

JEMAS(PG) – 2023 M.Sc. PS

1. Sickle cell trait is a heterozygous recessive abnormality in which HbS comprises _____ of the total Hb:
(A) 20-40%.
(B) 30-50%.
(C) 10-20%.
(D) None of the above.
2. Which of the following properties of a roller pump is most important while operating a pediatric case?
(A) The entire console should be battery operated.
(B) The console should be light in weight and portable.
(C) The arterial pump head should operate for long hours.
(D) The arterial pump head should accept 1/4 inch tubings.
3. Which of the following is a rare complication of descending thoracic aorta clamping?
(A) Liver dysfunction.
(B) Paraplegia.
(C) Sphincter disturbance.
(D) Lower limb gangrene.
4. Major advantage of venous reservoir bag over hardshell venous reservoir is:
(A) Compact to transport.
(B) Safety w.r.t. Air embolism.
(C) Lowest possible prime volume.
(D) Ease of assembly and priming.
5. Filtration capacity of a screen filter depends upon:
(A) Material used.
(B) Pore size.
(C) Thickness.
(D) Number of filters in the series.
6. A line is connected from an arterial filter to cardiotomy reservoir for:
(A) Removal of platelet clumps.
(B) Removal of clot, fibrin shreds and calcium.
(C) Escape of trapped air.
(D) As a recirculation line to improve oxygenation.
7. During partial CPB, the best way of knowing whether the perfusion is pulsatile is by checking:
(A) Urine output.
(B) Pulse oximeter tracing.
(C) Pa diastolic pressure.
(D) Mean arterial pressure.
8. A water to blood leak would give rise to all, except:
(A) Increase in reservoir volume.
(B) Increase in pH.
(C) Decrease in hemoglobin.
(D) Hemoglobinuria.

9. Hypothermia can lead to all of the following, except:
- (A) Decreased renal flow.
 - (B) Reduction in cerebral metabolism by 50% at 28⁰ C.
 - (C) Increase in plasma volume.
 - (D) Hypokalemia.
10. The maximum acceptable water pressure at inlet of heat exchanger in membrane oxygenator is:
- (A) < 40 psi.
 - (B) < 60 psi.
 - (C) < 80 psi.
 - (D) < 100 psi.
11. Performance Index' of an arterial cannula is:
- (A) Internal diameter / External diameter.
 - (B) Flow / External diameter.
 - (C) Pressure gradient / External diameter.
 - (D) Pressure gradient / Flow.
12. The narrowest component of venous limb of the circuit is:
- (A) Cannula tip.
 - (B) Body of cannula.
 - (C) Cannula - venous line connection.
 - (D) Venous line.
13. Pressure drop across the best oxygenators at a flow of 5litres /min, is (in mm of Hg):
- (A) <120.
 - (B) <70.
 - (C) <40.
 - (D) <10.
14. Sieving Coefficient' for any solute during ultrafiltration, at best, could be:
- (A) 0.5.
 - (B) 1.0.
 - (C) 2.0.
 - (D) 4.0.
15. During a conventional CPB, which of the following gases is the most likely component of gaseous micro emboli?
- (A) Oxygen.
 - (B) Nitrogen.
 - (C) Carbon dioxide.
 - (D) Carbon monoxide.
16. The role played by glutamate in St. Thomas cardioplegia is:
- (A) Provide substrate.
 - (B) Immediate diastolic arrest.
 - (C) Prevention of reperfusion oedema.
 - (D) Membrane stabilisation.

17. Histidine in HTK Custodial Cardioplegia acts as:
- (A) An enhancer of buffering capacity.
 - (B) A cell membrane stabilizer.
 - (C) Improves ATP production during reperfusion.
 - (D) An inhibitor of lactate production.
18. Trans-Esophageal Echo is useful in the operation theatre in all of the following ways, EXCEPT:
- (A) Adequacy of deairing the heart.
 - (B) Filling of the heart while coming off CPB.
 - (C) Adequacy of perfusion on CPB.
 - (D) Placement of aortic and venous cannulae.
19. In which of the following cases retrograde cerebral perfusion was first used?
- (A) Arch aneurysm.
 - (B) Ascending aortic dissection.
 - (C) Cerebral air embolism.
 - (D) Brain tumour operation.
20. A patient, on IABP for many days, is for open heart surgery. Which of the following is least expected in the case?
- (A) Heparin resistance.
 - (B) Stroke.
 - (C) Serum creatinine = 1.5mg%.
 - (D) Lower limb ischemia.
21. What is rated flow of oxygenator?
- (A) Max amount of blood that can pass through oxygenator per minute.
 - (B) Max rate of blood flow that oxygenator can tolerate without causing leakage.
 - (C) Amount of blood with 75% SpO₂ that can be fully oxygenated per minute.
 - (D) Max stroke volume from pump that can pass with maintaining absolutely normal line pressure.
22. At what point of CPB it is appropriate to stop ventilation of lungs?
- (A) After cross clamping.
 - (B) After venous cannulation.
 - (C) After arterial cannulation.
 - (D) After initiation of cardioplegia.
23. Modified Carpentier's procedure, Starness procedure, Cone procedure-all these are related to:
- (A) HLHS.
 - (B) Interrupted aortic arch.
 - (C) Ebstein anomaly.
 - (D) Kawasaki disease.
24. For pediatric and neonatal ICR cases which of the understated method is used to determine how much PRBC to add during priming:
- (A) $C1V1=C2V2$.
 - (B) $75 \cdot B \cdot W \cdot (Pt's \text{ HCT} - \text{Target HCT}) / \text{Target HCT}$.
 - (C) $\{(Pt's \text{ blood volume} \cdot \text{Preoperative HCT}) / \text{Target HCT}\} - Pt's \text{ Blood Volume}$.
 - (D) $\{(Pt's \text{ blood volume} + \text{CPB Priming volume}) \cdot \text{required HCT rise}\} / \text{HCT of packed cell}$.

25. Surface area of standard membrane lung ranges in:
- (A) 0.6-4 sq.m.
 - (B) 1-2 sq.m.
 - (C) 20-50 sq.m.
 - (D) 0.2-0.9 sq.m.
26. Heparin resistance is diagnosed when:
- (A) ACT<480 despite Heparin>400units/kg.
 - (B) ACT<400 despite Heparin>600units/kg.
 - (C) ACT<400 despite Heparin>300units/kg.
 - (D) ACT<480 despite Heparin>500units/kg.
27. For spinal protection during aortic surgery recommended rate of CSF drainage is:
- (A) 20 ml/hr.
 - (B) <30 ml/hr.
 - (C) >30 ml/hr.
 - (D) <15 ml/hr.
28. Approx. rate of blood drained from aorta during MUF should be:
- (A) 5-10ml/kg/min.
 - (B) 10-25ml/kg/min.
 - (C) 20-40ml/kg/min.
 - (D) 40-45ml/kg/min.
29. In adult patient during SACP, MAP should be maintained approx.:
- (A) Less or equals 50mmHg.
 - (B) Less or equals 65mmHg.
 - (C) Less or equals pre operative SBP of patient.
 - (D) Less or equals 25mmHg.
30. RCP blood flow optimized by maintaining pressure in SVC approximate:
- (A) 25mmHg.
 - (B) 40 mmHg.
 - (C) 15 mmHg.
 - (D) 20 mmHg.
31. Which group of patient are more vulnerable to develop Horrow type II protamine reaction during heparin neutralization?
- (A) Hypertensive.
 - (B) Diabetic.
 - (C) Diabetic who are on protamine containing Insulin (NPH).
 - (D) None of the above.
32. ECCO₂R is beneficial in:
- (A) Respiratory acidocis.
 - (B) Respiratory alkalosis.
 - (C) Metabolic acidocis.
 - (D) None of the above.

33. In a pediatric acyanotic ICR within a few moments of starting CPB hematuria started. What can be the most probable cause?
- (A) Hemolysis.
 - (B) Blood transfusion reaction.
 - (C) AKI.
 - (D) Oedema.
34. During complete CPB if your surgeon tells you that patient's heart is distending what should be your strategies to encounter the situation?
- i) Increase your flow.
 - ii) Decrease your flow.
 - iii) Decrease temp.
 - iv) Decrease vent.
 - v) Increase temp.
 - vi) Increase vent.
 - vii) Use GTN infusion.
- (A) All of the above.
 - (B) i, iii & vii.
 - (C) i, v, vi & vii.
 - (D) ii, iii, & vi.
35. Before starting CBP you have checked your hemotherm for proper water level but after starting hypothermia hemotherm starts to show low water level alarm. No water leakage to patient was confirmed with proper inspection. Then what can be the probable causes?
- (A) Water has evaporated out of the chamber.
 - (B) Ice is formed inside the chamber.
 - (C) Water has not been changed for too long.
 - (D) Both a & b.
36. If Just after opening chest surgeon finds a significant LSVC then you have to add a different venous line for LSVC then after connecting it to main venous line with Y connector how it will be primed?
- (A) Priming of that line is not required at all.
 - (B) Line will be primed from surgeon side manually with syringe.
 - (C) Put a clamp at the junction of reservoir and venous drainage line and recirculate with controlled flow.
 - (D) None of the above.
37. Stroke volume of ½" tubing is:
- (A) 45ml.
 - (B) 54ml.
 - (C) 27ml.
 - (D) 36ml.
38. Central partial bypass is done for:
- (A) Ascending aortic surgery.
 - (B) Proximal arch surgery.
 - (C) Distal arch surgery.
 - (D) Descending aortic surgery.

39. When patient is already on IABP support preoperatively and is also suspected to require IABP support on post operative period then what can be the strategy for IABP during CPB?
- (A) Totally turned off.
 - (B) Full support with pre-op assist ratio.
 - (C) Turned on in very low assist ratio.
 - (D) Remove the IABP before CPB.
40. Which bypass line in CPB circuit is kept as a safety measure for hazards like intra CPB oxygenator clot or oxygenator leakage?
- (A) Arterial filter bypass.
 - (B) Oxygenator to reservoir bypass.
 - (C) Arterial filter to reservoir bypass.
 - (D) Oxygenator inlet to outlet bypass.
41. Reperfusion injury related with:
- (A) Stunning.
 - (B) Cardiac arrhythmia.
 - (C) Myocardial necrosis.
 - (D) All of the above.
42. Taped cardioplegia temperature is:
- (A) 32-35°C.
 - (B) 28-32.
 - (C) 18-22.
 - (D) None of the above.
43. HTK cardioplegia arrest the heart by:
- (A) Repolarization.
 - (B) Depolarization.
 - (C) Hyperpolarization.
 - (D) None of the above.
44. Severe PAH can be managed using by:
- (A) Sildenafil citrate.
 - (B) Nitric oxide.
 - (C) All of the above.
 - (D) None of the above.
45. The 'two minute drill' is very closed to:
- (A) Perfusionist.
 - (B) Surgeon.
 - (C) Anaesthetist.
 - (D) . Attending Nurse
46. Cross circulation for clinical intra-cardiac operations was an immense departure from established surgical practice in the year:
- (A) 1964.
 - (B) 1954.
 - (C) 1950.
 - (D) None of the above.

47. DeBakey classification of thoracic aortic dissection type II indicates:
- (A) Descending aorta only.
 - (B) Ascending aorta only.
 - (C) Arch of aorta.
 - (D) All of the above.
48. In aortic arch surgery CSF drainage is allowed to keep the pressure:
- (A) <10 mmHg.
 - (B) <20 mmHg.
 - (C) <15 mmHg.
 - (D) . >15 mmHg
49. Water stone shunt between:
- (A) SVC ascending aorta.
 - (B) Ascending aorta MPA.
 - (C) Ascending aorta RPA.
 - (D) None of the above.
50. Potential complication of port access cardiac surgery:
- (A) Aortic dissection.
 - (B) Acute limb ischemia.
 - (C) Coronary sinus or right ventricular perforation.
 - (D) All of the above.
51. On full CPB, prior to aortic cross clamping, RA is not completely empty. Which of the following causes is NOT responsible for the clinical situation?
- (A) Patient has an additional ASD.
 - (B) Inadequate gravity force for drainage.
 - (C) Venous line partly kinked.
 - (D) IVC cannula wedged into hepatic vein.
52. Immediately after being on total CPB, before aortic cross clamping, heart fibrillates and LV distends. Which of the following causes is NOT responsible for the clinical situation?
- (A) More than grade I AR.
 - (B) More than grade I MR.
 - (C) Presence of PDA.
 - (D) Large number of broncho-pulmonary collaterals.
53. Almost empty reservoir, low arterial pressure with empty heart on CPB is diagnostic of which of the following conditions?
- (A) Incomplete occlusion of roller pump-head.
 - (B) Wrong calculation of body surface area, hence wrong flows.
 - (C) Recirculating line open.
 - (D) Retroperitoneal dissection due to femoral cannula.
54. During a redo AVR with normal coronary arteries, a surgeon insists on delivering the first dose of cardioplegia by retrograde route rather than by ostiacardioplegia route, mainly because:
- (A) Visualise annulus well.
 - (B) Unhindered surgery.
 - (C) Previous prosthesis obstructs view of ostium.
 - (D) It offers a better myocardial.

55. In a case with ASD, on total CPB, prior to cross-clamping of aorta, RA is empty but on snaring SVC & IVC, RA becomes full immediately. This suggests which of the following clinical situations?
- (A) IVC cannula wedged into hepatic vein.
 - (B) Too small IVC cannula.
 - (C) Presence of L-SVC.
 - (D) Venous line kinked
56. Following an open heart surgery, a patient is shifted to intensive care. Two hours later, patient is found to have excessive drainage and is required to place on CPB again to control hemorrhage. Which of the followings will be the perfusionist's main concern?
- (A) Availability of blood for priming.
 - (B) Possibility of heparin resistance.
 - (C) Serum creatinine levels.
 - (D) Serum potassium levels.
57. Sudden air-locking of venous line can occur during what stage of MV replacement surgery?
- (A) During longitudinal paraseptal left atriotomy.
 - (B) After excising calcific mitral valve.
 - (C) While suturing prosthetic valve.
 - (D) While suturing lower angle of left atriotomy.
58. Which of the following operations is performed with a bicaval cannulation but without caval tourniquets?
- (A) ASD closure.
 - (B) Correction of TAPVC.
 - (C) TOF correction.
 - (D) Open Mitral Valvotomy with LA clot removal.
59. If a patient is operated immediately following a complication of coronary angioplasty, the perfusionist should be concerned about:
- (A) Dissection during aortic cannulation.
 - (B) Urine output.
 - (C) Cerebral perfusion.
 - (D) Accelerated leucocyte activation.
60. A patient with MSMR, ASAR with severe PH is being operated for MVR + AVR. While coming off CPB, patient is in NSR, SpO₂ is 100%, CVP of 1mm of Hg, ABP of 88/54 of Hg. To bring up ABP, one should FIRST:
- (A) Start dopamine drip.
 - (B) Start adrenaline drip.
 - (C) Return volume via arterial line.
 - (D) Give head low of 25 degree.
61. During On-Pump CABG using LIMA & RIMA, at near end of CPB, the reservoir level is very low. The loss of volume must be in:
- (A) 1st space.
 - (B) 2nd space.
 - (C) 3rd space.
 - (D) 4th space.

62. After repair of TOF, patient is just off CPB. The surgeon wishes to lift heart to check bleeding. The bleeding is likely from:
- (A) Cardioplegia cannulation site.
 - (B) RSPV vent.
 - (C) Right atriotomy.
 - (D) RVOT patching.
63. Which of the following is an indication of redoing LIMA – LAD distal anastomosis?
- (A) Pulmonary artery diastolic pressure = 20 mm of Hg.
 - (B) Gr I-II MR on TEE.
 - (C) 2 mm ST elevation in lead I.
 - (D) Hypokinesia of postero-lateral segment on TEE.
64. Pulse oximeter cannot be used on a conventional CPB to monitor arterial saturation because of:
- (A) Hypothermia.
 - (B) Hemodilution.
 - (C) Alkalosis.
 - (D) Flow is not pulsatile.
65. On total CPB, RA & MPA are full. The measure that should NOT be taken is, to:
- (A) Search for PDA.
 - (B) Adjust the venous cannula position.
 - (C) Increase the gravity force.
 - (D) Quickly cross-clamp the aorta.
66. Trans-Oesophageal Echocardiography is NOT useful in assessing:
- (A) Mitral valve area.
 - (B) LVEF.
 - (C) Coronary blocks.
 - (D) Chamber dimensions.
67. Swan – Ganz catheter provides information about:
- (A) JVP.
 - (B) RA pressure.
 - (C) RVEDP.
 - (D) LVEDP.
68. For which of the following conditions temporary epicardial pacing is required in the operation room?
- (A) Repeated ventricular tachycardia.
 - (B) Complete atrio-ventricular dissociation.
 - (C) Sudden onset atrial fibrillation.
 - (D) Repeated ventricular fibrillation.
69. A surgeon wishes to insert retrograde cardioplegia cannula only after instituting CPB. During insertion of the retrograde cardioplegia cannula, perfusionist should:
- (A) Reduce arterial flows.
 - (B) Cool the patient quickly.
 - (C) Keep heart partly filled.
 - (D) Keep the cardiotomy suctions at full speed.

70. While delivering retrograde cardioplegia with cannula (RCC) through coronary sinus (CS), at a rate of 200ml/ min, the CS pressure is 75 mm of Hg. The cause of pressure of 75 mm of Hg is:
- (A) Too fast delivery of cardioplegia.
 - (B) RCC is in one of the tributary of coronary sinus.
 - (C) Diffuse atherosclerotic disease of coronary veins.
 - (D) CS ostial stenosis 80.
71. On CPB, anesthetist stops ventilation:
- (A) Immediately after CPB is started.
 - (B) After 'total' CPB is established.
 - (C) After desired temperature is reached.
 - (D) After cardioplegically stopping the heart.
72. All of following is expected in Robotic surgery EXCEPT:
- (A) No incision, only ports.
 - (B) Assisted venous drainage.
 - (C) Percutaneous arterial cannulation.
 - (D) Very short CPB and cross clamp times.
73. A case of VSD with severe PH, has an excessive return through the vent passed through RSPV during VSD closure surgery. The suspected cause is:
- (A) Additional PDA.
 - (B) MAPCA.
 - (C) Additional AR.
 - (D) Incomplete aortic cross clamping.
74. Which of the following structures can never be damaged during median sternotomy?
- (A) Left Innominate vein.
 - (B) Ascending aorta.
 - (C) RV.
 - (D) LV.
75. In a case with TOF, surgeon will ask to reduce the flows:
- (A) So as to insert the RSPV vent.
 - (B) While delivering cardioplegia.
 - (C) During VSD closure.
 - (D) During RVOT patching.
76. Bilateral pulmonary thrombo-endarterectomy is performed with which of the following techniques?
- (A) Pump standby, on IABP and cell saver.
 - (B) Deep hypothermia circulatory arrest.
 - (C) On Pump, Cardioplegically arrested heart at 280 C.
 - (D) On pump, Beating heart at 370 C.
77. During operation of which of the following conditions cardioplegic arrest by root injection will be possible?
- (A) A-P window.
 - (B) Ascending aortic aneurysm.
 - (C) RSOV into RA without AR.
 - (D) RSOV into RV without AR.

78. The technique of “cross circulation” is attributed to:
- (A) Gibbon.
 - (B) Lillehei.
 - (C) DeBakey.
 - (D) Buckberg.
79. Blood cardioplegia was re-introduced and popularised by:
- (A) Gibbon.
 - (B) Lillehei.
 - (C) DeBakey.
 - (D) Buckberg.
80. The roller pump was invented by:
- (A) Gibbon.
 - (B) Lillehei.
 - (C) DeBakey.
 - (D) Buckberg.
81. In a case with multiple L to R shunts, PDA is closed:
- (A) Before commencing CPB.
 - (B) Only after on full CPB, before cooling.
 - (C) After aortic cross-clamping, just before cardiotomy.
 - (D) On achieving hemodynamics off CPB.
82. Ascending aorta should be cannulated as distally as possible in all of the following cases, except:
- (A) Severe AS with IHD for AVR with CABG.
 - (B) Severe MR for MV repair.
 - (C) AP window repair.
 - (D) On pump CABG.
83. In Off-Pump CABG surgery, the first distal anastomosis is placed on LAD. Which of the following facts is the least important reason for doing so?
- (A) In patients referred for surgery, it is usually significantly blocked.
 - (B) It is an important artery as it supplies 5 out of 10 segments of heart.
 - (C) Its exposure requires least manipulation of heart.
 - (D) It is on the anterior surface of heart in ‘side on’ position.
84. A ‘well controlled’ patient following MVR with a mechanical valve should have an INR of:
- (A) 1.1.
 - (B) 2.0.
 - (C) 2.7.
 - (D) 3.8.
85. A ‘well controlled’ patient following AVR with mechanical valve will have an INR of:
- (A) 1.2.
 - (B) 2.2.
 - (C) 3.5.
 - (D) 4.5.

86. A patient with 4day old post infarct VSD is for closure of VSD. Which of the following statements is the least likely statement?
- (A) PCW mean pressure of the patient is 8mm of Hg.
 - (B) Femoral artery cannulation is not required for conducting CPB.
 - (C) Patient will be on ventilator for pulmonary oedema.
 - (D) Bicaval venous cannulation with snugging of cave will be required.
87. A head-low position is given in all of the following situations, except:
- (A) Off-pump OM anastomosis.
 - (B) Retrograde cerebral perfusion.
 - (C) Retrograde coronary sinus perfusion.
 - (D) Circulatory arrest during arch replacement.
88. Which of the following events is expected on CPB after closing a patent BT shunt in a case with TOF?
- (A) CVP drops to zero.
 - (B) Mean arterial pressure increases.
 - (C) Arterial pCO₂ improves.
 - (D) Arterial pO₂ improves.
89. Which of the following is the least likely complication following cross clamping of descending thoracic aorta for a thoraco-abdominal aneurysm?
- (A) Renal failure.
 - (B) Paraplegia.
 - (C) Lower limb gangrene.
 - (D) Mesenteric ischemia.
90. A Surgeon confirms 'proper' placement of aortic cannula by checking all of the followings EXCEPT:
- (A) Marker on body of the cannula.
 - (B) Adjusting the collar of the cannula.
 - (C) Free flow of blood through the cannula.
 - (D) Feeling the tip of the cannula through the aorta.
91. Ventricular fibrillation, on CPB prior to aortic cross clamping is most damaging in which of the following conditions?
- (A) ASD closure.
 - (B) AR for AVR.
 - (C) CAD for CABG.
 - (D) MR for MVR.
92. The danger of repeating cardioplegia during mitral valve surgery is:
- (A) Right coronary air embolism.
 - (B) Increased venous return to la.
 - (C) Wet operating field.
 - (D) Calcium particulate embolism.
93. Which of the following strategies DOES NOT protect spinal cord, during surgery for thoraco-abdominal aneurysm?
- (A) CSF drainage.
 - (B) Distal aortic perfusion.
 - (C) Selective celiac artery perfusion.
 - (D) Mild hypothermia.

94. For which of the following associated procedures with CABG, bicaval cannulation will be required?
- (A) Ascending aortic aneurysm repair.
 - (B) MV Repair.
 - (C) LV aneurysm repair.
 - (D) Aortic valve replacement.
95. In which of the following conditions the aorta will be cross clamped very early to avoid distension of heart?
- (A) Severe aortic stenosis.
 - (B) Aorto-pulmonary window.
 - (C) Large VSD.
 - (D) Severe mitral stenosis.
96. If the surgeon proposes to cross-clamp the aorta early in a case, then the perfusionists duty is to:
- (A) Prime extra volume particularly with blood.
 - (B) Never to cool the case and keep the temperature above 320C.
 - (C) To keep cardioplegia ready right at start of CPB.
 - (D) Keep aortic pressure high by starting phenylephrine.
97. Accidental sucking of saline in the cardiotomy suctions should be watched during which of the following steps of MV replacement surgery?
- (A) During dissecting the inter atrial septum.
 - (B) After excising mitral valve.
 - (C) While suturing prosthetic valve.
 - (D) While suturing left atriotomy.
98. During a secundum ASD closure operation, the venous reservoir level suddenly falls on opening the RA due to venous line airlock & the blood is drained only through cardiotomy suctions. The cause is:
- (A) Aortic dissection by the cannula tip.
 - (B) Venous line kink.
 - (C) Inadequate snaring of venous cannule.
 - (D) Missed PDA.
99. The outlet of retrograde cardioplegia is all of the following , EXCEPT:
- (A) RCA into aorta.
 - (B) LCA into aorta.
 - (C) Thebesian veins into RA, RV.
 - (D) Thebesian veins into IVC.
100. In a case for excision of LA myxoma, the left heart is vented through:
- (A) RSPV.
 - (B) LA.
 - (C) MPA.
 - (D) Aortic root.