2 in area (or 1 mm 2/25 = 0.04 mm2). In turn, each of the 25 smaller squares contains 16 even smaller squares which measure: 0.2 mm/4 = 0.05 mm in width and 0.05 mm x 0.05 mm = 0.0025 mm2 = 2500 µm2 (or 0.04 mm2/16 = 0.0025 mm2). Cells that are 10 µm or smaller should be counted in the central square count red blood cells, platelets, most types of yeast, and sperm cells

9B STUDY OF HEMOCYTOMETRE (NEUBAEUR CHAMBER)

Q.1.which squares are used for rbc count?

A. 80 smallest squares in central square.

Q.2. which squares are used for wbc count?

A.64 smaller squares in four corner squares.

Q.3. which squares are used for platelet count?

A. 80 smallest squares in central square.

Q.4.what are the dimensions of the smallest squares , (used for rbc and platelet count)?

A.length=1/20 mm

Width=1/20 mm

Depth=1/10 mm

Volume=1/4000 mm^3

Q.5.what are the dimensions of the squares used for wbc count?

A.length=1/4 mm

Width=1/4 mm

Depth=1/10 mm

Volume=1/160 mm

Q.6.Enumerate the uses of the HEMOCYTOMETRE (NEUBAEUR CHAMBER)

A.It is used to count rbc , wbc , platelets , sperms.

10A. DETERMINATION OF TOTAL RED CELL COUNT

PRINCIPLE=Red cells are counted in diluted specimen using hemocytometer.

NEEDS=disposable lancet , spirit swab , rbc pipette , diluting fluid (Hayem's fluid) , hemocytometre,coverslip , microscope

PROCEDURE=Set the microscope.Clean the hemocytometre and put a coverslip.Focus the central square.Take 5 ml of Hayem's fluid in a test tube.Aseptic dermal prick.Take blood in the rbc pipette up to the mark 0.5.Fill the rbc pipette up to the mark 101 with Hayem's fluid.Roll the pipette in horizontal position for one minute for mixing.Charge the chamber .Focus

under 40X and count the rbc in 80 smallest squares. Draw 80 squares on a piece of paper .Enter the number of cells counted in each square.

PRECAUTIONS= Hold the coverslip from its edges .Discard the first drop of blood from the prick .Discard first three drops from the pipette before charging the chamber. Avoid air bubbles in the pipette. Avoid overcharging / undercharginc the chamber.Allow 5 minutes between charging and counting to give time to cells to settle down.Leave lower left to avoid double counting.

Width of smallest square	1/20 mm
Depth of smallest square	1/10 mm
Volume of smallest square	1/4000 mm^3
Rbc in 80 smallest squares	*
Rbc in 1 smallest square	*/80
Rbc in 1/4000 mm^3	*/80
Rbc in 1 mm^3 in diluted blood	*/80X4000 = #
Rbc in 1 mm^3 in undiluted blood	#X200

RESULT=

Length of smallest square	1/20 mm

TOTAL RBC COUNT = ---------- per mm^3

10B DETERMINATION OF TOTAL RED BLOOD CELL COUNT

Q.1.What is the normal value of rbc count?.

A.4 to 6 million per mm^3 .

Q.2.Define anemia.

A.Decreased oxygen carrying capacity of blood due to decreased number of erythrocytes or reduced amount of hemoglobin.

Q.3.Enumerate the types of anemia.

A.aplastic , hemolytic , iron / cyanocobalamin / folate deficiency.

Q.4.Define polycythemia.

A.Increased number of erythrocytes.

Q.5.Enumerate the types of polycythemia.

A.Primary polycythemia (polycythemia vera),secondary polycythemia.

Q.6.What is the purpose of diluting the specimen?

A.In an undiluted specimen , the cells are too crowded to count.

Q.7. What is the composition of diluting fluid.

A.Sodium chloride	**0.5 gram**	**To prevent hemolysis of rbc.**
Sodium sulphate	**2.5 gram**	**To prevent clotting**
Mercuric chloride	**0.25 gram**	**To prevent contamination**
Distilled water	**100 ml**	**Diluents**

Q.8.What is the function of rbcs.

A.Deliver oxygen to tissues.

Q.9.Explain the dilution factor.

A.0.5 parts of blood is mixed in a total of 101 parts of diluting fluid .

Fluid drawn last in the stem does not take part in mixing.

The actual mixing takes is in the bulb so 1 part is discarded leaving 101 – 1 =100 , remaining volume.

Volume of fluid in pipette = 100 parts

Volume of blood in pipette = 0.5 parts

Dilution factor = 100 / 0.5 = 200

11A . DETERMINATION OF WBC COUNT

PRINCIPLE=The wbc are counted in a diluted specimen using hemocytometre

NEEDS= disposable lancet , spirit swab ,wbc pipette , diluting fluid (Turk's fluid) , hemocytometre,coverslip , microscope

PROCEDURE Set the microscope.Clean the hemocytometre and put a coverslip.Focus the outer four corner squares.Take 5 ml of Turk's fluid in a test tube.Aseptic dermal prick.Take blood in the wbc pipette up to the mark 0.5.Fill the wbc pipette up to the mark 11 with Turk's fluid.Roll the pipette in horizontal position for one minute for mixing.Charge the chamber .Focus under 40X and count the wbc in 64 smaller squares. Draw 64 squares on a piece of paper .Enter the number of cells counted in each square.

PRECAUTIONS= Hold the coverslip from its edges .Discard the first drop of blood from the prick .Discard first three drops from the pipette before charging the chamber. Avoid air bubbles in the pipette. Avoid overcharging / undercharginc the chamber.Allow 5 minutes between charging and counting to give time to cells to settle down.While counting , leave lower left to avoid double counting.

RESULT=

Length of smaller square	1/4 mm
Width of smaller square	1/4 mm
Depth of smaller square	1/10 mm
Volume of smaller square	1/160 mm^3
wbc in 64 smaller squares	*
wbc in 1 smaller square	*/64
wbc in 1/160 mm^3	*/64
wbc in 1 mm^3 in diluted blood	*/64X160 = #
wbc in 1 mm^3 in undiluted blood	#X20

TOTAL LEUCOCYTE COUNT = ----------per mm^3

11B . DETERMINATION OF WBC COUNT Q.1.What is the

normal wbc count?

A.4000 to 11000 per mm^3.

Q.2.what is meant by leukopenia?

A.wbc count below 4000 per mm^3

Q.3.What are the causes of leukopenia?

A.Marrow damage/disease/suppression /cancers , typhoid , malaria , influenza , dengue , tuberculosis ,vitamin / mineral deficiency.

Q.4.What is meant by leukocytosis?

A.wbc count above 11000 per mm^3.

Q.5.What are the causes of leukocytosis?

A. viral, bacterial, fungal, or parasitic infection, cancer, hemorrhage, and exposure to certain medications or chemicals including steroids.

Q.6.What is meant by leukemia?

A. type of cancer of the blood or bone marrow , an abnormal increase of immature white blood cells.

Q.7.What are the causes of leukemia?

A. ionizing radiation, a few viruses such as human T-lymphotropic virus, and some chemicals, notably benzene and alkylating chemotherapy agents for previous malignancies,use of tobacco.

Q.8.What is the composition of diluting fluid.

1%gention violet	1.5 ml	Stains wbc nuclei
Glacialacetic acid	1.5ml	Kills rbc
Distilled water	100ml	Diluents

Q.9.What are the functions of leukocytes.

A. cells of the immune system defending the body against infectious disease and foreign materials.

Q.10. Explain the dilution factor.

A.0.5 parts of blood is mixed in a total of 11 parts of diluting fluid .

Fluid drawn last in the stem does not take part in mixing.

The actual mixing takes is in the bulb so 1 part is discarded leaving 11 – 1 =10 , remaining volume.

Volume of fluid in pipette = 10 parts

Volume of blood in pipette = 0.5 parts

Dilution factor = 10 / 0.5 = 20

12A DETERMINATION OF PLATELET COUNT

PRINCIPLE The platelets are counted in a diluted specimen using hemocytometre

NEEDS disposable lancet , spirit swab ,rbc pipette , diluting fluid ,hemocytometre,coverslip , microscope

PROCEDURE= Set the microscope.Clean the hemocytometre and put a coverslip.Focus the central square.Take 5 ml of 1% ammonium oxalate in a test tube.Aseptic dermal prick.Take blood in the rbc pipette up to the mark 1.0.Fill the rbc pipette up to the mark 101 with 1% ammonium oxalate .Roll the pipette in horizontal position for 10 minutes for mixing.Charge the chamber .Focus under 40X and count the platelets in 80 smallest squares. Draw 80 squares on a piece of paper .Enter the number of cells counted in each square.

PRECAUTIONS= Hold the coverslip from its edges .Discard the first drop of blood from the prick .Discard first three drops from the pipette before charging the chamber. Avoid air bubbles in the pipette. Avoid overcharging / undercharginc the chamber.Allow 15 minutes between charging and counting to give time to platelets to settle down and hemolysis of rbc .While counting , leave lower left to avoid double counting.

Volume of smallest square	**1/4000 mm^3**
platelets in 80 smallest squares	*****
platelets in 1 smallest square	***/80**
platelets in 1/4000 mm^3	***/80**
platelets n 1 mm^3 in diluted blood	***/80X4000 = #**
platelets in 1 mm^3 in undiluted blood	**#X100**
Length of smallest square	**1/20 mm**
Width of smallest square	**1/20 mm**
Depth of smallest square	**1/10 mm**

RESULT=

TOTAL PLATELET COUNT = ---------- per mm^3

12B DETERMINATION OF PLATELET COUNT

Q.1.What is the normal platelet count? A.1000 to 400 000 per mm3

Q.2.What is meant by thrombocytosis?

A.Platelet count over 400 000 per mm3

Q.3.What are the causes of thrombocytosis.

Essential thrombocytosis (a form of myeloproliferative disease) Other myeloproliferative disorders such as chronic myelogenous leukemia, polycythemia vera, myelofibrosis Reactive (secondary)to inflammation ,surgery.

Q.4.What is meant by thrombocytopenia.

A.Platelet count lower than 150 000 per mm3

Q.5.What are the causes of thrombocytopenia.

A. Vitamin B12 or folic acid deficiency Leukemia or myelodysplastic syndrome Decreased production of thrombopoietin by the liver in liver failure Sepsis, systemic viral or bacterial infection Dengue fever can cause thrombocytopenia by direct infection of bone marrow megakaryocytes, as well as immunological shortened platelet survival. Hereditary syndromes.

Q.6.What are the functions of platelets?

A. The function of platelets is the maintenance of hemostasis. This is achieved primarily by the formation of thrombi, when damage to the endothelium of blood vessels occurs.

Q.7. Explain the dilution factor.

A . 1.0 parts of blood is mixed in a total of 101 parts of diluting fluid .

Fluid drawn last in the stem does not take part in mixing.

The actual mixing takes is in the bulb so 1 part is discarded leaving 101 – 1 =100 , remaining volume.

Volume of fluid in pipette = 100 parts

Volume of blood in pipette = 1.0 parts

Dilution factor = 100 / 1.0 =100

Q.8.What is the diluent and what is its function?

A. 1% ammonium oxalate , anticoagulant , kills wbc , kills rbc , preserves platelets.

13A BLOOD SMEAR / FILM

PRINCIPLE

A blood film or peripheral blood smear is a thin layer of blood smeared on a microscope slide and then stained in such a way to allow the various blood cells to be examined microscopically. Blood films are usually examined to investigate hematological problems (disorders of the blood) and, occasionally, to look for parasites within the blood such as malaria and filaria.

NEEDS

slides , methanol , Romanowsky, Wright's, or Giemsa stain ,disposable lancet , spirit swab

PROCEDURE

Aseptic dermal prick , pulp of left ring finger.

Touch one end of the clean , dry , grease free slide at the point of ooze.

Blood films are made by placing a drop of blood on one end of a slide,

and using a *spreader slide* to disperse the blood over the slide's length.

The slide is left to air dry, after which the blood is fixed to the slide by immersing it briefly in methanol.

The fixative is essential for good staining and presentation of cellular detail.

After fixation, the slide is stained to distinguish the cells from each other.

Routine analysis of blood in medical laboratories is usually performed on blood films stained with Romanowsky, Wright's, or Giemsa stain

PRECAUTIONS

Slide should be clean and grease free.

RESULTS

Blood smear is ready for microscopic study.

13B BLOOD SMEAR / FILM

Q.1.What is meant by a blood smear?

A. A blood film or peripheral blood smear is a thin layer of blood smeared on a microscope slide and then stained in such a way to allow the various blood cells to be examined microscopically.

Q.2.Describe the usefulness of the blood film.

A. . Blood films are usually examined to investigate hematological problems (disorders of the blood) and, occasionally, to look for parasites within the blood such as malaria and filaria

Q.3.Name some stains used in blood smear.

A. , Romanowsky, Wright's, or Giemsa stain

Q.4. Which substance is used as a fixative.

A. methanol.

Q.5.What is the function of the fixative?

A. The fixative is essential for good staining and presentation of cellular detail

The fixative halts all chemical reactions within the cell including autolysis and decomposition so the internal conditions of the cell are stabilized.

Q.6.What are some qualities of well prepared blood smear.

A.The film should not be too thick.

The film should have uniform thickness.

The film should have a head , body and tail.

The film should be washed gently.

The film should be dried in air.

14A DIFFERENTIAL LEUKOCYTE COUNT

PRINCIPLE

Five different and diverse types of leukocytes exist,

NEEDS

slide , microscope , cedarwood oil , Giemsa stain ,

PROCEDURE

Prepare a blood smear.

Place it on the stage of microscope .

Put a drop of cedar wood oil.

Identify the various types of leukocytes by noting their characteristic features.

Draw 100 squares on your journal.

Count 100 cells and enter in each square the symbol of the type of white cell observed.

.N=Neutrophil ,E=Eosinophil , B=Basophil , L=Lymphocyte , M=Monocyte.

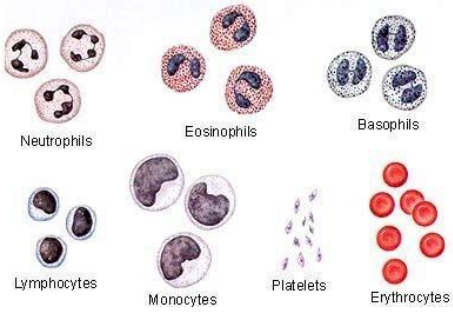
PRECAUTIONS

Slide should be clean and grease free.

RESULT

N=Neutrophil	__%
E=Eosinophil	__%
B=Basophil	__%
L=Lymphocyte	__%
M=Monocyte	__%

14B DIFFERENTIAL LEUCOCYTE COUNT



FUNCTIONS

Neutrophils	eosinophils	basophils	lymphocytes	Monocytes
Phagocytosis/ Intracellular killing	Allergy/ parasitosis	Allergic reactions	Antibodies/ cytotoxicity	Phagocytosis

Cell	Increased in	Decreased in
Neutrophil	Infection , inflammation , ischemia ,	Marrow failure , typhoid ,
Eosinophils	Allergy , parasitic infections	Stress response

Basophils	Hypersensitivity	Hyperthyroidism
Lymphocytes	Tuberculosis	Steroids
Monocytes	Malaria ,	Steroids

	Neutrophil	eosinophil	Basophil	lymphocyte	Monocyte
Granules	Pink	Pink	Blue	none	None
Nucleus	2 to 5 lobes	2	2	Large	Large , notched
Diameter µm	12 to 15	12 to 17	10 to 14	6 to 12	10 to 30
Percent	50 to 70	1 to 6	<1	20 to 40	5 to 7
Distinguishing feature	Multilobate polymorph	Pink granules	Granules obscure nucleus	Large nucleus Cytoplasm ratio	Ground Glass Cytoplasm

CLASS	**FUNCTION**	**PROPORTION**
NK cells	Lysis of virally infected cells and tumour cells	7% (2-13%)
Helper T cells	Release cytokines/ growth factors, regulate immune cells	46% (28-59%)
Cytotoxic T cells	Lysis of virally infected cells, tumour cells and allografts	19% (13-32%)
γ δ T cells	Immunoregulation and cytotoxicity	5% (2%-8%)
B cells	Secretion of antibodies	23% (18-47%)

15A BLOOD INDICES

Blood indices are blood tests that provide information about the hemoglobin content and size of rbc indicating anemia and type of anemia.

Hematocrit (PCV) (Hct)	%	35 to 45
Erythrocyte (rbc)	10^{12} / litre	4.6 to 6.4
Hemoglobin (Hb)	g / dl	13 to 15

	MCV MEAN CORPUSCULAR VOLUME	MCH MEAN CORPUSCULAR HEMOGLOBIN	MCHC MEAN CORPUSCULAR HEMOGLOBIN CONCENTRATION
definition	Average size of a rbc	Average amount of Hb in a rbc	Average concentration of hemoglobin per unit volume of rbc
formula	Hctx10 / rbc	Hbx10 / rbc	Hb x 100 / hct
example	42x10 / 4.2 =100	12.5 x 10 / 4.2 =30	12.5 x 100 / 42 =30
Units	fl (femtolitres)	pg / cell (pictogram)	g / dl (deciliter)

Normal range	80 to 100	27to 31	32 to 36
↑ in	Macrocytosis	Hyperchromia	Hyperchromia
↓ in	Microcytosis	Hypochromia	Hypochromia

ACUTE BLOOD LOSS = NORMOCYTIC / NORMOCHROMIC

MCV	NORMAL (NORMOCYTIC)
MCH	NORMAL (NORMOCHROMIC)
MCHC	NORMAL (NORMOCHROMIC)

PERNICIOUS ANEMIA / B12 DEFICIENCY ANEMIA / FOLATE DEFICIENCY ANEMIA

MACROCYTIC / NORMOCHROMIC

MCV	↑ MACROCYTOSIS
MCH	NORMAL
MCHC	NORMAL

HEREDITORY SPHEROCYTOSIS / SICKLE CELL ANEMIA = MACROCYTIC HYPERCHROMIC ANEMIA

MCV	↑ MACROCYTOSIS
MCH	↑ HYPERCHROMIA
MCHC	↑ HYPERCHROMIA

IRON DEFICIENCY ANEMIA =MICROCYTIC HYPOCHROMIC ANEMIA

MCV	↓ MICROCYTOSIS
MCH	↓ HYPOCHROMIA
MCHC	↓ HYPOCHROMIA

15B BLOOD INDICES

Q.1.On which three parameters are the blood indices based on?

A.Hematocrit , Hemoglobin , rbc count

Q.2.Name the types of normal hemoglobin.

A.HbA =two alpha and two beta subunits , HbF =two alpha and two gamma subunits

Q.3. Name the types of abnormal hemoglobin.

- Hemoglobin H (β_4) - A variant form of hemoglobin, formed by a tetramer of β chains, which may be present in variants of α thalassemia.

- Hemoglobin Barts (γ_4) - A variant form of hemoglobin, formed by a tetramer of γ chains, which may be present in variants of α thalassemia.

- Hemoglobin S ($\alpha_2\beta^S_2$) - A variant form of hemoglobin found in people with sickle cell disease. There is a variation in the β -chain gene, causing a change in the properties of hemoglobin, which results in sickling of red blood cells.

- Hemoglobin C ($\alpha_2\beta^C_2$) - Another variant due to a variation in the β -chain gene. This variant causes a mild chronic hemolytic anemia.

Q.4.If

Hct 40%

Hb 10 grams/deciliter

RBC 5×10^{12} cells/µL

Find MCV , MCH , MCHC

A.MCV = 80 femtoliters/cell

MCH = 20 picograms/cell

MCHC = 25 grams/deciliter

Q.5.State the conversions used in blood indices.

A. (deci- is 10^{-1}) (micro is 10^{-6}) (femto- is 10^{-15}) (pico- is 10^{-12})

Q.6.State two ways of finding out MCHC

A. Hb x 100 / Hct MCH x 100 / MCV

16A PRACTICAL= EXAMINATION OF RESPIRATORY SYSTEM

INSPECTION

Subject in lying position.Stand at the foot end ..Observe.

RESPIRATORY RATE	Normal / tachypnea
RESPIRATORY PATTERN	(Kussmaul breathing , Cheyne Stokes breathing ,suprasternal retraction , intercostal retraction)
FINGERS	cyanosis , clubbing
CHEST WALL	kyphosis , scoliosis , barrel chest , pectus excavatum , pectus carinatum
TRACHEA	Deviation

PALPATION

Place both palms on lung fields. ask the subject to count 1 to 10.Feel.

Increased vibration	Pneumonia
Decreased vibration	pleural effusion
Trachea	Deviation
Tactile fremitus	Equal/unequal
Respiratory expansion	Equal/unequal

PERCUSSION

Place the middle phalynx of left hand on the chest wall.Strike the middle phalynx of middle finger of left hand with the pulp of middle finger of right hand .Listen.

NOTE	CONDITION
TYMPANIC	PNEUMOTHORAX
MUFFLED	PLEURAL EFFUSION
DULL	PNEUMONIA

AUSCULTATION

Using the chestpiece of the stethoscope , listen.

Breathing	Inspiration:expiration	Pause between inspiration expiration	Nature
Vesicular	3:1	None	Normal
bronchial	1:3	Present	Abnormal(pneumonia)

PATTERN	CONDITION
WHEEZING	ASTHMA , EMPHYSEMA
RHONCI	BRONCHITIS
CRACKLES / RALES	HEART FAILURE
STRIDOR	FOREIGN BODY , TUMOUR
VOCAL FREMITUS	EQUAL/UNEQUAL
EGOPHONY (E to A transition)	PNEUMONIA/FIBROSIS

16B EXAMINATION OF RESPIRATORY SYSTEM

Q.1.What is the normal respiratory rate?

A.14 per minute.

Q.2.Describe Cheyne Stokes breathing.

A.Alternating apnea and hyperpnea.

Q.3. when suprasternal retraction and intercostals retraction are seen?

A.Respiratory failure.

Q.4.Name the condition in which the trachea is displaced?

A.Lung collapse.

Q.5.Define cyanosis.

A. **Cyanosis** is the appearance of a blue or purple coloration of the skin or mucous membranes due to the tissues near the skin surface being low on oxygen. A severe hypoxia or severe circulatory failure may induce the cyanosis. levels of 2.0 g/dL of deoxyhemoglobin may produce cyanosis.

Q.6.Enumerate the types of hypoxia.

A.hypoxic , anemic , circulatory , tissue

Q.7.What is asphyxia?

A.Hypoxia coupled with hypercapnia.

Q.8.Describe egophony.

A. When the lung field is consolidated (filled with liquid or other solid mass such as tumor or fungus ball), the patient's spoken "e" will sound like a phonetic "ā" ('ay') to the clinician through the stethoscope indicating consolidation in the area being auscultated.

Q.9.What is meant by **Whispered pectoriloquy?**

A. Usually spoken sounds of a whispered volume by the patient would not be heard by the clinician auscultating a lung field with a stethoscope. However, in areas of the lung where there is lung consolidation, these whispered spoken sounds by the patient (such as saying 'ninety-nine') will be clearly heard due to an increase in sound by the clinician through the stethoscope.

Q.10.what are the signs of consolidation (pneumonia)?

inspection	palpation	percussion	Auscultation
↓ movement	↓ movement	Dull note	Bronchial sound

17A

PRACTICAL=DETERMINATION OF LUNG VOLUMES BY SPIROMETRY

PRINCIPLE

Spirometry (meaning *the measuring of breath*) is the most common of the pulmonary function tests (PFTs), measuring lung function, specifically the amount (volume) and/or speed (flow) of air that can be inhaled and exhaled. Spirometry is used for generating pneumotachographs, which are helpful in assessing conditions such as asthma, pulmonary fibrosis, cystic fibrosis, and COPD.

NEEDS Spirometer , noseclip , chymograph , tracing paper ,

PROCEDURE

, the test will be preceded by quiet breathing in and out from the sensor (tidal volume).

the patient is asked to take the deepest breath they can, and then exhale into the sensor as hard as possible, for as long as possible, preferably at least 6 seconds. It is sometimes directly followed by a rapid inhalation (inspiration),

PRECAUTIONS

During the test, soft nose clips may be used to prevent air escaping through the nose. Filter mouthpieces may be used to prevent the spread of microorganisms

RESULT

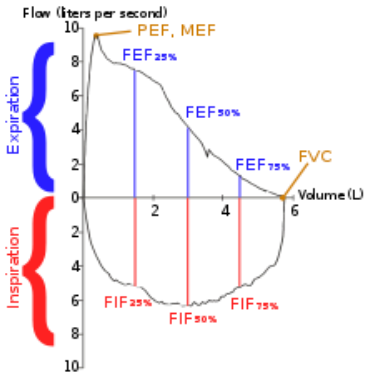
TIDAL VOLUME = ----------ml

INSPIRATIRY RESERVE VOLUME =----------ml

EXPIRATORY RESERVE VOLUME =----------ml

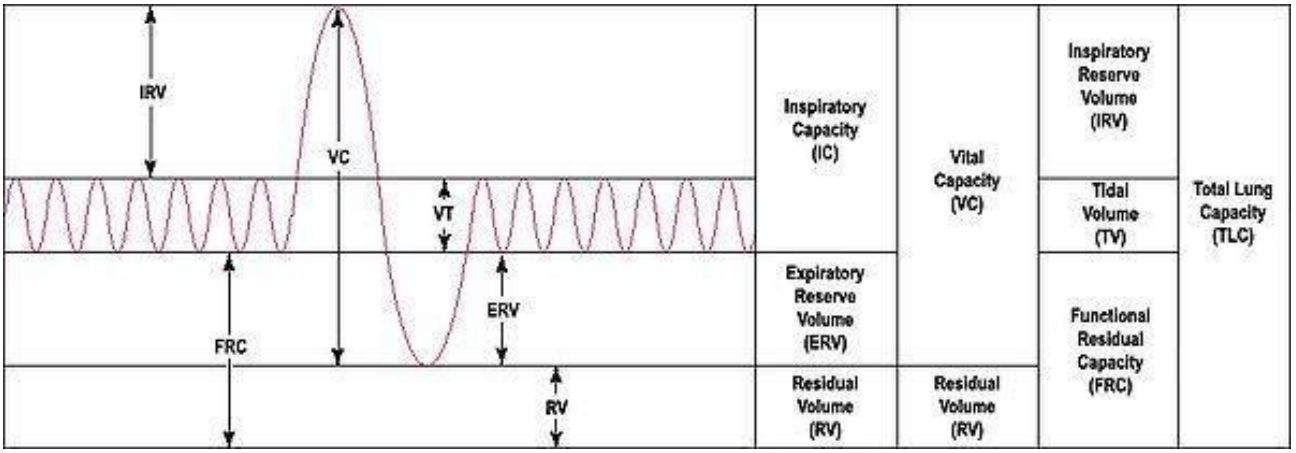
17B SPIROMETRY

Q.1.Describe a force volume loop.

	Flow-Volume loop showing successful FVC maneuver. Positive values represent expiration, negative values represent inspiration. At the start of the test both flow and volume are equal to zero (representing the volume in the spirometer rather than the lung). The trace moves clockwise for expiration followed by inspiration. After the starting point the curve rapidly mounts to a peak (the peak expiratory flow). FEV_1 Volume that has been exhaled at the end of the first second of forced expiration.MVV volume of air expired in a specified period during repetitive maximal effort. FEF The maximum instantaneous flow achieved during a FVC maneuver.FIF volume qualifiers indicate the volume inspired from RV at the point of measurement. PEF The highest forced expiratory flow measured with a peak flow meter.

Q.2.Describe different lung volumes and capacities.

TV	TIDAL VOLUME	500 ml	The amount of air moving in and out of lungs in normal quiet breathing
IRV	INSPIRATORY RESERVE VOLUME	3300 ml	the maximal volume that can be inhaled from the end-tidal inspiratory level
ERV	EXPIRATORY RESERVE VOLUME	1100 ml	the maximal volume of air that can be exhaled from the end- tidal expiratory position
RV	RESIDUAL VOLUME	1200 ml	the volume of air remaining in the lungs after a maximal exhalation
VC	VITAL CAPACITY	4900 ml	: the volume of air breathed out after the deepest inhalation.
FRC	FUNCTIONAL RESIDUAL CAPACITY	2300 ml	the volume in the lungs at the end- tidal expiratory position
IC	INSPIRATORY CAPACITY	3800 ml	the sum of IRV and TV
TLC	TOTAL LUNG CAPACITY	6100 ml	the volume in the lungs at maximal inflation, the sum of VC and RV.



18A To record the respiratory movements using a stethograph.

Principle:

The Stethograph is tied around the chest of the subject .the movements of the chest causes a change in the air pressure in the stethograph which is recorded on a moving drum .

Apparatus required: Stethograph,Kymograph,Marey's tambour,Bottle of water

The subject was asked to sit comfortably on a stool with his/her back towards the recording apparatus.The stethograph was tied around the chest of the subject at the level of the fourth intercostals space and the tambour was connected to it.The writing lever/pen was brought in contact with the paper of the kymograph and the drum was set to move at slow speed (2.5mm/sec)Normal respiration was recorded for about 5cmThe subject was asked to drink water and the effect of deglutition on the respiratory movement was recorded .Then a normal tracing was taken.After a normal tracing , the subject was asked to hold his breath as long as possible after quiet inspiration & expiration and following deep inspiration and deep expiration and the effects was recorded.Normal respiration was recorded and the drum was stopped. The subject was asked to take deep breaths as rapidly as possible for one and a half minutes. Immediately after hyperventilation, the drum was started and the effect on respiratory movements was recorded .Normal respiration was recorded. The stethograph was disconnected from Marey's tambour and the subject was asked to exercise (spot jogging)for one minute. Immediately after exercise, the stethograph was connected to the kymograph and the effect of exercise on respiratory movements was recorded.

Precautions:

The subject should be seated comfortably and in an erect posture.The stethograph should be tied at the level of 4th intercostal space as the expansion of the chest is maximum at this level.Before & after the recordings for each maneuver ,normal tracings should be taken.The recording should not be made during the act of hyperventilation but immediately after.The stethograph must be disconnected from the tambour during exercise and recording should be made immediately after exercise.For recording Breath-holding time (BHT) ,recording should be made after quiet inspiration and expiration, and forceful inspiration & expiration.

Result

Downstroke refers to inspiration Upstroke refers to expiration

Apnoea occurs during the act of deglutition

I. Respiratory rate -------: breaths/min

II.Breath holding time: After quiet inspiration-----: mins. After quiet expiration….. mins

After deep inspiration…..mins After deep expiration…… mins

18B To record the respiratory movements using a stethograph Q.1.

Define Deglutition Apnoea :

- Respiration stops during the process of swallowing
- Occurs due to closure of the glottis which helps in passage of food or water in the oesophagus and prevents entry of food materials into the respiratory tract .

Q.2. Define Breath-holding time and Breaking point.

- Time taken by the subject to hold his breath as long as he can
- The point at which breathing can no longer be voluntarily inhibited is called the breaking point. The breaking is due to the build up of arterial pCO2 and fall in pO2 which in turn will stimulate central and peripheral chemoreceptors that stimulates respiration.
- breaking point generally occurs at a level of alveolar pO2 56mm Hg and alveolar pCO2 of 49mmHg. Q.3. What is Periodic Breathing :

- Occurs following Hyperventilation
- Apnoea followed by a brief period of hyperpnoea
- Apnoea is due to removal of CO2 during hyperventilation
- Cheyne's stokes breathing –alternating apnoea & hyperventilation (sleep, High altitude, Left ventricular failure ,brain damage and following voluntary hyperventilation.)

Q.4. Describe the Effect of exercise on respiration:

- Hyperventilation due to stimulation of respiratory centres by increased discharge from the proprioceptors in the joints ,ligaments and muscles.Caused by,

- Increase in body temperature,K^+ level, lactic acid concentration
- Proprioceptive information from the exercising muscles & joints in case of mild to moderate exercises
- Persistence of Hyperventilation even after the completion of exercise is due to increased arterial H^+ concentration (Lactic acidosis)

Q.5. How can the results (in particular FEV1/FV C and FRC) be used to distinguish between restrictive and obstructive pulmonary diseases:

Type	Examples	Description	FEV1/FVC
restrictive diseases	pulmonary fibrosis, Infant Respiratory Distress Syndrome, weak respiratory muscles, pneumothorax	volumes are decreased	often in a normal range (0.8 - 1.0)
obstructive diseases	asthma or COPD	volumes are essentially normal but flow rates are impeded	often low (Asthma can reduce the ratio to 0.6, Emphysema can reduce the ratio to 0.78 - 0.45)

PRINCIPLE= In medicine, the **precordial exam**, also **cardiac exam**, is performed as part of a physical examination, or when a patient presents with chest pain suggestive of a cardiovascular patholog y. Like all medical examinations, the precordial examination follows the standard structure of inspection, palpation , percussion and auscultation.

NEEDS=Stethoscope

PROCEDURE= INSPECTION

Stand at the foot end of the couch and observe. Then inspect the precordium for:

- visible pulsations , apex beat, masses, scars, lesion, signs of trauma and previous surgery (e.g. median sternotomy), permanent Pace Maker, praecordial bulge.

PALPATION

Approach from the right side of the patient ,Palm of right hand is used to feel.

The valve areas are palpated for abnormal pulsations (palpable heart murmurs known as *thrills*) and precordial movements (known as *heaves*). Heaves are best felt with the heel of the hand at the sternal border.The apex beat is found approximately in the 5th intercostal space in the mid-clavicular line. The apex beat is assessed for size, amplitude, location, impulse and duration. There are specific terms to describe the sensation such as tapping, heaving and thrusting.

PERCUSSION

Place the middle finger of the left hand on the precordium , palmar aspect down , .Strike the pulp of the distal phalynx of the middle finger of the right hand on the dorsum of the middle phalynx of the middle finger of the left hand and listen to the note produced.

Demarcate the right and left borders of the heart by noting the points where the tympanic note changes to dull note.

AUSCULTATION

Use the chestpiece of the stethoscope to listen to the normal heart sounds and the bell of the stethoscope to listen to the abnormal heart sounds.

- S1 and S2 – lub dub ,if the splitting is abnormal or louder than usual.
- S3 -the syllables in the word *Kentucky* is similar to the pattern of sounds in an S3.
- S4 - the syllables in the word *Tennessee* is similar to the pattern of sounds in an S4.
- If S4 S1 S2 S3 Also known as a gallop rhythm.
- diastolic murmurs (e.g. aortic regurgitatio n, mitral stenosi s)
- systolic murmurs (e.g. aortic stenosis, mitral regurgitatio n)
- pericardial rub (suggestive of pericarditi s)
- bilateral basal crepitations at the base of the lungs (pulmonary oedema)

19B EXAMINATION OF PRECORDIUM Q.1.Define

precordium..

A.The area of the chest that directly overlies the heart is called precordium.

Q.2.Define apex beat.

A.The lowest and outermost point on the precordium where the cardiac impulse can be seen / felt.

Q.3.What is the normal position of the apex beat?

A.It lies in left fifth intercostals space ,midclavicular line.

Q.4.What is a murmur?

A.An abnormal heart sound is a murmur produced due to turbulent bloodflow.

Q.5.Describe the normal heart sounds.

A.

Heart sound	Caused by
S1	Closure of atrioventricular valves , start of systole
S2	Closure of semilunar valves , start of diastole
S3	Diastasis (rapid filling phase diastole)
S4	Atrial systole

Q.6.What is a thrill?

A.Thrill is a murmur that can be palpated.

Q.7.Describe the location of specific areas on the precordium.

A.

Area	Location
Aortic	Right , 2^{nd} intercostal space
Pulmonary	Left , 2^{nd} intercostal space
Tricuspid	Left , 4^{th} intercostal space
Mitral	Left , 5^{th} intercostal space , midclavicular line

Q.8.How are the intercostals spaces counted?

A.A ridge on the sternum at the manubriosternal joint lies at the point where the second rib joins the sternum.

Q.9.What are the causes of absent apex beat.

A.obesity , emphysema , dextrocardia

20A EXAMINATION OF TH E 'PULSE'

PRINCIPLE=Pulse (count of arterial pulse per minute) is equivalent to measuring the heart rate.

NEEDS=none

PROCEDURE=Place the pulps of the index and middle fingers over the skin overlying the radial artery at the wrist.Feel the throbs (pulsations) by applying gentle pressure .Assess for 60 seconds.

Comment on rate , rhythm , volume , character.

PRECAUTIONS=Introduce yourself.Explain procedure.Obtain consent.The wrist should be properly exposed and semipronated.

RESULT=

Rate	
Rhythm	
Volume	
Character	
Radio-femoral delay	
Apical-radial difference	
Vessel wall	

20B EXAMINATION OF THE 'PULSE'

Q.1.Define pulse.

A. A rhythmical throbbing of the arteries as blood is propelled through them.

Q.2.Describe the palpable pulses.

A.

pulse	Location
Carotid	anterior border of the sternocleidomastoid muscle, above the hyoid bone and lateral to the thyroid cartilage.
Brachial	Inside upper arm
Radial	Lateral wrist
Femoral	Mid inguinal point
Dorsalis pedis	Top of foot

Q.3.How will you report strength of pulse?

A.

Grade	State
0	Absent
1	Barely palpable
2	Easily palpable
3	Full
4	Aneurismal / bounding

Q.4.What are the major points to be noted in a pulse?

A.rate , rhythm , volume , strength , form , arterial wall , equality , radiofemoral delay

Q.5.Describe the various pulse patterns.

A.

Pulsus alternans	A strong pulse followed by a weak pulse
Pulsus paradoxicus	An exaggerated fall in arterial pressure in inspiration causing a weak pulse in inspiration
Collapsing / water hammer pulse	Hyperdynamic circulatory states
Pulse deficit	Apical /radial pulse difference

21A Determination of arterial pressure..

PRINCIPLE = Application of sufficient external pressure on an artery to occlude it and then gradually release the pressure to note at which point the circulation is reestablished.

NEEDS=sphygmomanometer , stethoscope

PROCEDURE= Palpatory method

Apply the cuff around the middle third of the arm of the subject.

Feel the radial pulse with two fingers of left hand.

Inflate the cuff gradually using the right hand.

Note the point at which the radial pulse disappears (a).

Deflate the cuff gradually.

Note the point at which the radial pulse reappears.(b)

Both (a) and (b) are the same and point to the systolic pressure.(SP)

Auscultatory method

Apply the cuff around the middle third of the arm of the subject.

Feel the Brachial artery in the cubital fossa.

Place the chestpiece of the stethoscope on this point.

Inflate the cuff gradually to 30 mmHg above the (SP)hod. Deflate the cuff gradually and listen to the Krotokow sounds.

The point at which the sound appears is the systolic pressure.

The point at which the sound disappears is the diastolic pressure.

Remove the cuff.

PRECAUTIONS=

Introduce yourself.Explain procedure.Take consent.Do not overinflate.

Do not keep inflated for a long time.

The subject should be lying down or seated comfortably.

The arm should be properly exposed to apply the cuff / chestpiece.

RESULT= SYSTOLIC PRESSURE =----------mmHg , DIASTOLIC PRESSURE=---------mmhg

21B Determination of arterial pressure

Q.1.Define Arterial Pressure.

A.The pressure of the circulating blood on the arteries; "*arterial pressure* is the product of cardiac output and vascular resistance".

Q.2.What is meant by systolic pressure . (SP)

A. It measures the pressure in the arteries when the left ventricle is in systole (when the heart muscle contracts).

Q.3. What is meant by diastolic pressure.(DP)

A. It measures the pressure in the arteries between heartbeats (when the left ventricle muscle is resting between beats and refilling with blood, is in diastole).

Q.4. What is meant by pulse pressure.

A.The difference between the systolic pressure and the diastolic pressure. (SP - DP)

Q.5.What is mean arterial pressure.(MAP) A. $$MAP \simeq DP + \frac{1}{3}(SP - DP)$$

Q.6.Explain the mechanism of production of Korotkow sounds. A.Normally , no sound can be heard over an artery as the bloodflow is streamline , but sound is heard over a partially open artery as the bloodflow is turbulent.

Q.7.Can we find the diastolic pressure by palpatory method? A.no

Q.8 Can we skip the palpatory method and perform directly by auscultatory method? A.no.

Q.9.What are the blood pressure categories defined by the American Heart Association.

Blood Pressure Category	**Systolic** mm Hg (upper #)		**Diastolic** mm Hg (lower #)
Normal	less than **120**	and	less than **80**
Prehypertension	**120** – **139**	or	**80** – **89**
High Blood Pressure (Hypertension) **Stage 1**	**140** – **159**	or	**90** – **99**
High Blood Pressure (Hypertension) **Stage 2**	**160** or higher	or	**100** or higher
Hypertensive Crisis **(Emergency care needed)**	Higher than **180**	or	Higher than **110**

22A TO STUDY THE EFFECT OF POSTURE ON ARTERIAL PRESSURE

PRINCIPLE

On assuming the upright posture from lying down position , there is a tendency of pooling of blood in lower limbs due to gravity , and a consequent fall in arterial pressure , but it is instantaneously countered by activation of the baroreceptor reflex which prevents any fall in arterial pressure.

NEEDS

Sphygmomanometer , stethoscope

PROCEDURE

The subject is in lying position.Record the systolic and diastolic pressure.The subject now assumes sitting position.Record the systolic and diastolic pressure again.The subject now assumes standing up position.Record the systolic and diastolic pressure again.

PRECAUTIONS

Introduce yourself.Explain procedure.Take consent.Do not remove the cuff until the arterial pressure in all three positions has been recorded.

RESULT

Position	Systolic pressure	Diastolic pressure
Lying		
Sitting		
Standing		

22B TO STUDY THE EFFECT OF POSTURE ON ARTERIAL PRESSURE

Q.1.What happens to the arterial pressure when we stand up from lying position?

A. There is a natural tendency of a sudden drop in arterial pressure when you stand up from a sitting position or if you stand up after lying down. Ordinarily, gravity causes blood to pool in your legs whenever you stand. Your body compensates for this (through the baroreceptor reflex) by increasing your heart rate and constricting blood vessels, thereby ensuring that enough blood returns to your brain. Q.2.What is postural hypotension?

A. But in people with postural hypotension, this compensating mechanism fails and blood pressure falls, leading to symptoms of dizziness, lightheadedness, blurred vision and even fainting(not enough blood reaching the brain).

Q.3..What are the causes of postural hypotension?

A. Postural hypotension can occur for a variety of reasons, including dehydration, prolonged bed rest, pregnancy, diabetes, heart problems, burns, excessive heat, large varicose veins and certain neurological disorders.

Q.4.Describe the Baroreceptor reflex.

A. Decreased blood pressure activates the baroreflex, causing heart rate to increase thus causing an increase in blood pressure.

The system relies on specialized neurons, known as baroreceptors, in the aortic arch, carotid sinuse s, and elsewhere to monitor changes in blood pressure and relay them to the brainstem. Subsequent changes in blood pressure are mediated by the autonomic nervous system. Q.5.What is the other name for postural hypotension?

A.Orthostatic hypotension.

Q.6.Name the protective mechanism normally operating in the body that prevents any significant drop in arterial pressure on assuming the upright posture. A.Baroreceptor reflex.

Q.7.Where are the baroreceptors located?

A. Baroreceptors are present in the auricles of the heart and vena cavae, but the most sensitive baroreceptors are in the carotid sinuses and aortic arch. The carotid sinus baroreceptors are innervated by the glossopharyngeal nerve (CN IX); the aortic arch baroreceptors are innervated by the vagus nerve (CN X). Baroreceptor activity travels along these nerves, which contact the nucleus of the solitary tract in the brainstem.

23A TO STUDY THE EFFECT OF EXERCISE ON ARTERIAL PRESSURE

PRINCIPLE

During exercise , the exercising muscles need greater amount of oxygen so there are specific changes in the circulatory and respiratory systems.

NEEDS

Sphygmomanometer , stethoscope ,treadmill / elliptical ,

PROCEDURE

The subject is in sitting position.Record the systolic and diastolic pressure.The subject now performs mild exercise .Record the systolic and diastolic pressure again.The subject now performs moderate exercise.Record the systolic and diastolic pressure again. The subject now performs severe exercise .Record the systolic and diastolic pressure again.

PRECAUTIONS

Introduce yourself.Explain procedure.Take consent.Do not remove the cuff until the arterial pressure in all three exercises has been recorded. Stop immediately at the first sign / complaint of discomfort RESULT

Exercise	Pulse(beats per min.)	Systolic pressure,mmHg	Diastolic pressure,mmHg
Sitting			
Mild exercise			
Moderate exercise			
Severe exercise			

23B TO STUDY THE EFFECT OF EXERCISE ON ARTERIAL PRESSURE

Q.1.What is meant by mild / moderate / severe exercise?

A.

Maximum heart rate (beats / minute)	Exercise
100	Mild
130	Moderate
160	Severe

Q.2.What is the effect of exercise on arterial pressure?

A.

Exercise	Systolic pressure	Diastolic pressure
Sitting	120	80
Mild exercise	140	80
Moderate exercise	160	70
Severe exercise	180	90

,

Q.3.Explain the relationship of systolic pressure and exercise.

A.The systolic pressure depends directly on the cardiac output. As the cardiac output increases in mild / moderate / severe exercise , so the systolic pressure also rises progressively proportionately during mild / moderate / severe forms of exercise.

Q.4. Explain the relationship of diastolic pressure and exercise.

A.The diastolic pressure depends directly on the total peripheral vascular resistance (vasomotor / arteriolar tone).

In mild exercise , the total peripheral vascular resistance (vasomotor / arteriolar tone) does not change much , so the diastolic pressure stays the same.

In moderate exercise , the total peripheral vascular resistance (vasomotor / arteriolar tone) decreases (vasodilation in active muscles) , so the diastolic pressure also decreases.

In severe exercise , the total peripheral vascular resistance (vasomotor / arteriolar tone)increases (vasoconstriction in skin / less active or non participant muscles),so the diastolic pressure increases. Q.5.Give a few examples of different grades of exercise.

A.

Mild	moderate	Severe
Jogging Biking (<10km /h)	Calisthenics Biking (10 < km/h < 20	Running Biking (>20 km / h)

24A TO STUDY THE ELECTROCARDIOGRAM

PRINCIPLE=Several electronic sensors are placed on the body to monitor electrical activity associated with heart function / cardiac cycle.

NEEDS=ECG machine , leads , gel , paper

PROCEDURE **You need to remove any hair from the subjects mid chest line (approximately 1 inch on either side of the nipple line**

Apply gel at the specific point , attach electrodes. setup, hook each of the

electrodes to the computer via the provided lead wires

PRECAUTIONS =Introduce yourself.Explain procedure.Obtain consent.subject supine.chest / arms / legs exposed.

RESULT=

Distance between two successive Q waves =----------small squares

=----------seconds

QQ interval=---------- seconds

Heart rate =----------beats per minute.

Q.1.Define an electrocardiogram.

A.Transthoracic interpretation of the electrical activity of the myocardium during a cardiac cycle.

Q.2.Describe the waves of ecg.

P	Atrial depolarization
QRS	Ventricular depolarization
T	Ventricular repolarizattion

Q.3.What is the usefulness of ecg?

A.It provides information regarding rate , rhythm , size , position and damage of heart and effects of disease , drugs and devices on heart.It aids in diagnosis / assessment of myocardial infarction , pulmonary embolism , arrhythmias ,

Q.4.Describe the intervals of ecg.

RR	0.6 s	Between two consecutive R waves
PR	0.12 s	Beginning of P to start 0f QRS

Q.5.Explain the calibration of ECG.

X – axis	Time	Seconds (25mm=1 sec)
Y – axis	Voltage	Millivolts (1 cm=1 mv)

Q.6.Describe the leads of ecg.

Limb lead I	Bipolar	Left arm / right arm
Limb lead II	Bipolar	Left leg / right arm
Limb lead III	Bipolar	Left leg / left arm
Augmented limb leads aVR	Unipolar	+ right arm
Augmented limb leads aVL	Unipolar	+ left arm
Augmented limb leads aVF	Unipolar	+left leg
Chest leads V1	Unipolar	4^{th} intercostal space right of sternum
Chest leads V2	Unipolar	4^{th} intercostal space left of sternum
Chest leads V3	Unipolar	Between V2 and V4
Chest leads V4	Unipolar	5^{th} intercostals space left midclavicular line
Chest leads V5	Unipolar	5^{th} intercostals space left anterior axillary line
Chest leads V6	Unipolar	5^{th} intercostals space left midaxillary line

Q.7.What is meant by cardiac axis.

A.The overall direction of travel of wave of depolarization .

Q.8.Give examples of interpretation of ECG.

Myocardial infarction	Pathological Q waves , ST elevation / depression
Coronary ischemia	T wave flat / inverted

25A CARDIOPULMONARY RESUSCITATION (1)

PRINCIPLE

Cardiopulmonary resuscitation (**CPR**) is an emergency procedure, performed in an effort to manually preserve intact brain function until further measures are taken to restore spontaneous blood circulation and breathing in a person in cardiac arrest

NEEDS

none

PROCEDURE

CPR involves chest compressions at least 5 cm (2 in) deep and at a rate of at least 100 per minute in an effort to create artificial circulation by manually pumping blood through the heart. In addition, the rescuer may provide breaths by exhaling into the subject's mouth .

PRECAUTIONS

The most important aspect of CPR are: few interruptions of chest compressions, a sufficient speed and depth of compressions, completely relaxing pressure between compressions, and not ventilating too much.

A universal compression to ventilation ratio of 30:2 is recommended In adults rescuers should use two hands for the chest compressions,

RESULT

CPR alone is unlikely to restart the heart; its main purpose is to restore partial flow of oxygenated blood to the brain and heart.

25B. OSPE / FAQ / VIVA CARDIOPULMONARY RESUSCITATION (2) Q.1.What are the indications of CPR?

A. Any person who is unresponsive with no breathing/ agonal gasps/ cardiac arrest.

Q.2.What is artificial respiration.

A. This process of externally providing ventilation is termed artificial respiration. .

Q.3.How can we restore a viable heart rhythm?

A. Administration of an electric shock to the subject's heart, termed defibrillation.

Q.4.When is defibrillation effective / ineffective?

A. Defibrillation is only effective for certain heart rhythms, namely ventricular fibrillation or pulseless ventricular tachycardia, rather than asystole or pulseless electrical activity.

Q.5.What is the rationale of performing CPR in asystole / pulseless electrical activity.

A. CPR may succeed in inducing a heart rhythm (ventricular fibrillation / tachycardia) which may be shockable (treatable by defibrillation).

Q.6.For how long should a CPR be continued?

A. Until the patient has a return of spontaneous circulation (ROSC) or is declared dead.

Q.7.Is there any rationale of CPR in respiratory arrest (pulse present)?

A. No.Pulse present , but is not breathing (respiratory arrest), artificial respirations needed.

Q.8.Why are two persons needed ?

A.CPR is being administered while a second rescuer prepares for defibrillation.

Q.9.What is high quality CPR?

A.Sufficient rate and depth without excessively ventilating.

Q.10.Describe the significance of CPR.

A.CPR is used on people in cardiac arrest in order to oxygenate the blood and maintain a cardiac output to keep vital organs alive. Blood circulation and oxygenation are required to transport oxygen to the tissues. The brain may sustain damage after blood flow has been stopped for about four minutes and irreversible damage after about seven minutes Q.11.Describe the effectiveness of CPR.

A. Only effective if performed within 7 minutes of the stoppage of blood circulation.

Q.12.Are there any possible complications of CPR?

A. rib fractures, sternal fractures, bleeding in the anterior mediastinum, heart contusion,[30] hemopericardium,[31][32][33] upper airway complications, damage to the abdominal viscus - lacerations of the liver and spleen, fat emboli, pulmonary complications - pneumothorax, hemothorax, lung contusions.

26A CARDIOPULMONARY RESUSCITATION (2) [ARTIFICIAL RESPIRATION]

PRINCIPLE

providing air for a person who is not breathin g or is not making sufficient respiratory effort on their own (although it must be used on a patient with a beating heart.)

NEEDS

None

PROCEDURE

An air tight seal between rescuer's mouth and the victim's mouth and 'blowing' to pass air into the victim's body.

1) Free the respiratory channels. Lift the neck with one hand with the other hand: Pull the head toward the back.
2) Pinch the nostril to close them keep the respiratory channels free while maintaining the neck uplifted.
3) Cover entirely the victim's mouth blow into it check to see if the chest rise showing that air is going in. If not; there is most likely something that blocks the air flow.
4) Remove your mouth. Loosen the nostrils. Check if air is coming out of the lungs & if chest is collapsing.
5) Repeat last 3 phases 12 to 15 times/minute.

PRECAUTIONS

Take away the cause or move away the victim from the cause .
Open and keep free the air passage by driving back the victim's head .
If air passage is blocked: Check for strange objects in the mouth & throat & remove them if possible, if not; then turn the victim on its side. Usually it will permit air to pass around the object.
Have someone call 1122 . Loosen up tight clothes around waist & neck if need be. Help maintain free air passage.

BREATHING PASSAGES MUST BE FREE AT ALL TIMES! If they are blocked you will note:
1) No air is coming out.2) Thorax is not rising nor collapsing.3) That your air blow is meeting resistance.
Consequently you MUST verify the neck & head position and also the presence of foreign objects in mouth or throat.

RESULT

Spontaneous respiration returns. OR
Arrival of ambulance / specialist care /equipments / oxygen OR

Resuscitation not successful.

26B **CARDIOPULMONARY RESUSCITATIO**N (2) [ARTIFICIAL RESPIRATION] Q.1.What are the other names of artificial respiration?

A. **Expired Air Resuscitation** (EAR), **Expired Air Ventilation** (EAV), **mouth-to-mouth resuscitation**, **rescue breathing.**

Q.2.In which situations , EAR may have to be performed.

A. near-drowning and opiate overdoses , trapped in fire .carbon monoxide poisoning , Drowning, strangling suffocation, excess of drugs, electrocution, heart attack, poisoning by gas, smoke .

All cases of respiratory failure / respiratory arrest.

Q.3.What is the oxygen level for inspired air of the victim receiving EAR.

	Inspired air % O_2	Expired air % O_2
Rescuer	21	17
Victim	17	14

Q.4.What are the survival chances in EAR?

TIME AFTER BREATHING STOPS (MINUTES)	% CHANCES OF SURVIVAL
1	98
5	25
10	1

Q.5.How soon / where should we start EAR?

A. Sooner you start the best are your chances. Start anywhere on the beach/ car/ bed/ street/ boat .

Q.6.What to do if in doubt?

A. If you are in doubt whereas the patient is breathing or not then act as if he was not breathing. EAR cannot in no way bring harm to someone who is already breathing.

Q.7.How can we judge whether breathing is present or absent?

A. Usually when someone breathes we can feel / see movements of his chest or perceive or hear his expirations by placing hand / ear near mouth.

Q.8.For how long / at what rate is EAR done?

A. Do this every 5 sec about 12 to 15 time per minute till the victim is conscious. If the victim does not give signs of life do it for 5 minutes at least!

Q.9.Compare respiratory failure with respiratory arrest.

	Respiratory failure	Respiratory arrest
Respiratory rate	Abnormally fast / slow	Zero
Respiratory sounds	Wheeze / stridor / cough	None
Skin colour	Blue (cyanosis)	Blue (cyanosis)
Mental status	Agitation / anxiety / confusion	Unconscious

27A MARKS DISTRIBUTION

TOTAL MARKS 100

OSPE	**30**
Unobserved Stations	**1.5x10=15**
Observed Stations	**5x3=15**

PROCEDURE WRITING	**5**
Principle	**1**
Apparatus	**1**
Procedure	**1**
Precautions	**1**
Results	**1**

PRACTICAL JOURNAL	**5**
Complete	**2**
Checked	**2**
Covered	**1**

PRACTICAL	**20**
Performance	**5 (by external)**
	5 (by internal)
Viva	**5 (by external)**
	5 (internal)

STRUCTURED CURRICULAR VIVA	**30**
	15 (by external)
	15 (by internal)
CONTINUOUS INTERNAL ASSESSMENT (Based on percentage of marks obtained in class tests during the session.)	**10**

27B PRACTICAL PHYSIOLOGY SPECIMEN PAPER OSPE

OBJECTIVELY STRUCTURED PERFORMANCE EVALUATION MARKS 30

NON OBSERVED STATIONS 10X1.5=15 MARKS (2 MINUTES FOR EACH)

Q.1. (a)What is the principle of sahli's method of Hemoglobin estimation. 1 (b)what is the oxygen carrying capacity of blood. 1

Q.2. (a) What is the normal value of hematocrit? 1 (b) Give two causes of decreased hematocrit. 1

Q.3. (a)Name two causes of thrombocytopenia. 1

(b)What is Hemophilia? 1

Q.4. (a)Name two examples of decreased rbc osmotic fragility . 1

(b)What are the indications of cardiopulmonary resuscitation. 1

Q.5. (a)What is vital capacity? 1

(b)Which pulmonary volume cannot be determined by spirometry? 1

Q.6. (a) Give two functions of eosinophils. 1
(b)Name any two features of neutrophil. 1

Q.7. (a)Name the augmented limb leads of ECG. 1

(b)Describe any two ECG signs o fmyocardial infarction. 1

Q.8. (a)What is postural hypotension? 1

(b)Name the reflex that normally prevents postural hypotension. 1

Q.9. (a)Describe the normal position of apex beat. 1

(b)What is pulse deficit . 1

Q.10. (a)Give two causes of leucopenia. 1

(b)What is the difference between leucocytosis and leukemia? 1

28A KEY

UNOBSERVED STATIONS

1a.Acid chemically reacts with hemoglobin to form acid hematin.

1b.1.34 x hemoglobin level ml per 100 ml.

2a.42 to 47%.

2b.aplastic anemia , hemolytic anemia..

3a.dengue , hypersplenism

3b.clotting factor VIII deficiency.

4a.hereditary spherocytosis , sickie cell anemia.

4b.respiratory failure , cardiac arrest.

5a.The amount of air that can be maximally inspired after forceful expiration.

5b.residual volume.

6a.immunity against parasites , allergic reactions.

6b.2 to 5 lobed nucleus , pink granules.

7a.aVR , aVF , aVL.

7b.pathological Qwaves , elevated / depressed ST segment.

8a.Fall in arterial pressure on assuming upright posture from supine position .

8b.baroreceptor reflex.

9a.Left 5^{th} intercostal space ,midclavicular line .

9b.Difference in heartrate at apexbeat and at radial pulse.

10a.bone marrow aplasia , drugs , radiation.

10b.leucotosis is physiological rise in WBC count in infection , leukemia is cancerous increase in WBC count..

28B OBSERVED STATIONS 4 MINUTES AT EACH STATION

5X3=15 MARKS

Q.11.(a)Examine the radial pulse of the subject. 4

(b)What is pulsus paradoxicus. 1

Q.12. (a)Determine the diastolic pressure of the subject. 4

(b)What is mean pressure. 1

Q.13.(a)Determine the Hemoglobin level. 4

(b)What is the oxygen carrying capacity of blood. 1

KEY

OBSERVED STATIONS

11a.Introduce yourself.Explain the procedure.Take consent.

Subject wrist semiflexed , semipronated.Place two fingers on the skin over the radial artery at wrist .Examine for 60 seconds to comment on rate,rhythm,character,volume.

11b.A pulse that is weak in inspiration.

12a.Introduce yourself .Explain the procedure.Take consent. Find systolic pressure by palpatory method .Then find diastolic pressure by auscultatory method.

12b.diastolic pressure + 1/3 pulse pressure

13a.Use Sahli's apparatus

13b.1.34 ml/gm