

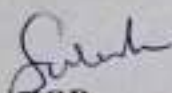
COURSE FILE

PROGRAM/YEAR/SEMESTER/SECTION: B.Pharm I Semester Section-A

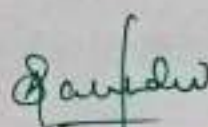
NAME OF THE COURSE: Human Anatomy and Physiology - I

COURSE CODE: BP103T

ACADEMIC YEAR: 2022-23


HOD




PRINCIPAL
Baleji Institute of Pharmaceutical Sciences
Laknepally (V), Narsampet (M)
Warangal (Dt) - 506 331 (T.S)

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Balaji Institute of Pharmaceutical Sciences
Lakshapally (V), Narsampet (M)
Warangal (Ct) - 506 001 (T.G.)

I. Institute Vision and Mission:

Vision

To become a premier institute of national and international reputation by delivering outstanding pharmaceutical education and research to develop high-caliber pharmaceutical professionals to meet the healthcare needs of the community and the technological requirements of pharmaceutical industries.

Mission

- M1 – To establish ourselves as a leading educational and research institution in the field of pharmaceutical education in order to earn national and international acclaim.
- M2 – To ensure that students get exposed to the latest Pharmaceutical industry technology and trends in the curriculum.
- M3 – To educate and develop high – caliber pharmaceutical graduates and post graduates order to enable them ready to complete for employment on a global scale.



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2. Cos, POs & PSOs:

COs:

Details of the programme. : B.PHARMACY I SEM Section-A

Details of Course : Human Anatomy and physiology

Course Outcomes (COs)

CO1	Describe various systems of human body, cellular organization and Tissue levels
CO2	Describe integumentary system, skeletal system and joints and their disorders
CO3	Knowledge on various body fluid, Blood and lymphatic system
CO4	Relationship between various organs physiology and nervous system control, knowledge on special senses
CO5	Knowledge on cardiovascular system and its regulation



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POs&PSOs

POs (Program Outcomes) for B.Pharm, Pharm.D & M. Pharm Programs

PO1	Pharmacy Knowledge	Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioural, social, and administrative pharmacy sciences; and manufacturing practices.
PO2	Planning Abilities	Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
PO3	Problem analysis	Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyse, evaluate and apply information systematically and shall make defensible decisions.
PO4	Modern tool usage	Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations
PO5	Leadership skills	Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfilment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.
PO6	Professional Identity	Understand, analyse and communicate the value of their professional roles in society (e.g., health care professionals, promoters of health, educators, managers, employers, employees)



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PO7	Pharmaceutical Ethics	Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behaviour that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions
PO8	Communication	Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions
PO9	The Pharmacist and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice
PO10	Environment and sustainability	Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO11	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis



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PSOs (Program Specific Outcomes) for B.Pharm

PSO1	The students shall be able to apply the knowledge and skill gained from various subjects and the aptitude developed throughout the course of the program in performing a job either independently or as a member of a team in various fields of pharmacy profession
PSO2	The students shall be able to make an initiation and achieve an innovation by properly integrating the input from various resources either independently or as a member of a team in various fields of pharmacy profession for betterment of the quality of life of the patients in the society

PSOs for Pharm.D

PSO1	Anticipate the patient's needs, participate in the creation of individualized disease management and prevention plans including patients self-management and behavioural changes
PSO2	Knowledge to participate with inter-professional health care team members in the management of health promotions for all patients by providing pharmaceutical care (including Medication therapy management / Therapeutic drug monitoring)

PSOs for M.Pharm (Pharmaceutics)

PSO1	To expertise in technical skills and gain knowledge in bioavailability and bioequivalence studies
PSO2	To impart knowledge and skill development on designing of dosage forms as per GMP guidelines



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Lakshmi Vihar, Narasimpet (M)
Warangal (Ts) - 506 001 (T.S)

PSOs for M.Pharm (Pharmaceutical analysis)

PSO1	To learn advanced analytical techniques for the determination of various drugs in single and combination dosage forms
PSO2	To operate, control, analyse and evaluate chemical substances, cosmetic products, finished products using hyphenated techniques

PSOs for M.Pharm (Pharmaceutical Quality Assurance)

To learn advanced analytical techniques for the determination of various drugs in single and combination dosage forms	
To operate, control, analyse and evaluate chemical substances, cosmetic products, finished products using hyphenated techniques	



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BAPS Institute of Pharmaceutical Sciences
Ludhiana, Punjab-141005
WhatsApp: 98151 23456

3. Course Content:

Kakatiya University, Warangal
Syllabus for the Bachelor of Pharmacy (B. Pharm) Four Years Course From the academic year 2017-2018 onwards

Program: B. Pharm I Semester

Course: BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I (Theory)

Scope: This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

Objectives: Upon completion of this course the students should be able to

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the various experiments related to special senses and nervous system.
5. Appreciate coordinated working pattern of different organs of each system.

Course Content:

Unit I 10 hours

- **Introduction to human body**
Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.
- **Cellular level of organization**
Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine
- **Tissue level of organization**
Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.
- **Integumentary system**
Structure and functions of skin

Unit II 10 hours



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- **Skeletal system**

Division of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system

Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction

- **Joints**

Structural and functional classification, types of joints movements and its articulation

Unit III 10 hours

- **Body fluids and blood**

Body fluids, composition and functions of blood, hemopoiesis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticuloendothelial system.

- **Lymphatic system**

Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system

Unit IV 08 hours

Peripheral nervous system:

Classification of peripheral nervous system: Structure and function of sympathetic and parasympathetic nervous system.

Origin and functions of spinal and cranial nerves.

- **Special senses**

Structure and functions of eye, ear, nose and tongue and their disorders.

Unit V 07 hours

- **Cardiovascular system**

Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heartbeat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.



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 Warangal (D) - 506 331 (T.D.)

4. Kakatiya University Almanac

UNIVERSITY COLLEGE OF PHARMACEUTICAL SCIENCES

KAKATIYA UNIVERSITY, VIDYARANYAPURI, WARANGAL - 506 009

ALMANAC (Proposed) for B. Pharmacy I Semester **Academic Year 2022-2023**

Sl. No.	Particulars	B. Pharmacy I Semester
1	Commencement of Class Work	01-12-2022
2	Short Recess for Sankranti	10-01-2023 to 21-01-2023
3	First Sessional Examinations	03-02-2023 to 05-02-2023
4	Second Sessional Examinations	04-04-2023, 06-04-2023 & 10-04-2023
5	Examination preparatory days	11-04-2023 to 23-04-2023
6	Commencement of end semester examinations	24-04-2023

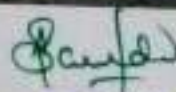
ALMANAC (Proposed) for Pharm. D -I Year **for the Academic Year 2022-2023**

Sl. No.	Particulars	Pharm. D - I Year
1	Commencement of Class Work	05-12-2022
2	Short Recess for Sankranti	10-01-2023 to 16-01-2023
3	First Sessional Examinations	22-02-2023 to 24-02-2023
4	Summer Vacation	01-05-2023 to 15-06-2023
5	Second Sessional Examinations	30-06-2023, 01-07-2023 & 03-07-2023
6	Third Sessional Examinations	16-09-2023, 19-09-2023 & 20-09-2023
7	Last Instruction day	22-09-2023
8	Examination preparatory days	23-09-2023 to 02-10-2023
9	Commencement of annual examinations	03-10-2023



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Warangal (Dt) - 506 331 (T.S)

5. Program-wise Institute Academic Calendar



BALAJI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by AICTE & PCI, Under Section 12, New Delhi and Affiliated to Kakatiya University, Wg.)

Lakshypally (V) Narsampet (M) Warangal Rural (Dist) Telangana State 506331

Contact : +91 9866050044 (Office), +91 9866652412 (Principal), +91 8718-230521 (Fax)

Program-wise Institute Academic calendar for B.Pharm I to VIII Semesters for the academic year 2022-23

12.09.2022 to 29.09.2022	Commencement of class work for VII semester
30.09.2022 to 09.10.2022	Short recess for Dasara
10.10.2022	Reopening after short recess
14.11.2022 to 15.11.2022	I sessional examination for VII semester
01.12.2022	Commencement of class work for I, III, V semester
06.01.2023 to 07.01.2023	II sessional examination for VII semester
07.01.2023	Last day of instruction for VII semester
09.01.2023 to 17.01.2023	Short recess for Sankranti for VII semester
10.01.2023 to 21.01.2023	Short recess for Sankranti for I, III, V semester
17.01.2023	Commencement of end semester examinations for VII semester
25.01.2023	Commencement of class work for VIII semester
03.02.2023 to 05.02.2023	I sessional examination for I semester
13.2.2023 to 14.02.2023	I sessional examination for III semester
15.02.2023 to 17.02.2023	I sessional examination for V semester
20.03.2023 to 21.03.2023	First Sessional examinations for VIII semester
27.03.2023 to 28.03.2023	II sessional examination for III semester
27.03.2023 to 29.03.2023	II sessional examination for V semester
01.04.2023	Last day of instruction for V semester
06.04.2023	Commencement of end semester examinations for V semester
07.04.2023	Last day of instruction for III semester
12.04.2023	Commencement of end semester examinations for III semester
04.04.2023 06.04.2023, 10.04.2023	II sessional examination for I semester
13.04.2023 to 23.04.2023	Examination preparatory holidays
24.04.2023	Commencement of end semester examinations for I semester
15.05.2023 to 16.05.2023	Second Sessional examinations for VIII semester
16.05.2023	Last instruction day for VIII semester
17.05.2023 to 23.05.2023	Semester examination preparatory days for VIII Semester
23.05.2023	Commencement of end semester examinations for VIII semester
16.06.2023	Commencement of class work for IV & VI semester
26.06.2023	Commencement of class work for II semester
09.08.2023 to 11.08.2023	I sessional examination for IV & VI semester

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6. Lesson Plan

LESSON PLAN for the academic year 2022-23
PROGRAM/YEAR/SEMESTER/SECTION: B.Pharm. I Sem Section-A Subject: Human
 Anatomy and Physiology
 Name of the
 faculty: Mr.J.Nagaraju

S.No.	Week No.	Unit No.	Topics	References
1	week 1	I	Definition and scope of anatomy and physiology	1 to 5
2			levels of structural organization	
3			body systems	
4			basic life processes	
5			homeostasis	
6	basic anatomical terminology			
7	Structure and functions of cell			
8	membrane transport			
9	cell division			
10	cell junctions			
11	General principles of cell communication			
12	intracellular signaling pathway			
13	Forms of intracellular signaling			
14	Classification of tissues, epithelial Tissue			
15	muscular tissue,			
16	connective tissues, nervous tissue			
17	Unit test-I			
18	week 4 & 5	II	Structure and functions of skin	1 to 5
19			Divisions of skeletal system , types of bone	
20			salient features and functions of bones of axial skeletal system	
21			salient features and functions of bones of appendicular skeletal system	
22			Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction	
23	Structural and functional classification of Joints			
24	types of joints movements and its articulation			
25	Disorders of Joints			
26	week 7	III	Unit test-II	1 to 5
27			Body fluids	
28			composition and functions of blood,	
29			hemopoiesis,	
30			formation of hemoglobin,	
31	Definition of anemia and types			
32	mechanisms of coagulation,			
33	blood grouping, Rh factors			
34	Blood transfusion, its significance			
35	disorders of blood			
36	Reticulo endothelial system,			
37	organization of lymphatic system			
38	Structure and functions of Lymph node			
39	Structure and functions of Spleen			
40	Structure and functions of other Lymph organs			
41	lymphatic vessels			
42	lymph circulation and functions of lymphatic system			
43	Disorders of Lymphatic disorders			
44	Unit test-III			



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45	week 12 & 13	IV	Classification of peripheral nervous system:	1 to 5
46			Structure and functions of sympathetic and	
47			parasympathetic nervous system.	
48			Origin and functions of cranial nerves.	
49			Origin and functions of spinal nerves, Cervical Plexus	
50			Brachia Plexus, Lumbar plexus & sacral Plexus	
51	week 14 & 15	IV	Structure and functions of eye	1 to 5
52			Structure and functions of ear	
53			Structure and functions of nose	
54			Structure and functions of tongue	
55			Disorders of special senses	
56			Unit Test-IV	
57	week 16	V	Anatomy of heart	1 to 5
58			Blood circulation	
59			structure and functions of artery, vein and capillaries	
60			conduction system of heart and	
61			heart beat, Pulse , regulation of heart rate by autonomic nervous system	
62			cardiac output, cardiac cycle	
63	week 16	V	Regulation of blood pressure.	1 to 5
64			Electrocardiogram and disorders of heart.	
65			Unit test-V	

References:

1	Tortora Gerard J. and Nicholas, P. Principles of anatomy and physiology Publisher Harpercollins college New York.
2	Wilson, K.J.W. Ross and Wilson's foundations of anatomy and physiology. Publisher: Churchill Livingstone, Edinburg
3	Guyton arthur, C. Physiology of human body. Publisher: Holsaunders.
4	Chatterjee, C.C. Human physiology. Volume I & II. Publisher: medical allied agency, Calcutta.
5	Peter L. Williams, Roger Warwick, Mary Dyson and Lawrence, H. d. Gray's anatomy. Publisher: Churchill Livingstone, London.

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Warangal (TG) - 506 391 (T.G.)

7. Course Timetable



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ESTD. 2005

BALAJI INSTITUTE OF PHARMACEUTICAL SCIENCES
(Approved by AICTE & PCI, Under Section 12, New Delhi and Affiliated to Kakatiya University, Warli)
Lakshapally (V) Narsampet (M) Warangal Rural (D) District Telangana State 506331
Contact: +91 9866050044 (Office), +91 9866652712 (Principal), +91 8718-230521 (Fax)

Time table for B.Pharm, PharmD & M.Pharm (Pharmaceuticals, Pharmaceutical Analysis & Pharmaceutical Quality Assurance) for the Academic year 2022-2023

B.PHARMACY I SEM Section-A TIME TABLE (2022-23)

DAY/TIME	9:30-10:30 am	10:30-11:30 am	11:30am-12:30 pm	1:15-2:15 pm	2:15-3:15 pm	3:15-4:15 pm
MON	HAB-1	PC-1	PA-1	TUT-HAB-1	TUT-PA-1	TUT-PC-1
TUE	PLC	RM	PLC	Batch-I (1:15-4:15 pm)		
WED	CS	RM	HAB-1	PLC (Practical)		
THU	PC-1	Library	CS	PC-1 (Practical)		
FRI	RM	PA-1	PC-1	CS (Practical)		
SAT	HAB-1	TUT-PLC	PA-1	PA-1 (Practical)		
Subject wise teacher		Theory	Practical			
VAB-1 - Human anatomy & Physiology - I		J Nagaraju	J Nagaraju			
PC-1 - Pharmaceutics-I		B Sureshtha	B Sureshtha			
PA-1 - Pharmaceutical analysis-I		B Madhu	B Madhu			
PLC - Pharma. Inorg. Chem		K. Kalpana	K. Kalpana			
RM - Biomedical Mathematics		D Jayender	-			
CS - Communicative skills		D Radhika	-			



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8. Student Nominal Rolls



BALAJI INSTITUTE OF PHARMACEUTICAL SCIENCES

Laknepally (V), Narsampet (M), Warangal Dist. - 506 331

B.Pharmacy -I Year Nominal Rolls for the Academic Year - 2022-2023 (Section-A)

S.No.	Permanent H. T. No.	Name of the Student	Community	Category
1	35123-6001	ABDUL ARIF ALAM	GENERAL	SPOT
2	35123-6002	ABDUR RAHIM	GENERAL	SPOT
3	35123-6003	ABUL UDDIN	GENERAL	MNGT
4	35123-6004	AKBAR ALI	GENERAL	MNGT
5	35123-6005	ANARUL ISLAM	GENERAL	MNGT
6	35123-6006	ANKALLA CHANDANA	BC-D	Convenor
7	35123-6007	ANOWAR HUSSAIN	GENERAL	MNGT
8	35123-6008	ARFATH ALI	OC	Convenor
9	35123-6009	ARSAD AHMED CHOUDHURY	GENERAL	MNGT
10	35123-6010	ASHRAFUL AHMED	GENERAL	MNGT
11	35123-6011	ASHRAFUL ISLAM	GENERAL	SPOT
12	35123-6012	ASRAFUL HOQUE	GENERAL	MNGT
13	35123-6013	BATTU SRAVAN KUMAR	BC-D	Convenor
14	35123-6014	BHUKYA SONIKA	ST	Convenor
15	35123-6015	BHUKYA VENNELA	ST	Convenor
16	35123-6016	BODDUPALLI SUVARNA	BC-B	Convenor
17	35123-6017	BONDUGULA SANJANA	OC	Convenor
18	35123-6018	BOODIDA AKSHAYA	SC	Convenor
19	35123-6019	BURRA MILIND GOUD	BC-B	Convenor
20	35123-6020	CHILUKURI THARUN	SC	Convenor
21	35123-6021	CHINTHAPANDU SAI SUDHA	BC-D	SPOT
22	35123-6022	DADIGELA SNEHA	BC-D	Convenor
23	35123-6023	DILSHA	BC-E	SPOT
24	35123-6024	EADARA MADHULIKA	SC	Convenor
25	35123-6025	ERRELI SONI	SC	Convenor
26	35123-6026	FARIDUL ISLAM	GENERAL	MNGT
27	35123-6027	FARISA FATHIMA	BC-B	Convenor
28	35123-6028	FIDDUSUR RAHMAN	GENERAL	MNGT
29	35123-6029	GOPALAPURAM SRIYA	BC-B	Convenor
30	35123-6030	GUGGILLA SHARON	SC	Convenor
31	35123-6031	GUGULOTHU GNANESHWARI	ST	MNGT
32	35123-6032	GUGULOTHU SHIVA SHANKAR	ST	Convenor
33	35123-6033	HAFIJUR RAHMAN	GENERAL	SPOT
34	35123-6034	HASANUR RAHMAN	GENERAL	MNGT
35	35123-6035	JADI PRAHALAD	SC	Convenor
36	35123-6036	JAHDUL ISLAM	GENERAL	MNGT
37	35123-6037	JAINUDDIN	GENERAL	MNGT
38	35123-6038	JAKKULA SWETHA	BC-D	Convenor
39	35123-6039	K KARTHIK	BC-B	Convenor
40	35123-6040	KAKKERLA SUSHMA	BC-B	Convenor
41	35123-6041	KAMAGONI SAI CHARITHA	BC-B	SPOT
42	35123-6042	KONDURI SIREESHA	BC-A	Convenor



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S.No.	Permanent H. T. No.	Name of the Student	Community	Category
43	35123-6043	KOTA ABHISHAKTH	SC	Convenor
44	35123-6044	KOYYADA PRASHAMSHA	BC-B	Convenor
45	35123-6045	LINGAM BHEEMAMMA	SC	Convenor
46	35123-6046	MADDINALA SHANKAR	BC-D	Convenor
47	35123-6047	MAHBUBUL HASAN LASKAR	GENERAL	SPOT
48	35123-6048	MAHMUDUL HASAN CHOUDHURY	GENERAL	SPOT
49	35123-6049	MALA BALA KRISHNA	SC	Convenor
50	35123-6050	MALOTH AKASH	ST	Convenor
51	35123-6051	MAMUNURI NETHAJI	SC	SPOT
52	35123-6052	MANDAL ZAINUL ABEDIN SAIFUL ISLAM	GENERAL	MNGT
53	35123-6053	MATTAPELLY OMSREEJA	BC-D	Convenor
54	35123-6054	MD NURSELIM	GENERAL	SPOT
55	35123-6055	MEDA DILEEP	OC	Convenor
56	35123-6056	MERAJUL ISLAM	GENERAL	SPOT
57	35123-6057	MINAL ALOM	GENERAL	MNGT
58	35123-6058	MIR NISAR ALI	GENERAL	SPOT
59	35123-6059	MOHAMMAD SANA	BC-E	SPOT
60	35123-6060	MOKIBUR RAHMAN	GENERAL	MNGT



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Warangal (Dt) - 506 331 (T.S)

9. Sample Course Assignment with Answers

BALAJI INSTITUTE OF PHARMACEUTICAL SCIENCE

Name of student - M ANASH

Name of subject - HUMAN Anatomy and physiology

class - B Pharmacy 1st Year

Roll No - 351236050

Date - 10/1/23

ASSIGNMENT

TISSUES

=> Tissues are composed of cells similar in structure and specialized to perform a specific function for the body

=> The human body is made of four general types of tissues

* Epithelial tissues:- For lining body cavities, covering internal organs and large surfaces.

* Connective tissues:- For supporting and linking tissues or organs together some are specialized to provide protection to store fat, and even to provide circulatory function in the cardiovascular system

* Muscle tissues:- For providing contraction and relaxation in the ~~hard~~ body surfaces in the heart chambers, and in hollow organs such as blood vessels and the digestive tract

* Nerve tissue:- For generating and transmitting electrical signals (nerve impulses) in the brain, spinal cord, and nerves

Epithelial tissues

- 1) Covering of body surfaces and internal organs and lining of body cavities
- 2) Major tissue component of glands
- 3) Nerve has a ~~surface~~ apical (exposed to environment) and a basomed

Membrane (usually attached to a connective tissue)

a) lacks blood vessels, so nourishment comes from the underlying connective tissue by diffusion movement

b) other unique characteristics

or reproduce rapidly

Cells in epithelial tissues are often attached to one another by desmosomes which allow the tissue to serve as an excellent protective layer



c) The name is derived from the number of layers of cells ('simple' means a single layer while 'stratified' means multiple layers) and the shape of cells ('squamous' means flattened, 'cuboidal' means cube-shaped and 'columnar' means elongated).

1) Simple squamous epithelium:

- A single layer of thin, flattened cells
- Found in areas where diffusion or filtration occurs
- Examples - air sacs of lungs, kidney tubules, and capillary wall

→ Simple squamous epithelium lining blood vessels and heart is called endothelium



Sandeep

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Vijaynagar (D) - 506 001 (T & D)



2) Simple cuboidal epithelium:-

- A single layer of cube-shaped cells
- Found in areas where secretion or absorption occurs
- Examples - Kidney tubules, and ducts of glands



3) Simple columnar epithelium:-

- A single layer of elongated cells
- designed for protection, secretion, or absorption
- Examples - lining of uterus and small intestine
- Some columnar cells have finger-like projections called microvilli which are extension of the cell membrane for increasing the surface area in absorption



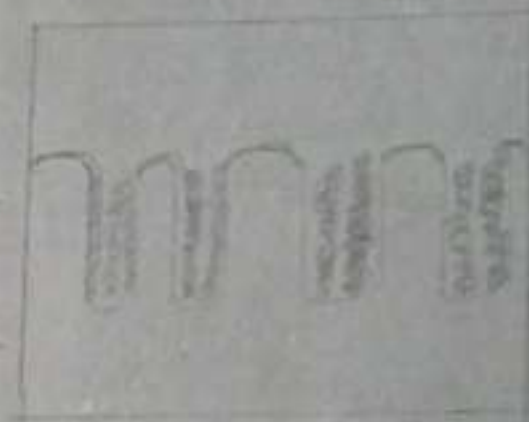
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Varanasi (II) - 220 321 (I & III)

4) pseudostratified columnar epithelium

→ A single layer of columnar cells that appears to be multiple-layered because of its multiple-layered nuclei

→ The cells have hair-like protein structure called cilia on the cell membrane to trap and expel foreign particles or bacteria, or they may be used to propel the egg cell in the uterine tubes.



5) stratified squamous epithelium:-

→ Many layers of flattened cells

→ cells at the bottom layers are the youngest and cuboidal-shaped, and will become flattened as they move upward to higher layers

→ Forms the epidermis (top skin layer) lining of oral cavity, throat, and Vagina



6. Stratified cuboidal epithelium

- 2 layers of cube shaped cells
- Function: protection
- Location: lining of layer back of sweat glands, salivary glands and the pancreas

7. Stratified columnar epithelium

- Top layer of elongated cells and layers of cube shaped cells
- Location: part of the wall of large excretory ducts of some glands such as ceripigial glands, small ducts in oral mucous membrane and part of conjunctiva of eye

* Function - Protection, secretion

7. Transitional Epithelium

- Many layers of cube shaped and elongated cells
- Function: Distensibility, protection
- Location: inner lining of urinary bladder and lining of ureters and urethra



Principle
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Muzungul (T) - 506 331 (T.S)

Glandular epithelium

- specialized to produce and secrete chemical substance into ducts or body fluids
- Made of cuboidal or columnar cells
- Exocrine glands use ducts to secrete their products into an open space (eg: sweat glands, oil glands, salivary glands, and tear glands)
- Endocrine glands secrete their products (hormones) directly into blood or body fluids (eg all hormonal glands are endocrine glands)

Types of exocrine glands

- Merocrine glands - A fluid product released through the cell membrane by exocytosis. ex: salivary glands, pancreatic glands, sweat glands
- Apocrine glands - cellular product and portions of the free ends of cells pinch off during secretion. ex: Mammary glands.
- Holocrine glands - entire cell with secretory products rupture. ex: sebaceous glands of skin



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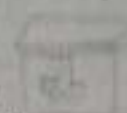
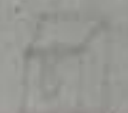
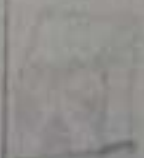
Multicellular exocrine glands

→ simple - single unbranched duct

→ compound - branched duct

→ Multicellular exocrine glands can be:

- Tubular - secretory cells from a tube
- Alveolar - secretory cells from a sac
- Tubuloalveolar

	Tubular secretory structure		Alveolar secretory structure	
Single duct structure (duct does not branch)				
	(a) simple tubular ex: salivary glands	(b) simple branched tubular ex: stomach (gastric) glands	(c) simple branched alveolar ex: sebaceous (oil) glands	
Compound duct structure (duct branches)				
	(e) compound tubular ex: duodenal glands of small intestine	(f) compound alveolar ex: Mammary glands	(g) compound tubuloalveolar ex: salivary glands	

Unicellular exocrine glands

→ unicellular exocrine glands

→ single cells

→ Have no ducts

→ produce mucin

lubricate surfaces



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10. Course Sessional Question Papers with COs & Blooms level

B.Pharm I sem I Sessional Exam Sub-Human Anatomy and physiology Section-A

Date: 13/02/2023 Time: 10.30-11.30 Marks-30M

Q.No	Question	Marks	CO	Blooms level
I.	Answer ALL the questions			
1)	What are basic life processes?	2	CO1	L1
2)	Mention skull bones?	2	CO2	L1
3)	Write the functions of bone and skeletal system?	2	CO2	L1
4)	Write a note on Stratified squamous epithelium?	2	CO1	L1
5)	Classify connective tissues?	2	CO1	L3
II.	Answer any TWO questions			
6)	Explain the anatomy and histology of long bone?	5	CO2	L2
7)	Write a note on neuromuscular junction?	5	CO2	L1
8)	Define Homeostasis and explain negative feed-back mechanism with example?	5	CO1	L2
III.	Answer any ONE questions			
9)	Classify tissues and explain epithelial tissue?	10	CO1	L3
10)	Classify joints and Explain with examples?	10	CO2	L3



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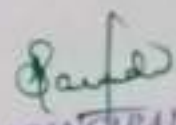
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B.Pharm I sem II Sessional Exam Sub-HAP Section-A

Date: 02/05/2023 Time: 10.30-11.30 Marks-30M

Q.No	Question	Marks	CO	Blooms level
I.	Answer ALL the questions			
1)	Mention cranial Nerves?	2	CO4	L1
2)	Write the functions of lymphatic system?	2	CO3	L1
3)	Write a note on brachial plexus?	2	CO4	L1
4)	Mention the functions of skin?	2	CO3	L1
5)	Define heart rate and pulse?	2	CO5	L3
II	Answer any TWO questions			
6)	Write a note on blood grouping and its significance?	5	CO3	L4
7)	Explain the anatomy of Eye?	5	CO4	L4
8)	Explain the anatomy of ear?	5	CO4	L4
III.	Answer any ONE questions			
9)	Define blood pressure and explain Regulation of blood pressure?	10	CO5	L4
10)	Explain the differences between sympathetic and parasympathetic nervous system?	10	CO4	L4




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Lakshmapally (V), Narsimipet (TA)
Warangal (DT) - 506 031 (T.S)

11. Sessional Answer Booklets



BALAJI INSTITUTE OF PHARMACEUTICAL SCIENCES

Lakshypally (V), Narsimhapur (M), Warangal Dist - 506 131

Name of the Subject :

HUMAN ANATOMY & PHYSIOLOGY

Hall Ticket No. :

3323-6033

Course :

B-Pharmacy 2nd year

Date of Exam :

13/04/23

Internal Exam : I / II / III Sessional Exam

No. of Additional Sheets used

Signature of Invigilator	Signature of Examiner

Q.No.	Marks
1	10
2	08
3	07
4	—
Total	25

III)

Q)

TISSUES

Tissues are composed of cells and they are in similar in structure and they are specialised for specific functions in our body.

Tissues are mainly classified into 4 types:-

→ Epithelial tissue

→ Connective tissue

→ Muscular tissue

→ Nervous tissue.

Epithelial Tissue:-

→ Cells that are covering the body surfaces, and internal organs and lining of body cavity.

→ Major tissue

→ Always have cell surface membrane.



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- They Reproduce rapidly
- Lacks of blood vessels. So nutrients come by diffusion movement
- These are classified into:-

1. Simple Squamous epithelium:-

- It is consist of single layer of thin flattened cells arranged on the basement membrane.

Location:- Lining of kidney tubules, peritoneum, heart blood vessels, air sacs of lungs.

Function:- Diffusion & filtration.

2. Simple Cuboidal epithelium:-

- It is consist of single layer of cube shaped cells arranged on the basement.

Location:- Lining of kidney tubules, peritoneum.

Function:- Absorption & Secretion.

3. Simple Columnar epithelium:-

- It is consist of single layer of rectangular/elongated cells. arranged on basement membrane.

Location:- Digestive tract, glands

Function:- Secretion, Absorption & Secretion



4. Pseudostratified Columnar Epithelium

• Location - Trachea & ciliated bronchi.

Function - Expel the foreign particles & mucus by cilia.

5. Stratified Squamous Epithelium

• It is made up of multiple layers of cells of flat shaped cells.

Location - Skin, mouth, vagina, throat.

Function - Protection & sense.

6. Stratified Cuboidal Epithelium

• It is made up of 2-3 layers of cube-shaped cells.

Location - Lining of deep ducts of sweat glands & some glands like esophagus & salivary glands.

Function - Protection.

7. Stratified Columnar Epithelium

• It is made up of several layers of elongated cells.

Location - Intestine, anus, mucosa, and cavity.

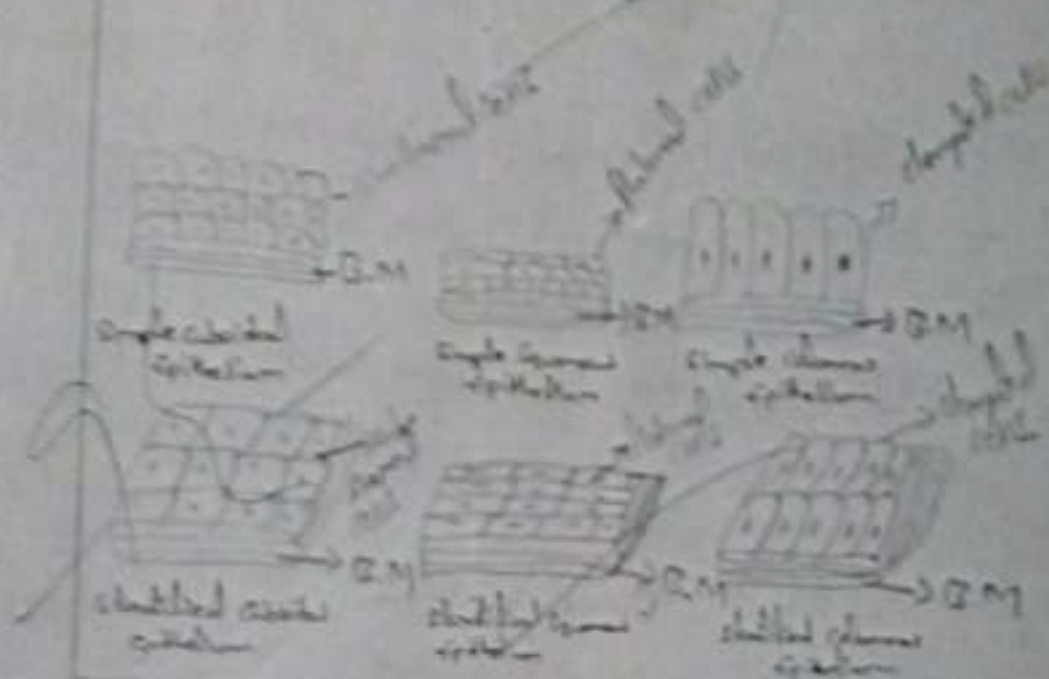
Function - Protection.



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I Tissues and Organs

Lectures: with many slides and notes
 Tissues: Diversity & Relation



III
 8

Homeostasis:-

→ Condition of 'equilibrium' in the body's internal environment. And it is a dynamic condition which is meant to keep the body's internal body parts in a narrow range compatible with maintaining life.

In health, as the body parts are
 functions are taking place
 as homeostasis.

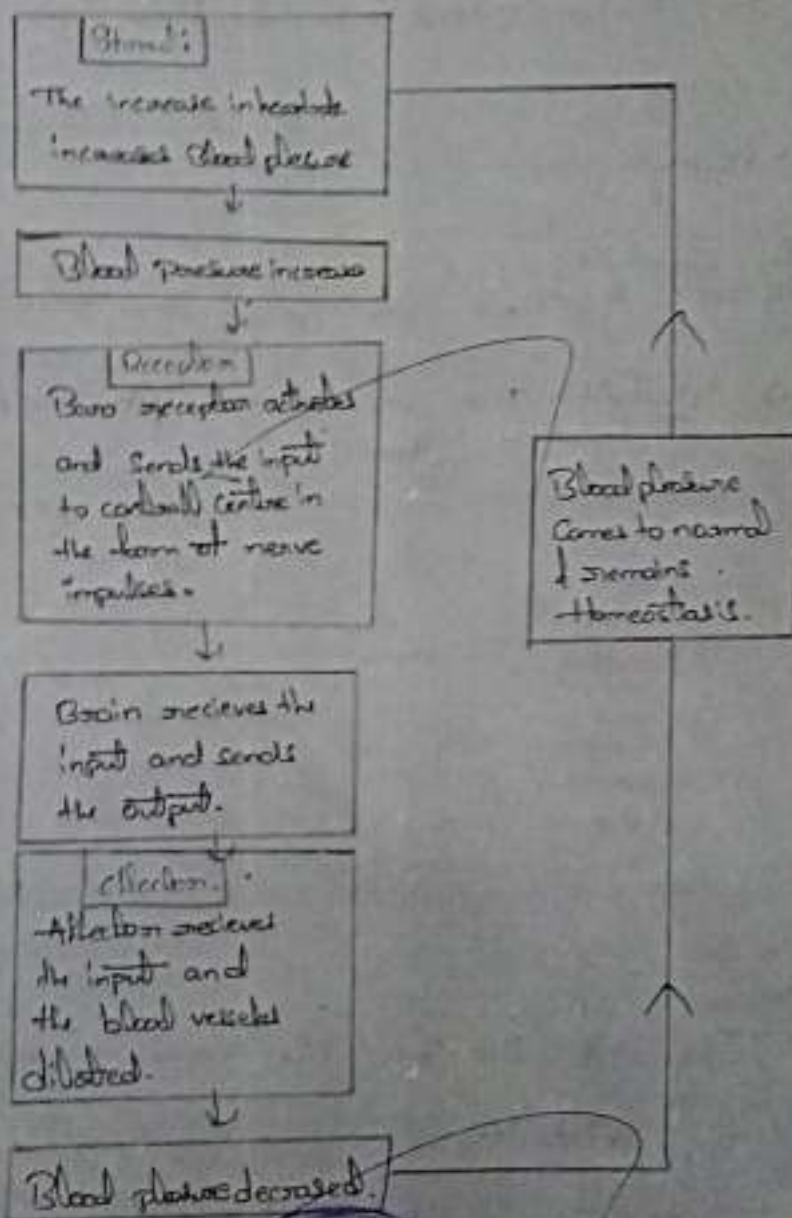
Safe

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Negative Feedback System:

→ A negative feedback system responds to the reverse decrease in the internal body environment.

-Example: Regulation in BP



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Bone's

- Bone is a hard and strong connective tissue
- It stores fat and minerals
- It supports the body
- It helps in movement
- It further divided into two types:

1) Epiphysis

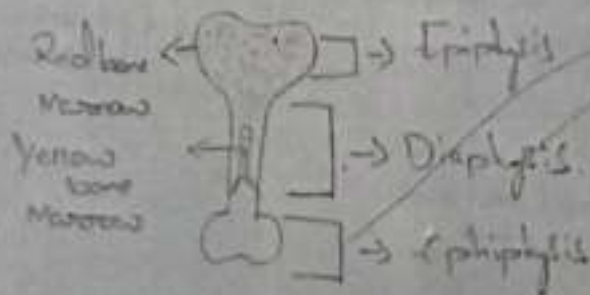
2) Diaphysis

1) Epiphysis:-

These are spongy bones present in ends.

2) Diaphysis:-

These are have yellow bone marrow in them.



II

They are six basic Life Processes:-

1) Metabolism:-

- It is meant by chemical reactions that takes place in our body.

2) Growth:-

- Cell division
- Increase in size



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3) Movement:-

- of body parts
- of substances.

4) Responsiveness

- Sense and reacting/responding to the stimulus.

5) Reproduction:-

- Production of offspring.

6) Differentiation:-

- It is a process which makes a cell from unspecialized state to specialized state.

2) There are 22 bones present in skull and they are divided into two types:-

Cranium (8).

Frontal - (2)

Temporal - (2)

Parietal - (2)

Sphenoid - (1)

Occipital - (1)

Facial bones (14).

Zygomatic - (2)

Maxilla - (2)

Mandible - (2)

Nasal bones - (2)

Lacrimal bones - (2)

Palatine bones - (2)

Vomer - (1)

Mandible - (1)

3) Bone:-

→ Support

→ As a storehouse of minerals

→ Production of blood

mineral homeostasis

storage of fat



Vascular System:

- Support the body
- Facilitates the movement
- Stores & releases the minerals
- Endocrine regulation
- Production of blood cells.
- Protection of internal organs.

4)

Stratified Squamous epithelium:-

- + It is made up of multiple layers of thin and flattened cells.

Location:- Skin, mouth, throat, Vagina

Function:- Protection & sense.

5)

They are three types of Connective tissues:-

- 1) Dense Connective tissue
- 2) Loose Connective tissue
- 3) Specialized Connective tissue.

(Or)

Loose Connective tissue.

Dense "

areolar "

Adipose "

Elastic "

Specialized "



2

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Lakshapally (V), Narsimhapur (M), Warangal Dist - 506 331.

Name of the Subject : Human Anatomy and Physiology

Hall Ticket No. : 3512360114 Course : B. Pharm. 3rd yr Date of Exam : 02/05/23

Internal Exam : ☒ I / ☐ II / ☐ III Sessional Exam

No. of Additional
Sheets : 04

Signature of Invigilator	Signature of Examiner

Q.No.	Marks
1	92
2	8
3	92
4	—
Total	92

1. Bit

5x2=10M

The 10 pairs of Cranial nerves:

- I. olfactory nerve
- II. optic nerve
- III. oculomotor nerve
- IV. Trochlear nerve
- V. Trigeminal nerve
- VI. Abduces nerve
- VII. Facial nerve
- VIII. Vestibulocochlear nerve
- IX. Glossopharyngeal nerve
- X. Vagus nerve
- XI. Accessory nerve
- XII. Hypoglossal nerve.

The Functions of Lymphatic System:

1. Maintains the body fluid
2. Tissue drainage
3. Absorption to the small intestine
4. Immunity.
5. To boost the WB response for immunity



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* Branchial plexus

The plexus of branchial plexus from the nerves that sends signals from the spinal cord. From that it carries the signal to shoulders, hands, arms.

4. The functions of skin:-

- It protects body from dust, waste material and etc.
- protection from sun rays
- helps in removal of waste in the form of sweat
- It helps to cover the damage of cell.

5. Heart rate:- It is defined as the number of heart beats per minute. for 1 minute the 1 contraction and 1 relaxation takes place/occurs.

Pulse rate:- It is defined as the number of ventricles per minute.
(or)

The noticeable pressure ~~feeling~~ which is created by the blood pressure is called as pulse rate.

∴ Pulse rate = Heart rate



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Wardhahalli (Tel) - 500 081 (Fax) - 500 081

19. Q. 10.10.10

10. The differences between Sympathetic and Parasympathetic nervous system:

System	System
Sympathetic nervous	Parasympathetic nervous
• It controls the body to stimulate to "fight-flight". • It originates from cranial, thoracic, lumbar regions of CNS. • It's Neurotransmitters: norepinephrine. • Action is fast response. • It is dilate. • Increases the heart beat. • Decreases the urinary output. • Increases the metabolic rate.	• It controls the body to occur "feed-breed" and to occur "rest-digest". • It originates from Cranial, Sacral regions of CNS. • It's Neurotransmitters: Acetylcholine. • Action is slow response. • It is constrict. • Decreases the heart beat. • Increases the urinary output. • Decreases the metabolic rate.



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 (as per IV) - Narsimhaiah (M)
 Bangalore (IN) - 500 331 (T. 01)

System Sympathetic division	System Parasympathetic division
- Muscle contraction takes place - Bronchial tubes dilate - Dilates pupil of eye - Decreases the production of saliva - Contracts the rectum	- Muscle relaxing takes place - Bronchial tubes constrict - Constricts pupil of eye - Increase the production of saliva - Relaxes the rectum

Q. Bit 2x5-10M

6. A Note on blood grouping and its significance.

Basically blood grouping are based on the 2 systems

i) ABO system

ii) Rh factor system.

ABO systems-

Blood group



contains

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* A blood group is blood the antigens

are present and antibodies are absent. In
a blood group the antibodies are both.

- B blood grouping - In B blood grouping the
antigen is B and antibodies are alpha.
- A blood group denotes the blood to 'A' antibodies.
- AB blood grouping - In the AB blood
group both the antibodies and antigens
are present.

• O blood grouping.

- In the blood group, they don't have any
antibodies and antigens.
- They can be called as universal donor.

Rh-factor - Rh factor contains of antigen.

D is a blood group contains antigen.

D is known as positive.

• If a blood group doesn't have antigen.

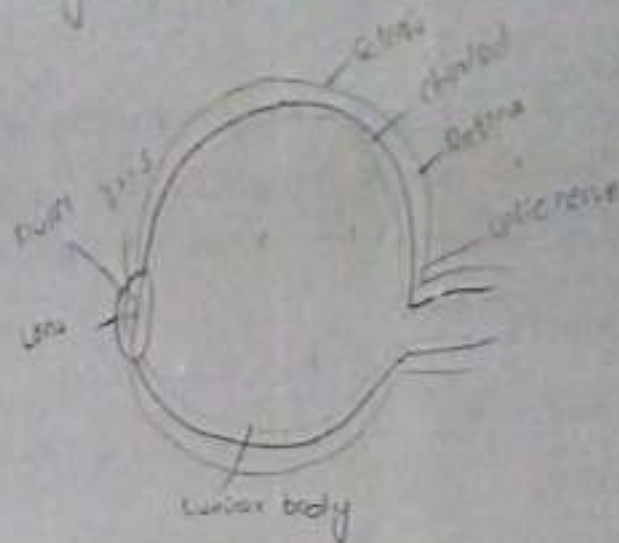
D is known as negative.

Blood group	Antigen	Antibodies
A	a	Beta
B	b	Alpha
AB	a, b	Alpha, Beta
O		



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7. Anatomy of eye



- Eye are protected by eyelashes.
- Eye plays a major role in the vision and it is known as sense organ.
- For every living organism sight plays a major role.
- The eye is ~~also~~ having 3 main parts.
 - i) outer layer
 - ii) middle layer
 - iii) inner layer
- Eye contains the
 - lacrimal glands,
 - lacrimal ducts
 - optic nerve.
- Pupil contracts and dilates the size according to the sunlight.
- Cornea, Retina



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Warrangal (D) 506 531 (T.S)

12. CO Mapping with PO & PSO

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(Approved by AICTE & PCI, Under Section 12, New Delhi) and Affiliated to Kakatiya University, Waj 1
Laknepally (V) Narsampet (M) Warangal Rural (Dt) Telangana State 506331
Contact : +91 9866050044 (Office), +91 9866552412 (Principal), +91 8718-230521 (Fax)

12. CO mapping with PO and PSO.

Course Outcomes	Program outcomes											PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
CO1	2	2	0	2	0	1	0	0	1	3	0	1	0
CO2	2	2	1	2	0	1	0	0	1	2	0	1	1
CO3	2	1	1	1	0	1	0	0	1	2	0	2	1
CO4	3	1	1	0	0	1	0	0	2	2	0	1	2
CO5	2	3	0	1	0	1	0	0	2	2	0	2	2
Average	2.20	1.80	1.00	1.50	0.00	1.00	0.00	0.00	1.40	2.20	0.00	1.40	1.50

Here in the table, '3' corresponds to a high correlation; '2' corresponds to a medium correlation, and

'1' corresponds to a low correlation, between CO and PO/PSO.

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13. CO-PO-PSO Attainment

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(Approved by AICTE & PCB, Under Section 10, New Delhi and Affiliated to Kakatiya University, Wg.)
 Lakshypally (V) Narsampet (M) Warangal (Dist) Telangana State 506333
 Contact: +91 9866050044 (Office), +91 9866652412 (Principal), +91 8718-230521 (Fax)

13. CO-PO-PSO attainment

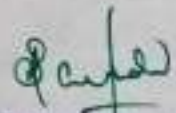
S No	Hall Ticket No.	Name of the Student	Continuance mode (10M)	Sessional Marks (30M)		Average marks computed for 15M	Total Sessional Marks 25M (A+B)	External	Indirect evaluation
			A	I	II	B			
1	35123-6001	ABDUL ARIF ALAM	10	27	27	13.5	23.5	C	2.4
2	35123-6002	ABDUR RAHIM	10	27	27	13.5	23.5	C	2.2
3	35123-6003	ABUL UDDIN	10	29	28	14.25	24.25	C	2.6
4	35123-6004	AKBAR ALI	10	18	20	9.5	19.5	F	2.2
5	35123-6006	ANKALLA CHANDANA	10	27	25	13	23	C	2.6
6	35123-6007	ANOWAR HUSSAIN	10	22	23	11.25	21.25	D	2.4
7	35123-6008	ARFATH ALI	10	2	17	4.75	14.75	F	2.2
8	35123-6009	ARSAD AHMED CHOUDHURY	10	15	23	9.5	19.5	D	2.3
9	35123-6010	ASHRAFUL AHMED	10	23	22	11.25	21.25	D	2.4
10	35123-6011	ASHRAFUL ISLAM	10	24	26	12.5	22.5	B	2.6
11	35123-6012	ASRAFUL HOQUE	10	25	27	13	23	C	2.3
12	35123-6013	BATTU SRAVAN KUMAR	10	28	26	13.5	23.5	D	2.4
13	35123-6014	BHUKYA SONIKA	10	25	25	12.5	22.5	C	2.3
14	35123-6016	BODDUPALLI SUVARNA	10	24	26	12.5	22.5	D	2.3
15	35123-6017	BONDUGULA SANJANA	10	AB	27	7	17	C	2.3
16	35123-6018	BOODIDA AKSHAYA	10	29	28	14.25	24.25	B	2.4
17	35123-6019	BURRA MILIND GOUD	10	29	28	14.25	24.25	C	2.2
18	35123-6020	CHILUKURI THARUN	10	25	23	12	22	D	2.6
19	35123-6021	CHINTHAPANDU SAI SUDHA	10	29	27	14	24	B	2.2
20	35123-6022	DADIGELA SNEHA	10	27	28	13.75	23.75	C	2.6
21	35123-6023	DILSHA	10	22	24	11.5	21.5	C	2.4
22	35123-6024	EADARA MADHULIKA	10	23	27	12.5	22.5	C	2.2
23	35123-6025	ERRELI SONI	10	19	25	11	21	F	2.3
24	35123-6026	FARIDUL ISLAM	10	27	27	13.5	23.5	C	2.4
25	35123-6027	FARISA FATHIMA	10	29	28	14.25	24.25	B	2.6
26	35123-6028	FIDDU/SUR RAHMAN	10	24	22	11.5	21.5	D	2.3
27	35123-6029	GOPALAPURAM SRIYA	10	29	28	14.25	24.25	B	2.4

*[Signature]***PRINCIPAL**

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28	35123-6030	GUGGILLA SHARON	10	17	27	11	21	D	2.3
29	35123-6031	GUGULOTHU GNANESHWARI	10	21	26	11.75	21.75	D	2.4
30	35123-6032	GUGULOTHU SHIVA SHANKAR	10	25	24	12.25	22.25	D	2.3
31	35123-6033	HAFIJUR RAHMAN	10	28	20	12	22	C	2.4
32	35123-6034	HASANUR RAHMAN	10	15	17	8	18	F	2.4
33	35123-6035	JADI PRAHALAD	10	22	24	11.5	21.5	A	2.2
34	35123-6036	JAHDUL ISLAM	10	26	21	11.75	21.75	D	2.6
35	35123-6037	JAINUDDIN	10	7	21	7	17	D	2.2
36	35123-6038	JAKKULA SWETHA	10	29	28	14.25	24.25	C	2.6
37	35123-6039	K. KARTHIK	10	21	22	10.75	20.75	C	2.4
38	35123-6040	KAKKERLA SUSHMA	10	26	28	13.5	23.5	C	2.2
39	35123-6041	KAMAGONI SAI CHARITHA	10	23	25	12	22	C	2.3
40	35123-6042	KONDURI SIREESHA	10	27	26	13.25	23.25	D	2.4
41	35123-6043	KOTA ABHISHAKTH	10	25	26	12.75	22.75	D	2.6
42	35123-6044	KOYYADA PRASHAMSHA	10	28	28	14	24	B	2.3
43	35123-6045	LINGAM BHEEMAMMA	10	24	17	10.25	20.25	F	2.4
44	35123-6046	MADDINALA SHANKAR	10	27	25	13	23	D	2.3
45	35123-6047	MAHBUBUL HASAN LASKAR	10	26	27	13.25	23.25	C	2.6
46	35123-6048	MAHMUDUL HASAN CHOUDHURY	10	22	27	12.25	22.25	C	2.4
47	35123-6049	MALA BALA KRISHNA	10	28	27	13.75	23.75	C	2.4
48	35123-6050	MALOTH AKASH	10	20	26	11.5	21.5	D	2.6
49	35123-6051	MAMUNURI NETHAJI	10	19	5	6	16	F	2.4
50	35123-6052	MANDAL ZAINUL ABEDIN SAIFUL ISLAM	10	AB	21	5.5	15.5	F	2.2
51	35123-6053	MATTAPELLY OMSREEJA	10	23	26	12.25	22.25	D	2.6
52	35123-6055	MEDA DILEEP	10	19	18	9.25	19.25	F	2.2
53	35123-6056	MERAJUL ISLAM	10	24	21	11.25	21.25	D	2.6
54	35123-6057	MINAL ALOM	10	17	25	10.5	20.5	F	2.4
55	35123-6058	MIR NISAR ALI	10	6	A B	1.5	11.5	F	2.2
56	35123-6059	MOHAMMAD SANA	10	26	27	13.25	23.25	D	2.3
57	35123-6060	MOKIBUR RAHMAN	10	24	17	10.25	20.25	F	2.4




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Target marks (50%)	5	15	15	7.5	12.5	50%	2
Number of students above target marks	57	50	55	51	56	46	57
Number of students attended	57	55	56	57	57	57	57
% of Students above Target Marks :	100.00	90.91	98.21	89.47	98.25	80.70	100
Attainment level	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Attainment ($3 \geq 70\%$, $2 \geq 60\%$, $1 \geq 50\%$, $0 < 50\%$)

Internal Exam Attainment value	3
External Exam Attainment value	3
overall direct attainment value (70% of external + 30% of internal Examination)	3
Indirect attainment value	3
Overall CO attainment (80% of direct attainment +20% of indirect attainment)	3

$$\text{CO-PO/PSO Attainment} = \text{COA} \times M/3$$

Course Outcomes	Program Outcomes											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO-PO-PSO MAPPING	2.20	1.80	1.00	1.50	0.00	1.00	0.00	0.00	1.40	2.20	0.00	1.40	1.50
CO-PO-PSO ATTAINMENT	2.20	1.80	1.00	1.50	0.00	1.00	0.00	0.00	1.40	2.20	0.00	1.40	1.50



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14. Ad Ons- Lecture Notes, PPTs & Previous Question Papers

RED BLOOD CELLS (RBCs) / ERYTHROCYTES

- * They are non-nucleated formed elements of the blood.
- * RBCs are circular, biconcave discs with diameter of 7.2μ . The edges are rounded & thicker (2.2μ) than the center (1μ), looks like dumb-bell.
- * During the early part of foetal life, the mammalian red cells are nucleated but in the later part, the nucleated cells disappear from circulation.
- * The cytoplasm of RBCs contains HB molecules, which constitute about 33% of the cell's weight. Each RBC contains about 280 million HB molecules.
- * RBCs are highly specialized for their O_2 transport function, bcz the matured RBCs have no nucleus, all the internal space is available for O_2 transport.
- * Because RBCs lacking mitochondria, generate ATP anaerobically i.e. they do not use up any of O_2 they transport.
- * Normal RBC count:
 - Adult male : 5 millions / $cu. mm$ [$cu. mm = 1 mL = 10^{-6}$ Liters]
 - Female : 4.5 " " (1 drop of blood = 50 μL)
 - Infants : 6-7 millions / mm^3
 - Fetus : 7.5 millions / mm^3

- * Properties :
 - * Rouleaux formation : Like pile of coins
 - * Specific gravity : 1.092 - 1.101 [Plasma 1.032]
 - * Packed cell volume (PCV) : Blood + anticoagulant $\xrightarrow[3000rpm]{\text{centrifuge}}$ clear plasma (55%)
- and RBCs settle at the bottom of centrifuge tube (constitutes 45% of total blood - PCV)
- * Variations in the number of RBCs :
 - Normal : $4.7 \pm 5\%$ for men [Hematocrit (HCT)]
 - $4.2 \pm 5\%$ for women
 - $\downarrow$ PCV : Anemia
 - $\uparrow$ PCV : Polycythemia

(1) Physiological variations :

(a) An increase in RBC count [polycythemia], occurs in the following conditions:

- * Age : at birth, the count is 8-10 millions / mm^3 and the count is $\downarrow$ within -10 days due to destruction causing physiological jaundice in some infants.
- * Sex : Before puberty and after menopause in females, the RBC count is similar to that of males but during reproductive periods, count is less - 4.5 millions / mm^3
- * High altitude : The inhabitants of mountains (above 10,000 feet from sea level) - have an increased count of > 7 millions / $cu. mm$ due to hypoxia, which stimulates erythropoietin from kidneys that stimulates bone marrow to produce RBCs.
- * Muscular exercise : Temporary $\uparrow$ in count after exercise, bcz of mild hypoxia and contraction of spleen (reservoir of blood)
- * Emotional conditions : Like anxiety $\uparrow$ RBCs bcz of sympathetic NS stimulation $\rightarrow$ T
- * Increased atmospheric temperature : $\uparrow$ count
- * After meals : slight $\uparrow$ in count

Production of RBCs (Erythropoiesis)

- * Erythropoiesis is the process by which the origin, development and maturation of - RBCs occur.
- * Hemopoiesis / hematopoiesis, is the process of origin, development & maturation of - all the blood cells.
- * Main stimulus for erythropoiesis is the decreased O_2 in circulation (hypoxia), which mainly detected by kidneys, which they secrete hormone, erythropoietin (EPO) (hemopoietin / erythrocyte stimulating factor), which is a glycoprotein, promotes the following processes:

- (a) production of proerythroblasts
- (b) Development of " " into matured RBCs
- (c) Release of matured RBCs into blood vessels from red bone marrow along 2 lines - reticulocytes (immatured RBCs).

- * Other stimulating factors → ↓ Blood volume [Hypovolemia]
→ Testosterone, stimulates thyroxine synthesis, which promotes EPO production
→ Hemopoietic growth factors: mainly interleukins (IL-3, 6, 11)
Secreted by T-cells → stimulates cells, macrophages
Secreted by T-cells → stimulates cells, macrophages

→ Colony stimulating factors [CSF]:

- * Granulocyte-CSF (G-CSF): Secreted by monocytes & endothelial cells
- * Granulocyte-monocyte CSF (GM-CSF): " " " " " "
- * Monocyte CSF (M-CSF): Secreted by monocytes & endothelial cells.

→ Vitamins: Vit-B: Its deficiency causes anemia & pellagra

- * Vit-B₁₂ (cyanocobalamin), essential for maturation, produced in intestinal flora and stored in liver. Def. of vit B₁₂ causes 'pernicious anemia'.
- * Vit-B₉ (Folic acid): essential for maturation. Def. causes 'megaloblastic anemia'.

* Vitamin-C & Vit D also essential for maturation.

→ Intrinsic factor (IF): Produced in gastric mucosa, essential for vit B₁₂ absorption from intestine. The def. causes pernicious anemia in case of gastritis, ulcers, gastrorectomy.

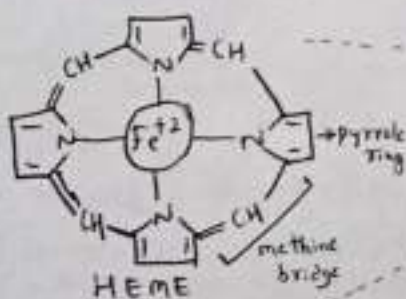
→ For Hb formation

- proteins and amino acids are essential for - Globin synthesis
- Iron essential for - heme synthesis
- Copper
- Cobalt & nickel " utilization of iron from GIT
- Vit C, B₁₂, nicotinic acid, B₆ also essential.
- Riboflavin - promotes iron absorption



Hemoglobin (Hb)

- * Hb is a red pigment of the blood and it is a chromoprotein consisting of 2 parts:
 - a protein part: Globin (96%) and
 - a non-protein, iron-containing pigment: Heme, which is a metalloporphyrin where the metal is Iron (Fe^{2+} form) and has 4-pyrrole rings attached to one another by methine bridges ($=CH-$).
- * The iron content of Hb is 0.34% and about 3-4 gm of Iron is present in Hb in the total amount of the blood of an adult.
- * The globin, helps the heme to keep the Iron in ferrous state (Fe^{2+}) and to combine loosely and reversibly with molecular oxygen (O_2). It contains 4 polypeptide chains (2 α -chains and 2 β -chains).
- * The M.W. of Hb is 68,000, it contains 4 atoms of Iron & 8 atoms of Sulfur.
- * At the center of heme ring, there is an Iron (Fe^{2+}) that can bind reversibly with one oxygen molecule, allowing each Hb molecule to bind 4 O_2 molecules from lungs.
- * Hb is also found outside RBCs in dopaminergic neurons, macrophages, alveolar cells, mesangial cells of kidney (regulates blood flow), where it acts as antioxidant and regulates Iron metabolism (not oxygen carrying function).



* Each RBCs having 280 million of Hb molecules

- * Normal levels: Avg: 14-16 g/dl.
 - At birth: 25 g/dl.
 - After 3rd month: 20 g/dl.
 - Adult males: 15 g/dl.
 - Females: 14.5 g/dl.

Derivatives of Hb:

- ① Oxyhemoglobin: Hb with O_2 by oxygenation. It is unstable compound & O_2 released from this compound freely & gives reduced Hb/Ferro hemoglobin.
- ② Carbhemoglobin [Carbamino-Hb]: Hb $\bar{C}O_2$ and O_2 can be released easily, and affinity of Hb for CO_2 is 20 times more than O_2 *Handwritten: 20 times more than O_2*
- ③ Carboxyhemoglobin: Hb $\bar{C}O$ and affinity of Hb for CO is 200 times more than O_2 *Handwritten: 200 times more than O_2*
- ④ Sulfhemoglobin: Hb $\bar{H}_2S$ and it is very stable
- ⑤ Nitrous oxide hemoglobin: Hb $\bar{NO}$
- ⑥ Methemoglobin/Ferric hemoglobin: Hb $\bar{O}_2$ but it is formed after treating blood with - potassium ferricyanide. Stable compound and Iron is in Fe^{3+} form, cannot bind O_2 .

* Sickle cell anemia : Sickle shaped cells aggregate and block the blood vessels, leading to infarction. Jaundice also occurs in these people/children.

* Thalassemia more common in Thailand

g) Nutrition deficiency anemia

* Iron deficiency anemia : women > men [Brittle nails, hair, trophy of papilla in tongue, dysphagia]

* pernicious anemia : Atrophy of gastric mucosa, resulting in ↓ prodⁿ of IF & poor absorption of vit B₁₂. [lemon yellow color of skin, red sore tongue, weakness, atrophy]
— This is fatal disease, Macrocytic & normochromic cells
→ common in old age, females than males
→ seen in autoimmune disease

* Megaloblastic anemia : Deficiency of Folic acid. Macrocytic, hypochromic (vit-B₉).
— anticancer drugs cause this type

h) Aplastic anemia : Bone marrow depression due to repeated exposure to X-rays, γ-rays, bacterial toxins, quinine, gold, benzene, radium.
✓ — common in TB & viral infections (hepatitis, HIV infection)
✓ — Normocyte, normochromic

② Hemoglobinopathy : Genetic defect due to abnormal structure of Hb

③ Polycythemia : ↑ Hb levels in high altitudes, smoking, dehydration, tumors

④ Hb contains 2 glucose [glycosylated Hb] : HbA_{1c} levels are ↑ in chronic-DM patients

SIGNS & SYMPTOMS OF ANEMIA :

- ① pale skin, paleness of lips, ear lobes, palm, nail bed, nail brittle [Skin]
- ② Tachycardia, ↑ COP, heart is dilated & cardiac murmurs are common [CVS]
- ③ ↑ rate & force of respiration, sometimes dyspnea [Respiration]
- ④ anorexia, nausea, vomiting, abdominal discomfort, constipation [Digestion]
- ⑤ BMR ↑ in severe cases (metabolism)
- ⑥ Albuminuria, renal function is disturbed
- ⑦ Menstrual cycle is disturbed. Amenorrhea, menorrhagia
- ⑧ Headache, restlessness, dizziness, vertigo, sensitivity to cold, fatigue etc.



Dalaji Institute of Pharmaceutical Sciences
Lakshminagar (V), Narsimhapur (M)
Warangal (D) - 506 381 (T.S.)

Blood platelets / Thrombocytes

PLC life span: 10 days
WBC: 12-15 days
T.C: 10 days

- * These are small colorless, non-nucleated, round/oval, biconcave discs having the diameter of 2-4 μ , life span is 5-9 days (destroyed by macrophages of spleen)
 - * platelets having cell membrane, microtubules below cell membrane and cytoplasm.
 - cell membrane (6nm thickness) contains glycoproteins, phospholipids, antibodies etc.
 - Glycoproteins, prevents adherence of platelets to normal endothelium but accelerates the adherence to collagen & damaged endothelium is ruptured blood vessels. These can also form ADP-receptors and thrombin-receptors.
 - phospholipids, accelerates clotting reactions and forms precursors of TXA_2 & other PGs .
 - Microtubules are responsible for disc-like shape of platelets & are made of tubulin pol.
 - Cytoplasm having all cell organelles (mito., ER, mitochondria, filaments, granules) & also calcs.
 - * contractile protein (actin, myosin), responsible for contraction of platelets and action
 - Contractile protein - thrombostenin, " Clot retraction
 - * Other proteins: Von Willebrand factor, for adherence of platelets
 - Fibrin stabilizing factor (XIII)
 - platelet derived growth factor (PDGF), for repair of damaged blood vessel
 - regulate plasma VIII levels.
 - platelet activating factor (PAF), aggregation of platelets during injury.
 - * Hormones: SHT, adrenaline, histamine
 - * Others: Ca, Cu, Mg, Iron, glycogen, blood group-Ag.
- The factors, which affect the total WBC count, can also affect platelet count.
- Normal platelet count: 2 lakhs - 4 lakhs / mm^3 .

* Physiological variations:

- Age: In Infants, count is less (1.5 lakh - 2 lakh) & reaches normal after 3 months
- High altitudes and after meals — ↑ count

* Pathological variations:

- Thrombocytopenia (↓ in count)
 - Acute infections, acute leukemia, aplastic, pernicious, chicken pox, small pox, splenomegaly (Enlarged spleen), Typhoid, TB, Cancer
- Thrombocytosis (↑ in count)
 - Allergy, asphyxia, hemorrhage, Bone fractures, Surgery, splenectomy, leukemia, platelets, Thrombocytosis (V), Nephrotic (N), Vitamin D - 500-300 (T.C)
- Thrombocythemia (peritard, abnormal ↑ in count)
 - Calcineos, Chronic leukemia, Hodgkin

packed cell volume [PCV] : It is the hematocrit value expressed as the % of cellular elements with that of whole blood. [hematocrit made from blood with more RBCs - normal 40-50% - 45% - 42% - 40%]

- This is the volume of RBCs packed at the bottom of a hematocrit tube when the blood is centrifuged.
- Blood is mixed with anticoagulant (EDTA/heparin) & filled in hematocrit or Wintrobe's tube (110 mm long and 3 mm bore) upto 100 mark.
- The tube with the blood is centrifuged at speed of 3000 rpm for 30 min.
- The RBCs packed at the bottom, is the PCV & plasma remains above this.
- ✓ In b/w the RBCs and plasma, there is a white buffy coat, which is formed by WBCs and platelets.
- Normal PCV values: Male - 40-45%, Female - 38-42%.
- ✓ → PCV increases in polycythemia and dehydration; & less, hypoxia decreases in anemia, pregnancy and liver cirrhosis. [PCV increases 1 month early from cause of anemia, hypoxia etc.]

Blood indices : Specifically meant for RBCs. which include number, shape, volume and colour of RBCs, which tells us the quality of blood. Used to diagnose types of anemia.

① Mean corpuscular volume (MCV) : It is the average (mean) volume of a single RBC and it is expressed in cubic microns (cu. μ). $MCV = \frac{PCV \text{ in \%}}{RBC \text{ count}}$

- Normal : 78-90 cu. μ
- If MCV is increased, the cell is known as 'macrocyte' in pernicious & megaloblastic anemia.
- If decreased, 'microcyte' in microcytic anemia.

② Mean corpuscular hemoglobin (MCH) : It is the quantity of Hb present in one RBC. $MCH = \frac{Hb \% \text{ in 100 ml of blood}}{RBC \text{ count}}$

- It is expressed in μ g or pg. Normal - 27-30 pg. [low MCH: hypochromic, iron deficiency anemia; high MCH: hypochromic, liver disease, hypothyroidism, congenital spherocytosis]
- It is decreased or normal in pernicious, megaloblastic, in which RBCs are macrocytic & normochromic/hypochromic.

③ Mean corpuscular Hb concentration (MCHC) : It is the concn of Hb in one RBC. $MCHC = \frac{Hb \%}{PCV} \times 100$

- It is the amount of Hb expressed in relation to the volume of one RBC.
- units are % and normal values : 30-38%.
- It is the most imp. absolute value in diagnosis of anemia.
- It is decreased in iron deficiency anemia in which RBCs are microcytic hypochromic.
- It is normal in pernicious, megaloblastic, and in which RBCs are macrocytic normochromic.

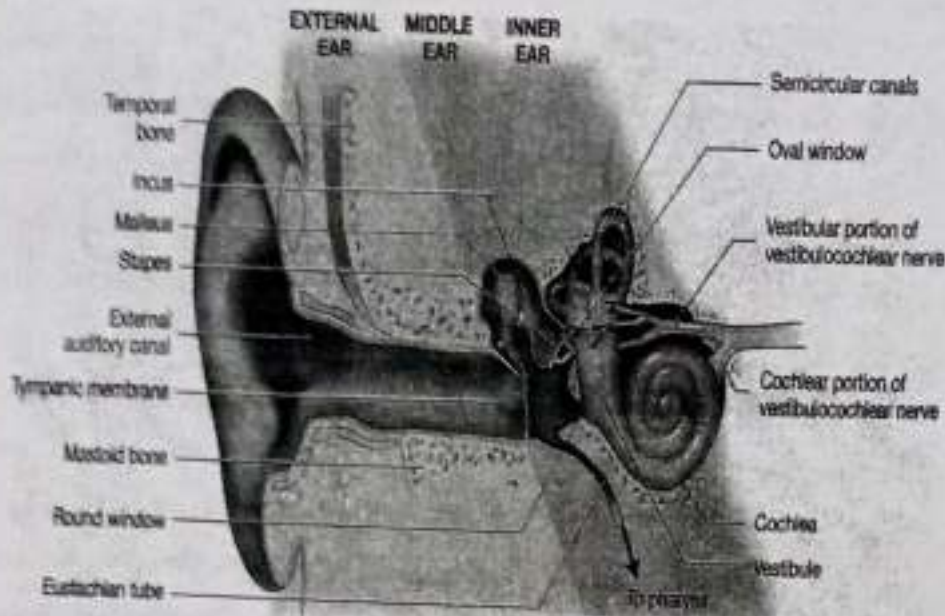
④ Colour Index (CI) : It is the ratio of % of Hb to % of RBC in blood. $CI = \frac{MCHC}{100}$

- Normal value : 1 (0.8-1.2)
- It is normal in pernicious, megaloblastic, and reduced in iron deficiency anemia.

Dr. J. S. Chitambar
Laxmapally (V), Nargund (T),
Warangal (Dt) - 506 301 (T. R)

SENSE OF HEARING

Anatomy of ear:



1. **External ear**-collects the sound waves and transfers them inward. It consists of

- Auricle (Pinna), made of cartilage, covered by skin and it consists of helix and lobule
- External auditory canal-curved tube of 2.5cm long lies in the temporal lobe
- Ear drum/tympanic membrane-thin, semitransparent partition between external auditory canal and middle ear

Near the exterior opening, the external auditory canal contains few hair and ceruminous glands secrete earwax/cerumen. Presence of hairs and cerumen prevents the entry of dust and foreign objects.

2. **Middle ear**-conveys the sound waves/vibrations to the oval window

It is a small air filled cavity in the temporal lobe

It is separated from external ear by ear drum and from internal ear by thin bony portion that contains 2 openings—oval window and round window

It consists of 3 small bones (auditory ossicles), connected by synovial joints. Include

- Malleus (hammer shape)-handle of malleus attaches to internal surface of eardrum and the head attaches with body of incus
- Incus (anvil shape), articulates with head of malleus
- Stapes (stirrup), base of it fits into oval window, below of it round window is there



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Warangal (Dt) - 506 331 (T.S.)

The auditory ossicles supplied with 2 skeletal muscles, which protects the inner ear from prolonged loud noises but not from brief sounds (gunshots)

- Tensor tympani muscle, which is supplied with trigeminal nerve (V), which protects the inner ear from loud noises
- Stapedius muscle, smallest skeletal muscle, supplied with facial nerve (VII), protects the oval window from loud noises and decreases the sensitivity of hearing

The anterior wall of the middle ear contains an opening, which opens into auditory tube/Eustachian tube, which connects middle ear with nasopharynx. During the swallowing and yawning, it opens allowing the air to enter/leave the middle ear until the pressure in the middle ear equals the atmospheric pressure.

But this tube is the route for pathogens to travel from nose and throat to the middle ear, causing an ear infection-otitis media (inflammation of middle ear)

3. Internal/inner ear/labyrinth-houses the receptors of hearing and equilibrium.

- It consists of an outer bony labyrinth, contains perilymph and it also consists of series of cavities- semicircular canals, vestibule and cochlea.

Semicircular canals, vestibule consists of receptors for equilibrium, whereas cochlea consists of receptors for hearing.

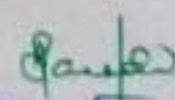
Vestibule and cochlea innervated by Vestibulocochlear nerve (VIII)

- An inner membranous labyrinth contains endolymph (rich in K^+ for the generation of auditory signals).

Physiology of hearing:

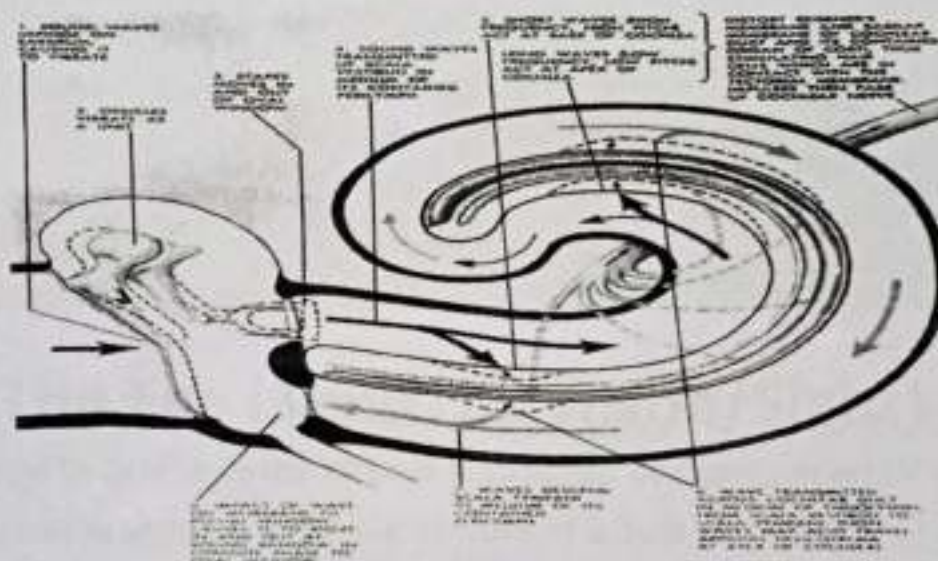
- Every sound produces sound waves/vibrations in the ear, which travels at speed of 332meters/second
- The auricle directs the sound waves into external auditory canal
- When the sound waves strikes the eardrum, the alternating high and low pressures of the air causes the eardrum to vibrate back and forth
- As the ear drum connected to malleus, which also starts vibrate the malleus. This transmits incus and then to stapes.
- The stapes pushes the membrane of oval window in and out (Oval window vibrates 20 times more vigorously than eardrum)




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Warangal (Dt) - 506 331 (T.R)

- The movement of the oval window sets up fluid pressure waves in the perilymph of cochlea, which are transmitted into scala vestibuli and then to scala tympani and to round window.
- Pressure waves also push the vestibular membrane back and forth, creating the pressure waves in the endolymph of cochlear duct.
- Pressure waves in endolymph causes the basilar membrane to vibrate which moves the hair cells of spiral organ against the tectorial membrane causes generation of receptor potential-generation of nerve impulse, which are carried to brain stem through VIII nerve to thalamus and finally to primary auditory area in the temporal lobe of cerebrum.

Mechanism of Hearing



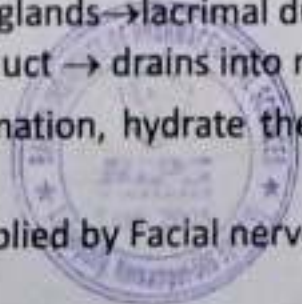
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Structure of the Eye



The Eye (Sense of Vision/Sight)

- Located in Orbital cavity of skull & supplied by Optic nerve(2nd cranial)
- Spherical in shape and having eye ball of 2.5cm diameter
- **Accessory organs:** Eyelids, eyelashes, eyebrows, lacrimal apparatus and extrinsic eye muscles
- **Eyelids (palpebrae):** Protect the eye from excessive sunlight & foreign objects
 - Supported by tarsal plate, consists of tarsal glands (secrete fluid that keep the eyelids from adhering to each other)
 - **Eye lashes** (projects from border of each eyelid) & **eyebrows** (present transversely above upper eyelid)
- **Lacrimal apparatus:** production and drainage of tears
 - Consists of Lacrimal glands → lacrimal ducts → lacrimal canal → lacrimal sac → nasolacrimal duct → drains into nasal cavity
 - Convey social information, hydrate the eye, contain an antimicrobial agent (Lysozyme)
 - Lacrimal glands, supplied by Facial nerve (VII)



Principal
Balaji Institute of Pharmaceutical Sciences
Lakshapally (V), Narasimha (M)
Varengal (D) - 506 331 (T.B)

Anatomy of Eyeball

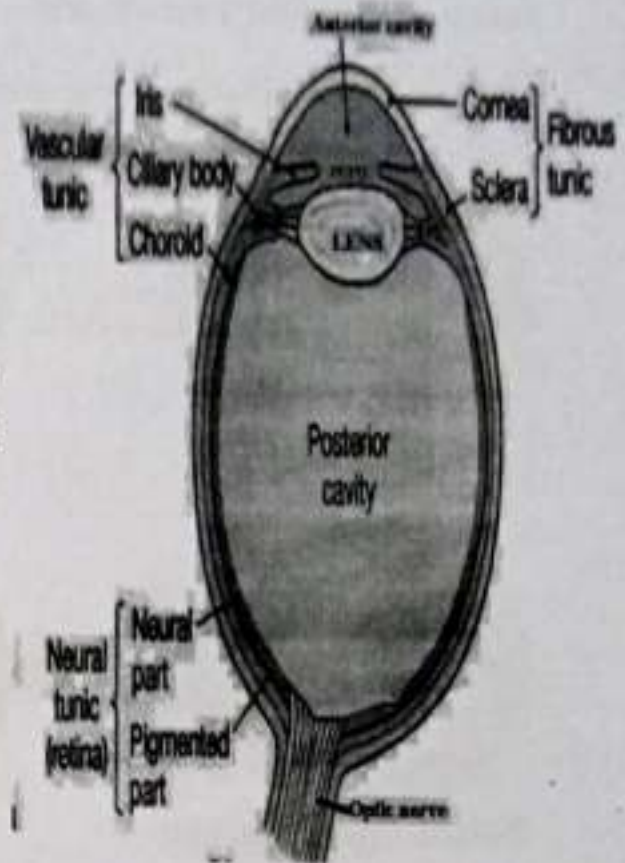
Three layers

1. Outer fibrous layer: Cornea, Sclera
2. Middle vascular layer: Choroid, Ciliary body, Iris
3. Inner nervous layer: Retina

Cornea : transparent coat, convex shape that helps to focus light onto retina

Sclera: white portion of eye

Choroid: highly vascularized, Consists of Melanocytes, produces melanin, gives dark brown color



Ciliary body: consists of **ciliary processes**, contain blood vessels secrete 'aqueous humor'

Suspensory ligaments-attaches to **LENS**

Ciliary muscle, smooth muscle: contractions/relaxations of muscle changes the shape of the **LENS**, adapting it for near or far vision.

- Contraction make the **lens thick &** focused for **short vision**
- Relaxation make the **lens thin** and focused for **distant vision**

Iris: colored portion, having melanocytes-determines color of eye (large amounts of melanocytes-brown to black; Very low amounts-blue and moderate amounts-green)

Pupil: black color,

- Bright light stimulates circular fibers-**Miosis**
- Dim-light stimulate radial fibers-**Mydriasis**

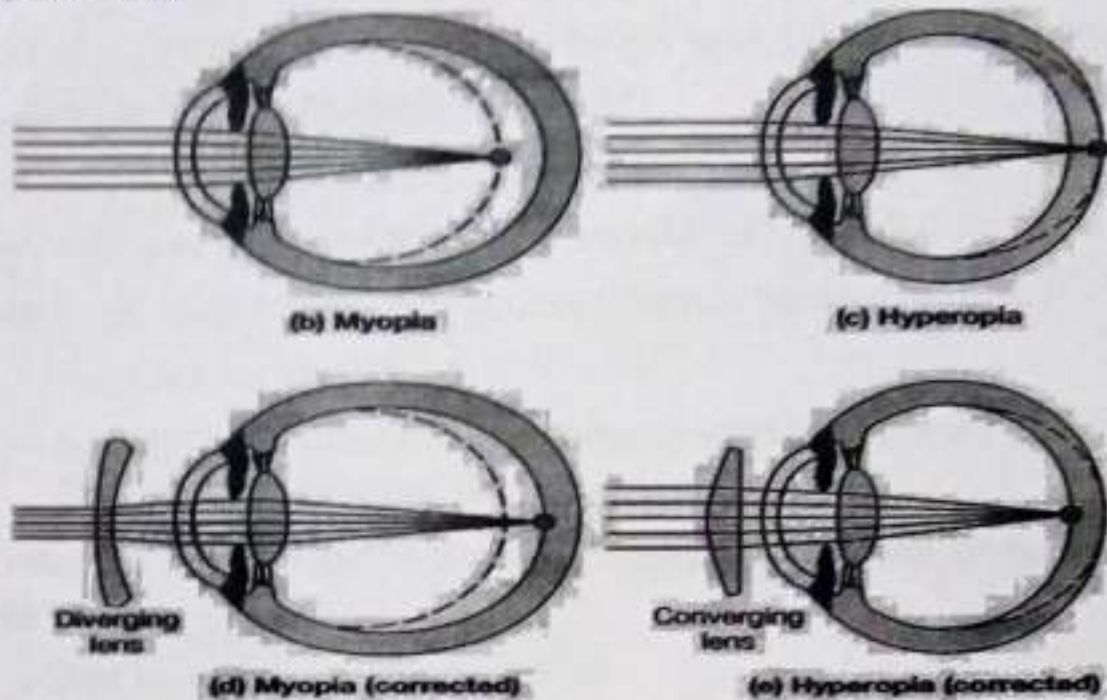


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Warangal (Dt) - 506 331 (T.S)

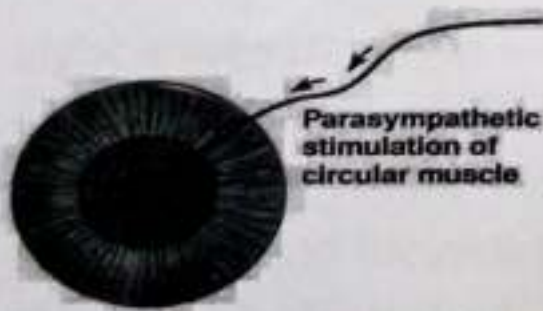
Accommodation Abnormalities

Myopia-near sightedness; corrected by **concave lens** (diverging) (close objects appears clearly)

Hyperopia- long sightedness; corrected by **convex lens** (converging) (distant objects appears clearly)



Mydriatic and Miotic effects (Pupillary reflexes)



(b) Pupillary constriction

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(c) Pupillary dilation

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Retina: consists of **Optic disc** (blind spot-no cones or rods)-exit of optic nerve, **retinal artery and vein**

- **Photoreceptors**-Rods (120 million)-stimulated by **dim-light**, produces shades of grey

Cones (6 million)-stimulated by **bright light**, produces color vision

- **Photopigments**- Rhodopsin in Rods

Porphyropsin (red), Iodopsin (green), Cyanopsin (blue) in Cones

Interior of eye ball: lens divide the anterior of eye ball into:

- **Anterior cavity** filled with aqueous humor for nourishments
 - Recycled for every 90 min.
 - too much fluid increases intraocular-pressure (normal:10-20mmHg) and causes 'Glaucoma'
- **Vitreous humor** fills the posterior cavity & consists of phagocytic cells
 - Not recycled – permanent fluid

Physiology of vision

- Light waves travels at speed of 3lakh Km/sec→Refracted at cornea (75%) and then by lens (25%) and focuses onto the retina →Transduction of light energy into receptor potential/nerve impulses transmitted to optic nerve →optic chiasm→optic tract →thalamus →primary visual area in occipital lobe of cerebral cortex



Nov-2021

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FACULTY OF PHARMACEUTICAL SCIENCE
B. Pharmacy (II-Semester) Examination
HUMAN ANATOMY AND PHYSIOLOGY-II
Paper-I

Time: 3 Hours)

(Max. Marks: 75)

Answer any five questions
All questions carry equal marks
(Marks: 5x15=75)

- 1 Explain the nerve impulse propagated along a neuron. Write a note on signal transmission.
- 2 Describe Cerebrospinal fluid and its circulations and write the functions of midbrain.
- 3 With a neat labelled diagram showing organs of Digestive system and explain the different layers of GIT.
- 4 Describe the location and anatomy of stomach. Write the acid production in the stomach.
- 5 Describe the anatomy of Pharynx and write the functions of pharynx.
- 6 Write the anatomy and histology of kidneys. Also enlist the functions and the role of RAS in kidneys.
- 7 Write the mechanism of Hormone action and enlist the functions of hormones.
- 8 Describe the location and histology of pituitary gland. Examine its relation with hypothalamus.
- 9 Describe the hormones secreted by ovaries and testes. Also examine their functions.
- 10 Write the disorders of female reproductive system.



Ganesh
PRINCIPAL
Baleji Institute of Pharmaceutical Sciences
Lakshypally (V), Narsimhpur
Warangal (DR) - 506 331 (T)

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FACULTY OF PHARMACEUTICAL SCIENCES

B. Pharmacy (I-Semester) Examination

Human Anatomy and Physiology-I

Paper-I

Time: 3 Hours)

(Max Marks: 75)

Section-A (Marks: 10x2=20)

Answer all the questions

1. Define cell junction and list out various types of cell junctions. (2m)
2. Write short notes on a) Neuromuscular junction b) Hemoglobin. (2m)
3. Define Diffusion and Osmosis. (2m)
4. List out the functions of skin. (2m)
5. Write the composition and functions of blood. (2m)
6. What is ECG and are different waves of ECG? (2m)
7. Write about cardiac output and cardiac cycle (2m)
8. What are the functions of Humerus bone. (2m)
9. Define Ganglion and mention its function. (2m)
10. Write the differences between two divisions of ANS (2m)

Section-B (Marks: 7x5=35)

Answer any seven questions

11. Explain the mechanism of Homeostasis. (5m)
12. Explain the Physiology of muscle contraction with a neat labelled diagram. (5m)
13. Describe the anatomy and Physiology of Lymph node with a neat labelled diagram. (5m)
14. What are Synovial Joints? Describe different types of synovial joints. (5m)
15. Classify Peripheral Nervous System and Explain the structure and function of Sympathetic system. (5m)
16. What is Cardiac cycle? Explain the various events in cardiac cycle. (5m)
17. Explain the mechanism of Blood Coagulation. (5m)
18. Describe the structure and functions of eye with a neat labelled diagram. (5m)
19. Write a note on disorders related to heart. (5m)

Section-C (Marks: 2x10=20)

Answer any two questions

20. Define Tissue? Classify different types of tissues and explain about Nervous tissue. (10m)
21. Explain in detail about characteristic features and functions of cranial and facial bones with a neat labelled diagram. (10m)
22. Describe the anatomical structure and conducting systems of Heart with a neat labelled diagram. (10m)



Signature
PRINCIPAL
 Balaji Institute of Pharmaceutical Sciences
 Lakshminarayana (V), Narasimpet (M)
 Warangal (Dt) - 506 331 (T.S)



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FACULTY OF PHARMACEUTICAL SCIENCES

B. Pharmacy (I Semester) Examination

HUMAN ANATOMY AND PHYSIOLOGY-I

Paper-I

Time: 3 Hours)

(Max. Marks: 75)

Answer any *Five* of the following
(Marks: 5x15=75)

1. Describe the structure and functions of mucous membrane.
2. Diagrammatically explain mitosis and meiosis.
3. Enlist the parts of typical bone and label it.
4. Write the structure and functions of Muscle contraction.
5. Explain the mechanism of coagulation and also write functions of RBC, WBC, Platelets.
6. Elaborate the structure & functions of spleen.
7. Elucidate the functions of Sympathetic and parasympathetic nervous system.
8. Discuss in detail anatomy of eyeball with a neat labelled diagram.
9. Write an essay on the normal Electrocardiogram (ECG).
10. Describe different types of capillaries and their function.



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PRINCIPAL

Balaji Institute of Pharmaceutical Sciences
Lakshapally (V), Narsampet (M)
Warangal (Dt) - 506 331 (T.S)