

CONTENTS

Morphology of Angiosperms		
UNIT-1	Angiosperm; Characteristics and origin	: 13-17
1.1.	Characteristics of angiosperms:	13
1.2.	Origin of Angiosperms:	14
1.3.	Monophyletic and Polyphyletic Origin of Angiosperms:	16
1.4.	Coevolution of Angiosperms and animals:	17
Additional Readings:		
1.5.	Telome Theory	264
1.6.	Phyllode Theory	269
1.7.	Role of Morphology in Plant Classification	271
UNIT-2	The Root	: 18-30
2.1.	Characteristics of root:	18
2.2.	Regions of the Root:	18
2.3.	Types of Roots:	20
2.4.	Functions of root:	21
2.5.	Modifications of Roots:	22
UNIT-3	The Stem	: 31-41
3.1.	Characteristics of Stem:	31
3.2.	Functions of Stem:	31
3.3.	Nature of plant stem:	32
3.4.	Types of Stems:	33
3.5.	Branching System of Stem:	35
3.6.	Modifications of Stem:	36
UNIT-4	The Leaf	: 42-60
4.1.	Characteristics of a Leaf:	42
4.2.	Functions of the leaf	42
4.3.	Parts of a Leaf	42
4.4.	Types of Leaves	43
4.5.	The shape of the leaf blade :	44
4.6.	Leaf margin	45
4.7.	The apex of the lamina	45
4.8.	Leaf Surface	46

4.9.	Modification of Leaves	46
4.10.	Venation	48
4.11.	Nature of Leaf	50
4.12.	Phyllotaxy	53
4.13.	Trichomes	56
4.14.	Hair	57
UNIT-5	Flower and Inflorescence	: 61-72
5.1.	Parts of a Flower	51
5.2.	Classification of flowers on the basis of the position of the ovary	62
5.3.	Perfect and Imperfect Flowers	63
5.4.	Monoecious and Dioecious	63
5.5.	Types of flowers based on symmetry	63
5.6.	Types of flowers based on the fusion of pistils	63
5.7.	Types of flowers based on the length of a stamen	63
5.8.	Union of Stamens	64
5.9.	Inflorescence	65
5.10.	Aestivation	69
5.11.	Placentation	70

Anatomy of Angiosperms

UNIT-1	Scope of Plant Anatomy	: 75-80
1.1.	Introduction:	75
1.2.	Scope of Plant Anatomy:	75
UNIT-2	Structure and Development of Plant Body	: 81-89
2.1.	Internal organization of plant body:	81
2.2.	The tissue system:	82
2.3.	Development of plant body:	86
UNIT-3	Tissues	: 90-105
3.1.	Classification of Plant Tissues:	90
3.2.	Pits:	98
3.3.	Plasmodesmata:	99
3.4.	Differences between pits and plasmodesmata:	100
3.5	Wall ingrowths and Transfer cells:	100
3.6	Adcrustation and Incrustation:	101
3.7	Ergastic Substances or cell inclusions:	101
3.8	Secretory tissues in plants:	102

UNIT-4	Apical meristems	: 106-125
4.1.	Structure and Organisation of Shoot Apex:	106
4.2.	Types of vascular bundles:	109
4.3.	Internal Structure of Dicot and Monocot Stem:	110
4.4.	Comparative account of the Internal Structure of Dicot and Monocot Stem:	113
4.5.	Anatomy of Leaf	114
4.6.	Kranz anatomy:	115
4.7.	Organization of root apex:	117
4.8	Quiescent center:	120
4.9	Anatomy of Root	120
UNIT-5	Vascular Cambium and Wood	: 126-149
5.1.	Secondary growth:	126
5.2.	Axially and radially oriented elements:	130
5.3.	Types of rays and axial parenchyma:	131
5.4.	Annual Rings or Growth Rings:	133
5.5.	Dendrochronology:	134
5.6.	Anomalous Secondary Growth:	134
5.7.	Reaction wood:	139
5.8.	Heartwood and Sapwood:	141
5.9.	Ring porous wood and diffuse-porous wood:	142
5.10.	Earlywood and Latewood:	143
5.11.	Tylosis	144
5.12.	Periderm:	144
5.13.	Rhytidome:	146
5.14.	Lenticels:	147
UNIT-6	Adaptive and Protective Systems	: 150-160
6.1.	Epidermal tissue system:	150
6.2.	Cuticle:	151
6.3.	Epicuticular wax:	152
6.4.	Stomata; structure, types, and function:	153
6.5	Adcrustation and Incrustation:	156
6.6	Anatomical adaptations of xerophytes:	156
6.7	Anatomical adaptations of hydrophytes:	159

The Embryology of Angiosperms

UNIT-1	Plant Embryology: Introduction	: 163-169
1.1.	History of plant embryology:	163
1.2.	Eminent plant embryologists and their contributions:	164
1.3.	Scope of embryology:	166
1.4.	Induction of flowering:	167
1.5.	The flower is a modified shoot:	167
1.6.	Flower development: genetic and molecular aspects:	168
UNIT-2	Anther and Pollen Biology	: 170-184
2.1.	Anther Wall:	170
2.2.	The function of anther wall:	170
2.3.	Microsporogenesis:	171
2.4.	Callose deposition and its significance:	172
2.5.	Micro gametogenesis:	173
2.6.	Pollen wall structure:	174
2.7.	Male germ unit:	175
2.8.	NPC System of Classification:	176
2.9.	Palynology and its scope:	178
2.10.	Pollen wall proteins:	179
2.11.	Pollen viability:	180
2.12.	Pollen Storage:	181
2.13.	Pollen germination:	182
2.14.	Abnormal features of Pollen or Grouping of Pollen:	183
UNIT-3	Ovule	: 185-194
3.1.	Structure of a mature ovule:	185
3.2.	Types of Ovules:	186
3.3.	Special structures in ovule:	187
3.6.	Megasporogenesis:	189
3.7.	Development of Female Gametophyte (Megagametogenesis):	190
3.8.	Other types of embryo sac development:	190
3.4.	Structure of mature embryo sac:	193
UNIT-4	Pollination, fertilization and post-fertilization developments:	: 195-218
4.1.	Pollination:	195
4.2.	Structure of stigma and style:	203
4.3.	Fertilization:	204

4.4.	Path of the pollen tube in the pistil:	204
4.5.	Double fertilization:	204
4.6.	Post-Fertilization Events:	206
4.7.	True and False Fruit:	206
4.8.	Embryogeny:	207
4.9.	Development of dicot embryo (Dicot embryogeny):	208
4.10.	Structure of Dicot Embryo:	209
4.11.	Development of Embryo in Monocots:	209
4.12.	Structure of Monocot Embryo:	210
4.13.	Endosperm:	211
4.14.	Suspensor: structure and functions:	212
4.15.	Embryo-endosperm relationship:	213
4.16.	Nutrition of embryo:	213
4.17.	Embryo development in Paeonia:	214
4.18.	Seed structure:	214
4.19.	Importance of Seed:	215
4.20.	Dispersal of Seeds:	215

UNIT-5 Polyembryony, Apomixis, Parthenocarpy, and Self incompatibility : 219-230

5.1.	Polyembryony:	219
5.2.	Significance of Polyembryony:	220
5.3.	Apomixis:	221
5.4.	Differences between Apomixis and Polyembryony	222
5.6.	Methods to overcome self-incompatibility:	225
5.7.	Modification of stigma surface:	226
5.8.	Parasexual hybridization (Protoplast fusion):	227
5.9.	Cybrids:	227
5.10.	In vitro fertilization:	228
5.11.	Parthenocarpy:	228

Practical

UNIT-1	Morphology of Angiosperms	: 233
UNIT-2	Anatomy of Angiosperms	: 236
UNIT-3	Embryology of Angiosperms	: 257
Selected Bibliography		: 273
