
SECTION A

PART I: Multiple Choice Questions [30 marks]

Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 31 (d). Each question carries ONE mark. Any double writing, smudgy answers, or writing more than one choice shall not be evaluated.

1. A patient with MS presents with irregularly irregular rhythm and no P waves. Most likely ECG diagnosis:
 - a) Atrial fibrillation
 - b) Atrial flutter
 - c) Sinus arrhythmia
 - d) Junctional rhythm
2. Which finding is most specific for cardiac tamponade on echo?
 - a) Pleural effusion
 - b) Right atrial collapse in systole
 - c) LV hypertrophy
 - d) Dilated LA
3. Which is an absolute contraindication to exercise stress testing?
 - a) Severe aortic stenosis with syncope
 - b) Controlled hypertension
 - c) Mild angina
 - d) Diabetes
4. Target heart rate for maximal stress is calculated as:
 - a) $220 - \text{age}$
 - b) $200 - \text{age}$
 - c) $220 + \text{age}$
 - d) $200 + \text{age}$
5. During an exercise stress test, which of the following findings is considered the most specific indicator of myocardial ischemia?
 - a) Downsloping ST-segment depression ≥ 1 mm at 80 ms after the J-point
 - b) Upsloping ST-segment depression < 1 mm during peak exercise
 - c) Development of frequent premature ventricular contractions (PVCs)
 - d) Achievement of target heart rate without ST changes
6. Contrast (bubble) echo is mainly used to detect:
 - a) LV systolic dysfunction
 - b) Aortic regurgitation
 - c) Intracardiac shunts (e.g., PFO/ASD)
 - d) Mitral stenosis
7. Abdominal aortic aneurysm requiring elective repair in a 65-year-old man:
 - a) Diameter ≥ 5.5 cm
 - b) ≥ 3 cm
 - c) ≥ 4 cm
 - d) Any aneurysm

8. Statins reduce risk of Acute Coronary Syndrome mainly by:
 - a) Lowering LDL, stabilizing plaque, anti-inflammatory effects
 - b) Increasing HDL only
 - c) Reducing BP
 - d) Vasodilation only

9. In a patient with suspected diastolic dysfunction, which echocardiographic parameter is most reliable for estimating LV filling pressure?
 - a) E/A ratio alone
 - b) E/e' ratio
 - c) Deceleration time only
 - d) LV wall thickness

10. Initial pathological step in atherosclerosis:
 - a) Myocyte hypertrophy
 - b) Endothelial injury + lipid infiltration
 - c) Fibrous cap rupture
 - d) Myocardial infarction

11. Regarding radiation safety in Cath Lab, ALARA principle means:
 - a) As Long As Radiation Allows
 - b) As Low As Reasonably Achievable
 - c) Avoid Lead And Radiation Always
 - d) Always Limit And Reduce Activity

12. Which of the following practices reduces patient radiation exposure during fluoroscopy?
 - a) Using high magnification continuously
 - b) Collimating the X-ray beam to the area of interest
 - c) Using maximum frame rate for cine imaging
 - d) Standing closer to the X-ray tube

13. Wedge pressure approximates:
 - a) RA pressure
 - b) LV systolic pressure
 - c) LA pressure
 - d) Pulmonary artery systolic pressure

14. Classic components of TOF include all EXCEPT:
 - a) Ventricular septal defect (VSD)
 - b) Right ventricular outflow tract obstruction (RVOTO)
 - c) Overriding aorta
 - d) Left ventricular hypertrophy

15. Which ECG finding is most characteristic of hyperkalemia?
- a) U waves
 - b) Peaked tall T waves
 - c) ST depression
 - d) QT prolongation
16. The PR interval is considered prolonged when it is:
- a) >0.12 sec
 - b) >0.20 sec
 - c) <0.08 sec
 - d) <0.12 sec
17. Heparin reversal in cath lab is achieved with:
- a) Protamine sulphate
 - b) Vitamin K
 - c) FFP
 - d) Tranexamic acid
18. Coronary blood flow to the left ventricle occurs predominantly during:
- a) Early systole
 - b) Mid systole
 - c) Diastole
 - d) Isovolumetric contraction
19. Which wave of the jugular venous pulse corresponds to atrial contraction?
- a) a wave
 - b) c wave
 - c) v wave
 - d) y descent
20. The Frank-Starling mechanism states that:
- a) Increased preload → increased stroke volume
 - b) Increased afterload → increased stroke volume
 - c) Increased HR → increased contractility
 - d) Increased contractility → increased preload
21. The hallmark echocardiographic feature of constrictive pericarditis is:
- a) Global LV hypokinesia
 - b) Systolic anterior motion of mitral valve
 - c) Septal bounce with ventricular interdependence
 - d) Apical sparing
22. Complication of femoral artery puncture ABOVE the inguinal ligament is:
- a) Pseudoaneurysm
 - b) Retroperitoneal haemorrhage
 - c) AV fistula
 - d) Hematoma only

23. A 50-year-old with chest pain shows ST elevation in V2–V4. The culprit vessel is most likely:
- a) RCA
 - b) LAD
 - c) LCX
 - d) PDA
24. Echo shows severe MR with eccentric jet hugging the LA wall. This is called:
- a) Laminar flow
 - b) Coanda effect
 - c) Bernoulli phenomenon
 - d) Venturi effect
25. The “pigtail” catheter in LV angiography is designed to:
- a) Prevent endocardial injury by side holes
 - b) Deliver stents
 - c) Measure coronary flow reserve
 - d) Cross CTO lesions
26. Pacemaker “capture” on ECG is defined as:
- a) Presence of a pacing spike followed by ventricular depolarization
 - b) Only pacing spike without QRS
 - c) Narrow QRS with sinus P wave
 - d) Absence of T wave
27. A 68-year-old patient with symptomatic bradycardia due to high-grade AV block undergoes DDD pacemaker implantation. Post-implantation ECG shows atrial pacing spikes followed by ventricular pacing spikes, maintaining AV synchrony. Which of the following statements BEST describes the function of a DDD pacemaker in this patient?
- a) Paces only the atrium, ignoring intrinsic ventricular activity
 - b) Paces only the ventricle, without atrial sensing
 - c) Paces and sensed at both atrium and ventricle, while sensing intrinsic activity in both chambers to maintain AV synchrony
 - d) Only senses intrinsic cardiac activity without delivering pacing
28. Hypertension accelerates atherosclerosis by:
- a) Endothelial dysfunction, vascular remodeling
 - b) Increasing only cholesterol
 - c) Only decreasing HR
 - d) Vasodilation
29. On echo, tricuspid regurgitation velocity is used to estimate:
- a) Left Ventricular systolic pressure
 - b) Right Atrial pressure only
 - c) Pulmonary artery systolic pressure
 - d) Pulmonary Capillary Wedge Pressure

30. Optimal BP target for most adults <65 years according to guidelines:
- a) <130/80 mmHg
 - b) <140/90 mmHg
 - c) <120/70 mmHg
 - d) <150/90 mmHg

PART II – Short Answer Questions [20 marks]

This part has 13 Short Answer Questions. Answer ALL the questions. Mark for each question is indicated in the brackets.

- 1. Name the main branches of the right coronary artery (RCA). **(1 mark)**
- 2. Define preload and after load. **(2 marks)**
- 3. Name two common indications for transesophageal echocardiography (TEE). **(2 marks)**
- 4. What is capture and loss of capture in pacemaker function? **(2 marks)**
- 5. What does DDD pacemaker mode stand for? **(1 mark)**
- 6. Name two lab markers commonly used to support heart failure diagnosis. **(1 mark)**
- 7. Give one echocardiographic sign of mitral stenosis. **(1 mark)**
- 8. Name two target organs affected by chronic hypertension. **(2 marks)**
- 9. What is TIMI flow grade 3 and grade 1? **(3 marks)**
- 10. Name two complications of right heart catheterization. **(2 marks)**
- 11. ECG sign of left ventricular hypertrophy? **(1 mark)**
- 12. What is P mitrale on ECG? **(1 mark)**
- 13. What is the role of implantable cardioverter-defibrillator (ICD)? **(1 mark)**

SECTION B: CASE STUDY [50 marks]

This section consists of FIVE questions, and ALL the questions are Compulsory. Mark for each sub-question is indicated in the brackets.

1. A 25-year-old female presents with exertional dyspnea and fatigue. On examination, she has a wide fixed split of the second heart sound and a systolic ejection murmur at the left upper sternal border. Echocardiography shows a secundum atrial septal defect with left-to-right shunt and mild right atrial/ventricular dilation.
 - a) Name three types of ASD and identify the most common type. **(2 marks)**
 - b) Explain the hemodynamic consequence of a left-to-right shunt in ASD. **(2 marks)**
 - c) List two echocardiographic features suggestive of ASD. **(2 marks)**
 - d) What ECG findings are commonly seen in secundum ASD? **(2 marks)**
 - e) Mention two treatment options for ASD. **(2 marks)**

2. A 55-year-old male with long-standing uncontrolled hypertension presents with dyspnea, mild pedal edema, and blurred vision. ECG shows LVH. Echo reveals concentric hypertrophy and diastolic dysfunction. Fundoscopy shows arteriolar narrowing and AV nicking.
 - a) Identify three target organs affected in this patient. **(3 marks)**
 - b) Describe two echocardiographic features of hypertensive heart disease. **(2 marks)**
 - c) List two lab investigations to assess secondary causes of hypertension. **(2 marks)**
 - d) Suggest first-line pharmacological therapy for this patient. **(2 marks)**
 - e) Name one lifestyle modification to control hypertension. **(1 mark)**

3. A 58-year-old male presents with sudden retrosternal chest pain radiating to the left arm, diaphoresis, and nausea. ECG shows ST-elevation in leads II, III, aVF. Troponin I is elevated.
 - a) Identify the type of MI and the infarcted territory. **(2 marks)**
 - b) Name the likely culprit coronary artery. **(1 mark)**
 - c) Which initial management steps are indicated in the first hour? **(3 marks)**
 - d) Explain the role of TIMI flow grade in post-PCI assessment. **(2 marks)**
 - e) Name two complications of inferior MI. **(2 marks)**

4. A 28-year-old female presents with fatigue, palpitations, and exertional dyspnea. Echocardiography shows thickened mitral valve leaflets with restricted opening, diastolic doming, and moderate mitral stenosis.
- a) Explain pathophysiology of mitral stenosis in RHD. **(2 marks)**
 - b) Name two ECG findings associated with mitral stenosis. **(2 marks)**
 - c) Describe one Doppler measurement used to assess mitral valve area. **(2 marks)**
 - d) What medical therapy is indicated for symptomatic relief? **(2 marks)**
 - e) Mention one interventional/surgical option for severe MS. **(2 marks)**
5. A 60-year-old male collapses in the cath lab recovery room. He is unresponsive and pulseless. ECG monitor shows ventricular fibrillation (VF). CPR is started immediately.
- a) Identify the initial steps of ACLS in this patient. **(2 marks)**
 - b) What is the first-line defibrillation protocol for VF? **(2 marks)**
 - c) Name two medications used in ACLS for refractory VF/pulseless VT. **(2 marks)**
 - d) Explain post-resuscitation care once ROSC (Return of Spontaneous Circulation) is achieved. **(2 marks)**
 - e) List two reversible causes (“Hs and Ts”) of cardiac arrest. **(2 marks)**

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