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**Morphology & Anatomy (221B)**

**Answers The Following Question :**

1. **Compare between the following :** 12

mark

a- Collateral and bicollateral vascular bundle

b- b- Vascular cambium and cork cambium .

c- Normal – Anomalous secondary growth .

2. **write on :** 12

mark

a- Secondary Xylem .

b- Rays .

c- Tyloses .

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a:-

اجابة السؤال الاول

Collateral	Bicollateral
The xylem and phloem lie together on the same radius in the position that xylem lies inwardsthe phloem outwards	In sush bundles the phloem is found to be present on both sides of xylemsimultaneously two cambium strips also occur

B:-

Vascular cambium	Cork cambium
The vascular cambiumis a lateral meristem whoseactivity leads to an increase in the thickness or girth of the shootand root by adding secondary vascular tissues (phloem and xylem)	It is a secondary lateral meristem that may arise from the permanent living cellsof the epidermis hypodermis cortex and the phloem cells (including the phloem ray cells) its activity adds to the diameter of the stem or the root beccauseits cells divide in a tangential plane cutting off cellstowards its inner as well as outer face

C:-

Normalsec.growth	Anomalous sec.growth
Normal secondary growth the usual developmentsthat take place are : (i)formationof a complete ring of cambium by the formation of inter-fascicularcambail strips (ii)secondary phloem is formed towards the outer side and secondary xylem towards the	(i)unusual position of the cambium (ii)abnormal functioning of the cambium (iii)formation of more than one ring of cambia (iv)formation of extra-stelar cambial ring (v)formation of interxylary

<b>innerside</b>	<b>phloem</b>
(iii)only one ring of cambium is formed	(vi)formation of interxylarycork
(iv)the position of the cambial ring is between primary xylem and primary phloem and the interfascicular cambial strips appear at the same level the activity of cambium is uniform	
(v)only one ring of cork cambium is formed in the extrastellarregion	

اجابة السؤال الثانى

**A:- secondary xylem**

the cambium produces towards the center of the stem and root secondary xylem which comprises various elements tracheids vessel members different types of fibres parenchyma cells xylem ray cells and sometimes secretary cells the occurrence and the arrangement of these elements vary in different groups of plants the quantitative differences in the number of cells as well as in the size of the elements that exist between the species of a single genus make it possible to identify the plant by its secondary xylem alone .

**B:-rays**

The rays in gymnosperms may comprise parenchyma cells only i.e.homocellular rays or parenchyma cells and tracheids i.e. heterocellular rays. they ray tracheids are distinguished from the ray parenchyma mainly by the presence of bordered pit and by the absence of a protoplast the ray parenchyma cells contain living protoplasts in the sapwood and generally in the heartwood darkly coloured resins the walls of the parenchyma cells may be primary only in the large majority of gymnosperms the ray are uniseriate and they are usually from one to twenty cells high .

**c:-tyloses**

**in many species axial and ray parenchyma cells located next to the vessels form outgrowths through the pit cavities into the lumen of the vessels when the laticifers become inactive these outgrowths are called tyloses tyloses block the lumen of vessels and reduce the permeability of the wood technically this phenomenon is selection for tight cooperating**