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ROLL NUMBER

WRITTEN TEST FOR THE POST OF PERFUSIONIST – A

DATE : 23/06/2017 TIME : 09.30 AM

DURATION : 90 MINUTES TOTAL MARKS : 80

INSTRUCTIONS TO THE CANDIDATE

1. Write your Roll Number on the top of the Question Booklet and in the OMR sheet.
2. Each question carries 1 mark.
3. There will not be any Negative Marking.
4. Darken only the bubble corresponding to the most appropriate answer.
5. Marking more than one answer will invalidate the answer.
6. Candidate should sign on the question paper and OMR sheet.
7. Candidate should hand over the question paper and OMR sheet to the invigilator before leaving the examination hall.

Signature of the Candidate

WRITTEN TEST FOR THE POST PERFUSIONIST – A

1. Dr. F. John Lewis performed the first successful open-heart surgery (closure of ASD) using general hypothermia and inflow occlusion in
   A. 1950 B. 1952 C. 1953 D. 1955
2. The "azygos flow concept" led to the first clinical use of controlled cross-circulation for closure of VSD on March 26, 1954, by
   A. Dr. C. Walton Lillehei
   B. Dr. John H. Gibbon
   C. Dr. John W. Kirklin
   D. Dr. Frederick Cross
3. The major problems associated with early open-heart surgery were all **except**
   A. No method for emptying the heart for reasonable lengths of time
   B. Unfamiliar pathology
   C. Inaccurate diagnosis
   D. Air Embolism
4. The advantages of Bubble oxygenators are **except**
   A. Simplicity
   B. Can be made from Indigenous materials
   C. No air embolism
   D. Cost effective
5. The following statements are true regarding the history of development of Heart Lung Machine and Oxygenators **except**
   A. Early perfusion devices had limited capability to exchange gases, which limited their use in isolated organ experiments
   B. Physiologists used whipping, bubbling, spraying, and filming the venous blood to add oxygen and remove carbon dioxide in laboratory experiments
   C. On May 6, 1953, the heart-lung machine was used successfully by Dr. C. Walton Lillehei during closure of an ASD in an 18-year-old girl
   D. In 1929, Brukhonenko speculated that artificial circulation of blood might some day be applicable for cardiac surgeries in humans
6. The main advantages of Displacement pumps are all **except**
   A. Absence of Spallation
   B. Simplicity of operation
   C. Low cost of disposable tubing
   D. Reliability
7. The output of an occlusive roller pump depends on all **except**
   A. Number of rotations of the pump head
   B. Internal diameter of the tubing
   C. Length of Tubing
   D. Length of contact of the roller with the tube

8. Regarding Occlusion setting the following statements are true **except**
   A. Over occlusion is undesirable as it decreases the lifetime of the tubing
   B. Historically, "minimal occlusion" was seen as the best solution
   C. Currently most perfusionists prefer a slightly Over occlusive pump
   D. Occlusion can be tested by static or dynamic techniques
9. The main disadvantage of Centrifugal Pump is
   A. The rate of flow depends on inlet pressure, outlet pressure and resistance
   B. It generate heat energy
   C. It can cause Venturi effect
   D. A flow meter is a must
10. Of the following pumps which is most suited for Ventricular Assist devices
   A. Roller Pumps
   B. Centrifugal Pumps
   C. Axial Pumps
   D. Diagonal Pumps
11. Who introduced the concept? "whole body hypothermia might be useful in Cardiac Surgery"
   A. Boerema and colleagues
   B. Kriklin and Barrett-Byes
   C. Bigelow and colleagues
   D. Borst and colleagues
12. Use of Hypothermic circulatory arrest in combination with CPB in adults was first reported by
   A. Bernard and colleagues
   B. Guiot and colleagues
   C. Weiss and colleagues
   D. Bigelow and colleagues
13. Centrifugal pump has not been widely adopted at ECMO centres. Why?
   A. It requires continuous servo regulation and pressure monitoring
   B. Excessive negative circuit pressure may result in cavitation
   C. Excessively elevated circuit pressure may result in circuit rupture
   D. Incompatible with membrane oxygenators due to increased intrinsic resistance to flow
14. Protamine infusion may cause all **except**
   A. Produce severe bronchospasm
   B. Elevate Systemic vascular resistance
   C. Cause Hypotension
   D. Allergic reaction
15. Safe duration of CPB depends on all **except**
   A. Duration of CPB
   B. Age of patient
   C. Type of priming solution used
   D. Type of Oxygenator used
16. Size of Arterial and Venus cannula is determined primarily by
   A. Perfusion flow rate
   B. Type of Venus return
   C. All of the above
   D. None of the above

17. Calculate the circulating Haematocrit
Patients Preoperative **Hb 10 gm%, Wt 60 Kg ,Blood volume 5L** and **Priming Volume 1200 ml**
A. 36 B. 26 C. 24 D. 32

18. The following are the common sites of Venting **except**
A. Right Superior Pulmonary vein
B. Left Atrium
C. Right Atrium
D. Root of Aorta

19. Regarding Miniaturised CPB the following are true **except**
A. It is developed to reduce the damaging effects of conventional CPB
B. Reduced hemodilution improves outcome
C. Venous reservoir is small
D. The components are heparin coated

20. Two stage venous cannula is used in all **except**
A. MVR+AVR
B. MVR+TVR
C. AVR+CABG
D. CABG alone

21. The indication for Closed Mitral valvotomy is
A. Severe MS+ Severe AR
B. Severe MS +mild MR
C. Severe MS + Calcium
D. Severe MS+LA Clot

22. The disadvantage of Ascending Aortic Cannulation is
A. Not readily accessible
B. Cerebral air embolism
C. Size of Cannula is a limitation
D. Complications related to cannulation is difficult to detect

23. Left Heart returns in arrested heart
A. It is approximately 20% of cardiac output
B. Comes via bronchial arteries
C. Opens into pulmonary artery
D. Cause rewarming of arrested heart

24. The drug which cause Vasoplegia is
A. Adrenaline
B. Dopamine
C. Enalapril
D. Milrinon

25. Regarding Left SVC all are true **except**
A. Formed by LSCV+LIJV
B. Opens into coronary sinus
C. Can be ligated if small
D. It is proportional to the size of Left Innominate vein

26. Complications of Aortic Cannulation are all **except**
    A. Dissection of Aorta
    B. Selective cannulation of neck vessels
    C. Spallation
    D. Cannula tip abutting against the posterior wall
27. All of the followings are causes of RA remaining full even on full CPB **except**
    A. Presence of Lt SVC
    B. IVC Cannula wedged in hepatic veins
    C. IVC cannula displaced into RA/RV
    D. SVC cannula in RA
28. Cooling on CPB is delayed in
    A. Aortic Regurgitation
    B. Mitral Regurgitation
    C. Till Patent BT shunt is ligated
    D. During release of Intra pericardial adhesions
29. Complications of Aortic Cross clamping include all **except**
    A. Incomplete clamping of Aorta
    B. Accidental clamping of tip of Aortic cannula
    C. Injury to LPA
    D. Injury to RPA
30. During delivery of Ante grade Cardioplegia surgeon checks the following **except**
    A. Aortic root should be distended
    B. PA should be distended
    C. No LV distension
    D. Quick diastolic arrest of the heart
31. Osteal route Cardioplegia is given in all cases of
    A. AVR
    B. CABG
    C. MVR
    D. VSD Closure
32. Complications of AVR include all **except**
    A. Bleeding from suture line
    B. Valve dehiscence
    C. Conduction block
    D. Coronary osteal obstruction
33. The commonest cause of aortic Regurgitation in young adult
    A. Marfan Syndrome
    B. Rheumatic Heart Disease
    C. Syphilitic Heart Disease
    D. Infective Endocarditis

34. Regarding Oxygenators all are true **except**
    A. Oxygenate venous Blood
    B. Represents the largest surface area to which circulating blood is exposed
    C. Performing many functions of the native lung including endocrine and Biologic transformation of humoral factors
    D. Oxygenators must perform flawlessly during each procedure in which they are utilized
35. Of the following statement regarding natural lung **one is correct**
    A. Surface area 0.6 m^2
    B. Blood Path width 200microns
    C. Blood Path length 250000microns
    D. Membrane Thickness 0.5 microns
36. An ideal artificial lung
    A. Use micro porous membrane materials for Oxygenation
    B. Transfers gases at physiologic blood flow rates with minimal blood trauma and priming volume
    C. Integrate multiple components like filters and pumps
    D. Have much smaller surface areas and are limited by diffusion
37. During CPB to prevent formation of gaseous microemboli, the temperature gradient between water and blood **should not exceed**
    A. 6°C B. 8°C C. 10°C D. 12°C
38. Oxygen Reference Blood Flow of an oxygenator is
    A. Oxygen content increased by 45 mL O_2 /L blood flow through Oxygenator at STP
    B. Oxygen content increased by 60 mL O_2 /L blood flow through Oxygenator at STP
    C. Oxygen content increased by 75 mL O_2 /L blood flow through Oxygenator at STP
    D. Oxygen content increased by 100 mL O_2 /L blood flow through Oxygenator at STP
39. Initial Priming Volume
    A. The minimum volume contained in the venous reservoir recommended by the manufacturer at the reference blood flow and reference oxygen flow
    B. Volume of blood contained in the device at the maximum reservoir level recommended by the manufacturer at reference blood flow and reference oxygen flow
    C. Volume of blood to fill the blood phase of the device, including the heat exchanger, to the manufacturers recommended minimal reservoir level
    D. The maximum volume of blood in the reservoir to avoid air embolism
40. The commonest material used for Oxygenator Coating is
    A. Polyethylene oxide C. Phosphorylcholine
    B. Heparin D. Methoxyethylacrylate

41. Stealth perfusion means CPB in which
    A. Patient's vascular system is used as the venous reservoir
    B. The reservoir can store large volume of blood
    C. Shed blood is collected in a separate reservoir
    D. Bubble Oxygenator is used
42. Maximum Oxygen transfer of Artificial Lung is
    A. Less than 10%
    B. Less than 50%
    C. Less than 25%
    D. Less than 100%
43. Important aspects of micro porous membrane lungs include
    A. Absence of a direct blood-gas interface once the membrane develops a proteinaceous coating
    B. Relatively high resistance to flow
    C. Independent regulation of $PaCO_2$ and PaO_2
    D. They are true membranes
44. Reference blood flow of an Oxygenator is a blood flow of
    A. 5 L/min B. 7 L/min C. 8 L/min D. 10 L/min
45. In bubble Oxygenator the position of pump is
    A. After Oxygenator
    B. Before Oxygenator
    C. After reservoir
    D. Before reservoir
46. A 60 yrs old patient with a surface area of 1.8 m^2(total estimated flow, 5.4 L/min; SVC, 1.8 L/min; IVC, 3.6 L/min) at a siphon (gravity) gradient of 40 cm would require **at least**
    A. 28 F SVC, 32 F IVC
    B. 30 F SVC, 34 F IVC
    C. 28 F SVC, 34 F IVC
    D. 30 F SVC, 28 F IVC
47. Regarding persistent Left Superior Vena Cava the following are true **except**
    A. A LSVC is present in approximately 0.3% to 0.5% of the general population
    B. It usually drains into the coronary sinus and then into the RA
    C. Large coronary sinus is present only in case of persistent Lt SVC
    D. It may confuse and complicate passage of a pulmonary artery (PA) catheter
48. The most important complication Associated with Left Heart Venting is
    A. Systemic air embolism
    B. Infection
    C. Bleeding
    D. Rupture of LV
49. The main difference between routine CPB circuit and ECMO is
    A. No Oxygenator
    B. No Tubing for blood flow
    C. No reservoir
    D. No Arterial filter
50. Regarding Haemo filters the following are true **except**
    A. Contain semipermeable membranes
    B. Used to remove excess fluid or electrolytes
    C. Always a pump must be used to propel blood through the device
    D. Fluid removal can be as great as 180 mL/min

51. Modified Ultra Filtration refers to
    A. Filtering the blood before CPB
    B. withdrawing blood from the patient, after weaning from CPB, and passing it through a hemoconcentrator and pumping it back into the patient
    C. Use of Semipermeable membrane is a must
    D. Filtering the blood using haemo concentrator during CPB
52. The commonest material used for surface coating of CPB circuit is
    A. Trillium
    B. Heparin
    C. Polymethoxyethylacrylate
    D. Phosphorylcholine
53. The Best Practice Perfusion Group has made the following recommendations regarding CPB **except**
    A. In all patients epi-aortic scanning should be employed before aortic instrumentation
    B. Patients undergoing CPB should be perfused at arterial inflow temperature ;not exceeding 37°C
    C. Efforts should be made to limit periop blood glucose level to less than 200 mg/dL
    D. Efforts should be made to utilize cell saving and filtration of aspirated blood exposed to pericardial and mediastinal surfaces in order to minimize their direct reinfusion into the ECC.
54. No-reflow Phenomenon in Deep Hypothermic Circulatory arrest
    A. Develop as a result of circulatory arrest
    B. As a result of low regional blood flow
    C. Develop as a result of severe hypoxia
    D. As a result of steal phenomena
55. Diffusion is
    A. Spontaneous intermingling of two gases even against the force of gravity
    B. Diffusion and Osmosis are same
    C. Diffusion is the movement of solutes in a solution from an area of lower concentration to an area of higher concentration
    D. A semipermeable membrane should separate the solute and solvent
56. Regarding ultra-filtration the following statements are true **except**
    A. Process in which the blood is separated from a crystalloid solution by a semipermeable membrane
    B. It is the movement of water across a membrane as the result of a hydrostatic pressure gradient
    C. Dialysate is required on the opposite side of the membrane
    D. The fluid removed during ultrafiltration is called plasma water

57. The first clinical dialysis procedure was performed by
    A. George Haas
    B. Thomas Graham
    C. Adolf Fick
    D. John Jacob Abel
58. Regarding Ultra Filtration the following statement is **false**
    A. Ultrafiltration can concentrate the blood without the removal of plasma proteins
    B. Ultra filtration can reduce lung water and tissue edema
    C. It improves perioperative hemostasis and reduces post operative ventilator support
    D. A patient supported on CPB cannot tolerate a higher rate of ultrafiltration
59. Criteria for Placement of Ventricular Assist Devices are the following **except**
    A. Cardiac Index <2.0L/min/ m^2
    B. Systemic Vascular resistance>200 IU
    C. Atrial pressure <20mmHg
    D. Urine Output <20ml/hr
60. All of them are Contra Indication for Aortic Endoclamps for Aortic occlusion in restricted – Access Cardiac Surgery **except**
    A. Peripheral vascular disease
    B. Aortic Aneurysm
    C. Severe Aortic Stenosis
    D. Marfan Syndrome
61. The surgeon who used surface cooling to 28degree cenigrade with 5.5 min of inflow occlusion to facilitate successful closure of ASD in a 5 year old child
    A. Gibbon
    B. Lewis and Thaufeek
    C. Biglow etal
    D. Sealy etal
62. The temperature of cold Cardioplegia is
    A. -16°C B. -10°C C. -06°C D. -4°C
63. The main difficulty in devising a reasonable strategy for hypo thermia in man is
    A. Poikilotherms
    B. Homeotherms
    C. Can undergo Hybernation
    D. Can undergo Aestivation
64. Regarding hyper thermia the following statement is **true**
    A. Hyperthermia provide organ protection during CPB
    B. Helps to preserve high Energy Phosphates
    C. Increase brain permeability and Neuronal damage
    D. Prevent entry of calcium into the cell

65. Regarding Ph stat the following statement is **false**
    A. pH Stat regulation preserves the ratio of [OH-] to [H+] with change in temperature and produces an alkaline shift with cooling
    B. pH-stat regulation maintains an absolute constant [H+] regardless of temperature, and requires added H+, usually as CO2, with cooling
    C. pH-stat may be beneficial in infants to increase CBF and allow more efficient cooling
    D. Protection of the brain during deep hypothermia (temperature <20°C) may be best accomplished with pH-stat during the initial cooling phase.
66. Advantage of Nikorantil as Cardioplegic additive is all **except**
    A. Less cardioplegia and potassium chloride requirement
    B. Reduced perioperative coronary spasm
    C. Preconditioning
    D. Increased need for catecholamine use postoperatively
67. Potassium Citrate was used to arrest heart during CPB by
    A. Hearse B. Melrose C. Delnido D. Follett
68. Of the following all are **true** regarding Antegrade CP **except**
    A. Delivery may be inadequate in severely diseased coronary arterial circulation
    B. Can be delivered through coronary sinus
    C. Is of no use in severe AR
    D. Direct cannulation of densely calcified coronary ostia leads to embolization
69. Disadvantage of Retrograde Cardioplegia is
    A. Less LA protection
    B. Less RA protection
    C. Less LV protection
    D. Less RV protection
70. The concentration of Potassium in CP solution is
    A. 5 to 10 mmol/L
    B. 10 to 40 mmol/L
    C. 30 to 40 mmol/L
    D. 50 to 60 mmol/L
71. Temparature of warm Cardioplegia is
    A. 16°C-18°C
    B. 28°C-32°C
    C. 34°C-35°C
    D. 44°C-25°C
72. Reperfusion injury is mainly contributed by
    A. Polymorphs
    B. Lymphocytes
    C. Eosinophils
    D. Monocytes
73. N Acetyl Cystine is used as intraoperative Adjuncts for Myocardial Protection
    A. May reduce oxidative stress
    B. Cheap
    C. May not interfere with preconditioning
    D. Limits myocardial injury

74. The following are the character of HITS except
    A. Duration less than 300 ms
    B. Amplitude is >3 dB of blood flow signal
    C. By directional
    D. An accompanying "chirp"-like sound

75. Embolic events during CPB can be reduced by using
    A. In line filters
    B. Bubble Oxygenators
    C. TEE
    D. Epi-arterial Scanning

76. Acute lung injury during CPB can be prevented by use of
    A. Heparin-bonded circuits
    B. Bubble Oxygenators
    C. Leukocyte depletion filters
    D. Corticosteroids

77. Normally healthy brain maintains CBF to an MAP of
    A. 50 to 55 mm Hg
    B. 40to 45mm Hg
    C. 30 to 35mm Hg
    D. 60 to 65 mmHg

78. Methods to improve Neurologic Outcome during CPB include all **except**
    A. MAP above 50
    B. Use Pulsatile flow
    C. Avoid hyperglycaemia
    D. α-stat acid-base management

79. Deep Hypothermia means a temperature of
    A. 5°C-10°C
    B. 10°C-12°C
    C. 13°C-22°C
    D. 23°C-26°C

80. Calculate the pump flow rate of a child of weight 20 Kg
    A. 50-75
    B. 75-100
    C. 80-120
    D. 100-175

PERFUSIONIST : ANSWER KEY (23/06/2017)

1	B	21	B	41	A	61	B
2	A	22	B	42	A	62	D
3	D	23	A	43	D	63	B
4	C	24	C	44	C	64	C
5	C	25	D	45	A	65	A
6	A	26	C	46	B	66	D
7	C	27	D	47	C	67	B
8	C	28	A	48	A	68	B
9	B	29	C	49	C	69	D
10	C	30	B	50	C	70	B
11	C	31	A	51	B	71	C
12	A	32	B	52	B	72	A
13	D	33	C	53	A	73	A
14	B	34	C	54	D	74	C
15	C	35	D	55	A	75	C
16	C	36	B	56	C	76	A
17	C	37	A	57	D	77	A
18	C	38	A	58	A	78	B
19	C	39	A	59	C	79	B
20	B	40	B	60	C	80	C