

**POST GRADUATE DIPLOMA IN CLINICAL
CARDIOLOGY (PGDCC)**

Term-End Examination

June, 2015

**MCC-001 : FUNDAMENTALS OF CARDIOVASCULAR
SYSTEMS – I**

Time : 2 hours

Maximum Marks : 60

Note :

- (i) *There will be multiple choice type of questions in this examination which are to be answered in OMR Answer Sheets.*
- (ii) *All questions are compulsory.*
- (iii) *Each question will have four options and only one of them is correct. Answers have to be marked in figures in the appropriate rectangular boxes corresponding to what is the correct answer and then blacken the circle for the same number in that column by using HB or lead pencil and not by ball pen in OMR Answer Sheets.*
- (iv) *If any candidate marks more than one option, it will be taken as the wrong answer and no marks will be awarded for this.*
- (v) *Erase completely any error or unintended marks.*
- (vi) *There will be 90 questions in this paper and each question carries equal marks.*
- (vii) *There will be no negative marking for wrong answers.*
- (viii) *No candidate shall leave the examination hall at least for one hour after the commencement of the examination.*

1. Left coronary artery arises from which coronary sinus ?
 - (1) Left anterior aortic sinus
 - (2) Left posterior aortic sinus
 - (3) Right anterior aortic sinus
 - (4) Right posterior aortic sinus

2. Diaphragm is innervated by which nerve ?
 - (1) Great splanchnic nerve
 - (2) Phrenic nerve
 - (3) Lesser splanchnic nerve
 - (4) Vagus nerve

3. Deep cardiac plexus is situated
 - (1) Below the arch of aorta
 - (2) On the oesophagus
 - (3) In front of the bifurcation of trachea
 - (4) On the thoracic duct

4. In Valsalva manoeuvre, all of the following changes are seen *except one* :
 - (1) Phase I transient rise in systemic BP commence
 - (2) Phase II reduced venous return and systolic BP with reflex tachycardia
 - (3) Phase III abrupt transient reduction in systemic BP as straining ceases
 - (4) Phase IV hypotension and reflex tachycardia

5. Which one of the following is *not* present in right ventricle ?
 - (1) Papillary muscle
 - (2) Chordae tendinae
 - (3) Trabecular carneae
 - (4) Muscular pectinae

6. Which of the following is the remnant of septum secundum ?
 - (1) Fossa ovalis
 - (2) Annulus ovalis
 - (3) Valve of coronary sinus
 - (4) Valve of inferior vena cava

7. Which of the following veins opens directly into the right atrium ?
- (1) Great cardiac vein
 - (2) Small cardiac vein
 - (3) Anterior cardiac vein
 - (4) Middle cardiac vein
8. Embryologically both common carotid arteries are derived from which of the following aortic arches ?
- (1) 2nd aortic arch
 - (2) 6th aortic arch
 - (3) 3rd aortic arch
 - (4) 4th aortic arch
9. Which is the dominant pacemaker of the heart ?
- (1) Purkinje fibres
 - (2) Sino atrial node
 - (3) Atrio ventricular node
 - (4) Bundle of His
10. Where is sino atrial node located in the heart ?
- (1) In the fossa ovalis
 - (2) At upper border of crista terminalis
 - (3) In the anterior wall of right auricle
 - (4) Near the opening coronary sinus
11. Limbus fossa ovalis is seen from which part of the chamber ?
- (1) Left atrium
 - (2) Right ventricle
 - (3) Right atrium
 - (4) Left ventricle

- 12.** How many pulmonary veins drain into the left atrium ?
- (1) 2 pulmonary veins
 - (2) 4 pulmonary veins
 - (3) 6 pulmonary veins
 - (4) 3 pulmonary veins
- 13.** All of the following are tributaries of the coronary sinus *except*
- (1) Anterior cardiac vein
 - (2) Middle cardiac vein
 - (3) Small cardiac vein
 - (4) Great cardiac vein
- 14.** The second component of S2 is best heard in which of the following areas ?
- (1) Right 5th intercostal space at sternal margin
 - (2) Left 2nd intercostal area at sternal margin
 - (3) Right 2nd intercostal area at sternal margin
 - (4) Left 5th intercostal space at sternal margin
- 15.** Right or left coronary artery dominance is with reference to the origin of
- (1) Anterior interventricular artery
 - (2) First obtuse marginal artery
 - (3) Posterior interventricular artery
 - (4) Sino atrial nodal artery
- 16.** 4th heart sound (S4) is seen in all of the following conditions *except*
- (1) HOCM
 - (2) Ischemic heart disease
 - (3) Hypertension
 - (4) Mitral stenosis

17. The moderator band is seen in which of the following chambers of the heart ?
- (1) Right ventricle
 - (2) Right atrium
 - (3) Left atrium
 - (4) Left ventricle
18. Embryologically fossa ovalis represents which part of the septum ?
- (1) Septum secundum
 - (2) Septum primum
 - (3) Ostium secundum
 - (4) Ostium primum
19. Which of the following statements is *incorrect* regarding isovolumetric relaxation ?
- (1) This is the time between the closure of atrioventricular valves and opening of semilunar valves.
 - (2) The volume of ventricle remains same
 - (3) This corresponds to 2nd heart sound
 - (4) Ventricular pressure falls
20. Mid-systolic click with late systolic murmur is heard in which of the following conditions ?
- (1) Severe pulmonary artery stenosis
 - (2) Severe aortic valve stenosis
 - (3) Ebstein's anomaly
 - (4) Mitral valve prolapse
21. Holosystolic murmur increasing with inspiration at lower left sternal border is heard in which of the following conditions ?
- (1) Severe mitral regurgitation
 - (2) Ventricular septal defect
 - (3) Tricuspid regurgitation
 - (4) Patent ductus arteriosus

- 22.** Low-pitched, mid-diastolic murmur heard at apex in a patient at left lateral position is seen in all of the following conditions *except*
- (1) Severe mitral stenosis
 - (2) Large ventricular septal defect
 - (3) Large patent ductus arteriosus
 - (4) Severe pulmonary artery hypertension
- 23.** High frequency ejection systolic murmur is heard in all of the following conditions *except*
- (1) Small muscular VSD
 - (2) Aortic stenosis
 - (3) Pulmonary valve stenosis
 - (4) Severe mitral regurgitation
- 24.** In hypertrophic obstructive cardiomyopathy all of the following clinical features are seen *except*
- (1) Systolic ejection clicks
 - (2) Systolic anterior motion of the anterior mitral leaflet
 - (3) Harsh crescendo decrescendo murmur at left sternal border
 - (4) Murmur increases after ventricular premature beat
- 25.** Kussmaul's sign is seen in which of the following conditions ?
- (1) Severe tricuspid regurgitation
 - (2) Constrictive pericarditis
 - (3) Severe aortic regurgitation
 - (4) Severe mitral regurgitation
- 26.** 36 year old female, presented with H/O leg swelling since 4 months, her blood pressure was 110/80 mmHg. Pulse rate was 96/mt. On palpation her radial pulse disappears on deep inspiration and reappears on expiration. On auscultation S1, S2 normal, no murmur. What is the character of her pulse ?
- (1) Anacrotic pulse
 - (2) Dicrotic pulse
 - (3) Pulsus paradoxus
 - (4) Pulsus bisferiens

27. 42 year old male, came to cardiology OP with H/O giddiness and chest discomfort since 6 months. O/E his blood pressure was 110/70 mmHg. On palpation his pulse was small volume with slow raising. On auscultation he has ejection systolic murmur at right second intercostal space lateral to sternum. What is the character of his pulse ?
- (1) Dicrotic pulse
 - (2) Pulsus bisferiens
 - (3) Anacrotic pulse
 - (4) Pulsus bigeminus
28. Collapsing pulse is seen in all of the following conditions *except*
- (1) PDA
 - (2) Severe aortic regurgitation
 - (3) Severe pulmonary regurgitation
 - (4) AV Fistula
29. Hypokinetic pulse is seen in all of the following conditions *except*
- (1) Heart failure
 - (2) Severe aortic stenosis
 - (3) Hypovolemia
 - (4) Hypertrophic obstructive cardiomyopathy
30. Pulsus parvus et tardus is seen in which of the following conditions ?
- (1) Severe pulmonary valve stenosis
 - (2) Severe mitral stenosis
 - (3) Severe aortic stenosis
 - (4) Severe tricuspid stenosis
31. Differential cyanosis is seen in which of the following conditions ?
- (1) Patent ductus arteriosus
 - (2) Patent ductus arteriosus with severe pulmonary artery hypertension
 - (3) Coarctation of aorta
 - (4) Ebstein's anomaly

- 32.** Radio brachio femoral delay is seen in which of the following conditions ?
- (1) Aortic arch syndrome
 - (2) Supravalvular aortic stenosis
 - (3) Subvalvular aortic stenosis
 - (4) Coarctation of aorta
- 33.** Prominent arterial pulsations at root of the neck is seen in all of the following conditions *except*
- (1) Coarctation of aorta
 - (2) PDA
 - (3) Aortic regurgitation
 - (4) Aortic stenosis with mitral regurgitation
- 34.** 38 year old female presented with H/O joint pains, fever and dyspnea on sitting and standing position since 3 months. She sleeps comfortably on supine position. Her blood pressure on supine was 100/70 mmHg. Her pulse was low volume and regular in rhythm. What does she probably have ?
- (1) Severe mitral stenosis
 - (2) Acute rheumatic fever
 - (3) Left atrial myxoma
 - (4) Severe aortic stenosis
- 35.** Trepopnea is defined as which of the following ?
- (1) Breathlessness on supine position
 - (2) Breathlessness on lying on one side
 - (3) Breathlessness at night times
 - (4) Breathlessness on effort
- 36.** The sequence of S2 i.e. (A2-P2) depends on which of the following factors ?
- (1) Right ventricular volume
 - (2) Left ventricular volume
 - (3) Pulmonary vascular resistance
 - (4) Cardiac output

- 37. Reverse split of S2 is seen in which of the following conditions ?**
- (1) RBBB
 - (2) LBBB
 - (3) Complete heart block
 - (4) 2nd degree AV block
- 38. Wide and variable split of S2 is seen in which of the following conditions ?**
- (1) LBBB
 - (2) RBBB
 - (3) Aortic stenosis
 - (4) Severe mitral stenosis
- 39. Single S2 is seen in which of the following conditions ?**
- (1) Ebstein's anomaly
 - (2) Tetralogy of fallots
 - (3) Transposition of great arteries
 - (4) Severe ventricular septal defect
- 40. Physiological S3 is heard in all of the following conditions *except* one :**
- (1) Severe mitral regurgitation
 - (2) Severe ventricular septal defect
 - (3) Severe patent ductus arteriosus
 - (4) Severe mitral stenosis
- 41. In isometric exercise all of the following haemodynamic changes can be seen *except***
- (1) Transient increase in systemic vascular resistance
 - (2) Transient decrease in cardiac output
 - (3) Transient increase in left ventricular filling pressure
 - (4) Increase in heart rate

- 42.** Isometric exercise is carried out by
- (1) By doing hand grip exercise
 - (2) By running on treadmill at 6 km/hour
 - (3) By cycling
 - (4) By swimming
- 43.** Which of the following pharmacological agents is used in dynamic auscultation ?
- (1) Sodium nitroprusside
 - (2) Ammonium nitrate
 - (3) Amlodipine
 - (4) Amyl nitrate
- 44.** In Prinzmetal's angina, which of the following drugs is ideal ?
- (1) Metoprolol
 - (2) Diltiazem
 - (3) Propranolol
 - (4) Sotalol
- 45.** In Prinzmetal's angina, which of the following statements is *incorrect* ?
- (1) It is a vasospastic angina
 - (2) It often occurs in the early morning
 - (3) It almost always comes after vigorous exercise
 - (4) Nitrates relieve the angina
- 46.** Long-term use of which of the following drugs causes gynecomastia ?
- (1) Furosemide
 - (2) Thiazide diuretics
 - (3) Spironolactone
 - (4) Bumetanide

47. Tietze syndrome is described as
- (1) Retro sternal discomfort due to myocardial ischemia
 - (2) Pleuropericardial pain due to pericarditis
 - (3) Costochondral pain at left intercostal space
 - (4) Epigastric burning due to indigestion
48. In which of the following conditions, should isometric exercise not be done ?
- (1) Aortic regurgitation
 - (2) Mitral regurgitation
 - (3) Ventricular septal defect
 - (4) Myocardial ischemia
49. Pericardial rub is heard in all of the following conditions *except*
- (1) Massive pericardial effusion
 - (2) Uremia
 - (3) Status post open heart surgery
 - (4) Tuberculous pericarditis
50. Which of the following auscultatory changes is *not* seen with amyl nitrate inhalation ?
- (1) Murmurs of aortic regurgitation are reduced
 - (2) Murmurs of mitral regurgitation are increased
 - (3) Diastolic murmurs of mitral stenosis are accentuated
 - (4) Diastolic murmurs of tricuspid stenosis are accentuated
51. Which is the alternative drug for amyl nitrate in dynamic auscultation ?
- (1) Amlodipine
 - (2) Ammonia nitrate
 - (3) Isosorbide dinitrate
 - (4) Verapamil

52. On sudden assumption of supine position from standing, all of the following systolic murmurs intensity accentuates *except*
- (1) Murmur of aortic stenosis
 - (2) Murmur of mitral regurgitation
 - (3) Murmur of mitral valve prolapse
 - (4) Murmur of ventricular septal defect
53. In ALCAPA, which of the following statements is *incorrect* ?
- (1) Left coronary artery drains into pulmonary artery
 - (2) Usually mitral regurgitation is present
 - (3) Treatment of choice is medical management
 - (4) Presence of q waves in V5-V6
54. In isovolumetric relaxation all of the following haemodynamic changes occur *except* one :
- (1) The volume of ventricle increases
 - (2) The ventricular pressure falls
 - (3) The semilunar and atrioventricular valves remain closed
 - (4) This corresponds to 2 heart sounds
55. In passive ventricular filling all of the following statements are correct *except*
- (1) Atrioventricular valves open
 - (2) Rapid inflow followed by slow inflow
 - (3) Atrial contraction corresponds to S3
 - (4) Towards the end, atria contracts
56. The preload is not influenced by which of the following factors ?
- (1) Venous return
 - (2) Systemic vascular resistance
 - (3) Compliance of the ventricle
 - (4) Atrial kick

57. Which of the following statements is *incorrect* regarding left ventricle ?
- (1) Left ventricle is triangular in shape
 - (2) It lies behind and to the left of the heart
 - (3) Its long axis lies at about 45 degrees to the vertical
 - (4) When left ventricle enlarges, it results in downward displacement of the apex
58. On X-ray chest PA view, with left atrial enlargement, all of the following findings are seen *except*
- (1) Double density
 - (2) Straightened left heart border
 - (3) Elevated right main bronchus
 - (4) Displaced descending thoracic aorta
59. In which of the following congenital heart diseases, the pulmonary artery is *not* enlarged ?
- (1) Primary pulmonary artery hypertension
 - (2) Tetralogy of fallots
 - (3) Severe atrial septal defect
 - (4) Large PDA
60. On X-ray chest PA view, all of the following findings are consistent with RA enlargement *except* one :
- (1) Right heart border is more than 2.5 cm from midline
 - (2) Vertical extent > 50% height of right mediastinal contour
 - (3) Occupies more than 2.5 interspaces in the vertical direction
 - (4) Increased radius of the curvature
61. Kerley-B lines on X-ray chest are seen in which of the following conditions ?
- (1) Ebstein's anomaly
 - (2) Mitral stenosis
 - (3) Pulmonary artery stenosis
 - (4) Transposition of great arteries

- 62.** Pulmonary oligemia is seen in which of the following congenital heart diseases ?
- (1) Severe aortic valve stenosis
 - (2) Parachute mitral valve
 - (3) Severe pulmonary valve stenosis
 - (4) Coarctation of aorta
- 63.** In pulmonary embolism, X-ray chest shows all of the following findings *except* one :
- (1) Dilatation of pulmonary vessels proximal to embolism
 - (2) Triangular pleural based infiltrate with the apex pointing towards the hilum
 - (3) Kerry-A lines
 - (4) Enlargement of pulmonary artery with distal oligemia
- 64.** Which vessel carries highest oxygenated blood in the embryo ?
- (1) Umbilical vein
 - (2) Umbilical arteries
 - (3) Aorta
 - (4) Cardinal vein
- 65.** What is the adult remanant of patent ductus arteriosus ?
- (1) Ligamentum teres
 - (2) Falciform ligament
 - (3) Ligamentum arteriosum
 - (4) Ligamentum venosus
- 66.** Embryologically the ductus arteriosus originated from which of the following aortic arches ?
- (1) Right fourth aortic arch
 - (2) Left fourth aortic arch
 - (3) Left fifth aortic arch
 - (4) Left sixth aortic arch

- 67.** In the fetal circulation the mixing of oxygenated and deoxygenated blood occurs in all of the following *except*
- (1) Ductus arteriosus
 - (2) Lung
 - (3) Liver
 - (4) Left atrium
- 68.** In the fetus the cardiovascular system reaches a functional status in which week ?
- (1) 4th week
 - (2) 6th week
 - (3) 3rd week
 - (4) 8th week
- 69.** Embryologically paired heart tubes are derived from
- (1) Entoderm
 - (2) Endoderm
 - (3) Mesoderm
 - (4) Notochord
- 70.** Normally when does the ductus arteriosus close ?
- (1) During fetal period
 - (2) Just before birth
 - (3) At birth
 - (4) At puberty
- 71.** The nerve supplying the parietal layer of serous pericardium is
- (1) Vagus
 - (2) Phrenic
 - (3) Intercostal nerve
 - (4) Sympathetic fibres from T2-T5

- 72.** Which of the following is the property of a cardiac cell to initiate and fire an action potential on its own without external stimulation ?
- (1) Spontaneity
 - (2) Automaticity
 - (3) Selectivity
 - (4) Conductance
- 73.** Which of the following is *not* affected by the preload in the heart ?
- (1) End systolic volume
 - (2) End diastolic volume
 - (3) Stroke volume
 - (4) Cardiac output
- 74.** Which of the following vessels has the largest effect on total peripheral resistance ?
- (1) Arteries
 - (2) Arterioles
 - (3) Veins
 - (4) Capillaries
- 75.** Which of the following blood vessels has the greatest compliance ?
- (1) Arteries
 - (2) Veins
 - (3) Arterioles
 - (4) Capillaries
- 76.** Which of the following is the correct formula for calculating Mean Arterial Pressure (MAP) ?
- (1) $\text{MAP} = \text{cardiac output} \times \text{stroke volume}$
 - (2) $\text{MAP} = \text{cardiac output} \times \text{heart rate}$
 - (3) $\text{MAP} = \text{stroke volume} \times \text{heart rate} \times \text{total peripheral resistance}$
 - (4) $\text{MAP} = \text{heart rate} \times \text{total peripheral resistance}$

- 77. Embryologically blood vessels are derived from**
- (1) Surface ectoderm
 - (2) Mesoderm
 - (3) Endoderm
 - (4) Neural ectoderm
- 78. Incomplete fusion of the endocardial cushions is usually associated with which of the following types of ASD ?**
- (1) Secundum
 - (2) Primum
 - (3) Common atrium
 - (4) Sinus venosus
- 79. Which is the common type of septal defect in congenital heart disease ?**
- (1) Secundum ASD
 - (2) Primum ASD
 - (3) Membranous VSD
 - (4) Muscular VSD
- 80. The right atrium is mainly derived from the**
- (1) Primitive pulmonary vein
 - (2) Primitive atrium
 - (3) Sinus venosus
 - (4) Right pulmonary vein
- 81. Closure of the foramen primum results in the fusion of the**
- (1) Septum secundum and the endocardial cushions
 - (2) Septal primum and the endocardial cushions
 - (3) Septum primum and the septum secundum
 - (4) Septum primum and right sino atrial valve

82. Which of the following is *not* the part of tetralogy of fallot ?
- (1) Pulmonary infundibular stenosis
 - (2) Interventricular septal defect
 - (3) Aorta arising from both ventricular cavity
 - (4) Interatrial septal defect
83. Embryologically the pulmonary arteries are derivatives of the
- (1) 6th aortic arch
 - (2) 5th aortic arch
 - (3) 2nd aortic arch
 - (4) 4th aortic arch
84. Most common congenital malformation of heart and great vessels associated with the congenital rubella syndrome is
- (1) ASD
 - (2) VSD
 - (3) Coarctation of aorta
 - (4) PDA
85. Which of the following is *not* a part of the specialised conduction system of the heart ?
- (1) Purkinje fibres
 - (2) Bundle of His
 - (3) Working myocardial cells
 - (4) Cells of AV node
86. Which of the following does *not* show rapid initial repolarisation at the start of an action potential ?
- (1) Atrial muscle
 - (2) Purkinje fibres
 - (3) SA node
 - (4) Bundle of His

87. Which of the following statements is *incorrect* ?

- (1) P wave is due to atrial depolarisation
- (2) QRS complex is due to ventricular depolarisation
- (3) QT interval is due to measure of duration of atrial action potential
- (4) T wave is due to ventricular repolarisation

88. With regards to the Frank-Starling law of the heart, an increased venous return to the heart will result in

- (1) Increased sympathetic activity
- (2) Increase in end diastolic volume
- (3) Decreased cardiac output
- (4) Decrease in stroke volume

89. 3rd heart sounds are seen in all of the following conditions *except*

- (1) Severe LV dysfunction
- (2) Mitral regurgitation
- (3) PDA
- (4) Aortic stenosis

90. Which is the correct statement regarding afterload ?

- (1) The pressure that must be overcome before semilunar valve opens
- (2) The pressure in blood vessel necessary to cause the semilunar valve to close
- (3) The maximum possible cardiac output above resting cardiac output
- (4) End systolic volume

SPACE FOR ROUGH WORK