SNS COLLEGE OF ALLIED HEALTH SCIENCE, COIMBATORE –35
(Affiliated to the Tamil Nadu Dr M.G.R Medical University, Chennai)
B.Sc. OPERATION THEATRE AND ANAESTHESIA TECHNOLOGY

PUZZLE
1131 – BASIC SCIENCES - ANATOMY
UNIT IV – CARDIOVASCULAR SYSTEM

Anatomy of Heart Logic Puzzle: Chamber and Valve Function Matching

Scenario: **Total marks: 10 marks**

A medical student is analyzing an echocardiogram of a patient with valvular heart disease. Key cardiac structures include right atrium, right ventricle, left atrium, left ventricle, tricuspid valve, pulmonary valve, mitral valve, aortic valve, chordae tendineae, and papillary muscles. A congenital defect disrupts flow dynamics, and the student must match each structure to its primary function, blood flow role (systemic/pulmonary), embryological origin, and valve characteristics. Only one role per structure, ensuring unidirectional flow logic.

Clues:

1. Right atrium receives deoxygenated blood from SVC/IVC; thin-walled, pectinate muscles; tricuspid valve prevents backflow to RA during RV contraction.
2. Right ventricle pumps to pulmonary artery (low pressure ~25 mmHg); trabeculae carneae, moderator band; pulmonary valve (semilunar) prevents pulmonary regurgitation.
3. Left atrium receives oxygenated blood from pulmonary veins; larger than RA in adults; mitral valve (bicuspid) ensures forward flow to LV.
4. Left ventricle is thickest-walled (~1.5-2 cm) for systemic pressure (120 mmHg); aortic valve (semilunar, 3 cusps) prevents backflow from aorta.
5. Chordae tendineae are fibrous cords attaching AV valves (tricuspid/mitral) to papillary muscles, preventing valve prolapse during systole.
6. Papillary muscles contract synchronously with ventricles, tensioning chordae to stabilize AV valves; located in RV/LV walls.
7. The congenital defect affects semilunar valves (pulmonary/aortic), causing stenosis/regurgitation more than AV valves derived from endocardial cushions.
8. Blood flow sequence: RA→RV→lungs→LA→LV→aorta; pressure gradients dictate valve closure (e.g., mitral closes at dicrotic notch).
9. Embryologically, AV valves (tricuspid/mitral) form from endocardial cushions, semilunar from neural crest cells; defects follow this pattern.

Question: Match each cardiac structure to its function, blood circuit (pulmonary/systemic), and valve type (if applicable), and identify which structures are most affected by the congenital defect disrupting semilunar valves.

Rubrics

Criterion	**Points**
Key Elements	2 pts
Logical Steps	4 pts
Correct Solution	2 pts
Biological Insight	2 pts
Total	**10 pts**