DEPTARTMENT OF PHYSIOLOGY
Academic year:2019-2020

Distribution of Syllabus for Honours Practical Courses for odd semester(1/3/5)

Name of Teacher	First Semester	Third Semester	Fifth Semester
Subhasree Sana		**CC5** **1.** Preparation and staining of blood film with Leishman's stain. **2.** Identification of the blood corpuscles. **3.** Differential count of WBC. **4.** Total count of RBC and WBC. **5.** Bleeding time and clotting time **6.** Hemoglobin estimation **7.** Preparation of haemincrystals . 8. Preparation and staining of bone marrow. **9.** Measurement of diameter of megakaryocyte. **10.** Reticulocyte staining **11. .**Blood group determination **CC7** Experiments on superficial (plantar) and deep (knee jerk) reflex **2.** Measurement of grip strength **3.** Reaction time by stick drop test **4.** Short term memory test (shape, picture word)	**CC11** 1. Principles of fixation and staining, 2. Staining and identification of fixed endocrine glands and nervous tissue.

		5. Two point discrimination test	
ManojKumar Chowdhury	-	-	-
Chandan Banerjee	**CC2** a) Determination of Systolic, Diastolic, Pulse and Mean Blood Pressure by non invasive methods (Auscultatory method). b) Determination of enzyme activities (eg. SOD, CAT, Amylase, Transaminase etc.)	**CC6** 1. Preparation of Amphibian Ringer solution **2.** Kymographic recording of the movements of perfused heart of toad. **3.** Study of the effects of changes in perfusion fluid pressure, changes in temperature, excess calcium and potassium ion concentration, acetylcholine, adrenaline on the on the movement of heart.	
AmaleshMondal	**CC1** **Study and identification of stained section of different mammalian tissues and organs:** Hyaline cartilage, Trachea, Lung, Spleen, Lymph gland, Parotid gland, Bone, Sub maxillary gland, Sublingual gland, Tongue, Oesophagus, Stomach, Duodenum, Jejunum, Ileum, Large intestine, Liver, Kidney, Ureter, Pancreas, Adrenal gland,Thyroidgland,Testis,Ovary,Spinalcord ,Cerebralcortex,Cerebellum, Skin, Cardiac muscle, Skeletal muscle, Smooth muscle, Artery, Vein, Uterus.		**DSE 1B** **1.** Gram staining of bacteria and identification of Gram positive and Gram negative bacteria. **2.** Demonstration: Spore Staining, Radial immune-diffusion.

Distribution of Syllabus for Honours Theory Courses for odd semester(1/3/5)

Name of Teacher	First Semester	Third Semester	Fif
Subhashree Sana	**CC1** **1. Capillary wall** **2. Intercellular communication** Basic idea of tight junctions, gap junctions and cell adhesion molecules. **3. Cell cycle** **4. Cell division a. Mitosis** **5. Meiosis** **6. Homeostasis** **7. Aging**	**CC7** **Reflexes :** a) Introduction b) Monosynaptic Reflexes: The Stretch Reflex c) Polysynaptic Reflexes: The Withdrawal Reflex d) General Properties of Reflexes **2. Cutaneous, Deep and Visceral Sensation** a) Introduction b) Ascending and descending tracts: origin, courses, termination and functions.Lower and upper motor neurones. Functions of the spinal cord with special reference to functional changes following hemisection and complete section of spinal cord. Brown-Sequard syndrome, Spinal animal. Pain production, perception and regulation. Referred pain. c) Pathways d) Touch e) Proprioception f) Temperature g) Pain h) Other Sensations **3. Arousal Mechanism, Sleep and the Electrical Activity of the Brain**	**CC12** **The Thyroi** a. Introduc b. Anatom c. Formati Thyroid d. Transpo Hormon e. Effects f. Regulati Secretio g. Clinical 2. **Endocrin Pancreas & Carbohydr** a. Intro b. Islet c. Stru & Se d. Effe e. Mec f. Insu g. Regu Secr h. Gluc i. Othe Horr

		a) Introduction b) The Reticular Formation & the Reticular Activating System c) Reticular formation: organization, connection and functions of ascending and descending reticular formation. Physiological basis of sleep and wakefulness d) The Thalamus & the Cerebral Cortex e) Evoked Cortical Potentials f) The Electroencephalogram g) Physiological Basis of the EEG, Consciousness, & Sleep h) Interpretation of abnormal EEG pattern **4. Control of Posture and Movement** a) Introduction b) General Principles c) Corticospinal&Corticobulbar System d) Anatomy & Function e) Posture and its regulation- Decerebrate rigidity, Decorticate rigidity, Postural reflexes and regulation of Posture f) Basal Ganglia g) Cerebellum h) Movement disorders **5. The Autonomic Nervous System** **a.** Introduction **b.** Anatomic Organization of Autonomic Outflow **c.** Chemical Transmission at autonomic Junctions **d.** Responses of Effector Organs to Autonomic Nerve Impulses	j. Hyp Diab Hum 3. **The Adr** **Adrenal Co** a. Intro b. Adre c. Adre i. S c F ii. F M d. Adre i. S F A F ii. F A F iii. F C iv. F F C v. F C S vi. F M vii. F A viii. S

		e. Cholinergic and Adrenergic Discharge **6. Central Regulation of Visceral Function** **a.** Introduction **b.** Medulla Oblongata **c.** Hypothalamus i. Anatomic Considerations ii. Hypothalamic Function iii. Relation to Autonomic Function iv. Relation to Sleep v. Relation to Cyclic Phenomena vi. Hunger vii. Thirst viii. Control of Posterior Pituitary Secretion ix. Control of Anterior pituitary Secretion x. Temperature Regulation, fever **7. Neural Basis of Instinctual Behaviour and Emotions** **a.** Introduction **b.** Anatomic Considerations **c.** Limbic Functions **d.** Limbic system: structure, connections and functions. Physiology of emotion. **e.** Sexual Behavior **f.** Fear & Rage **g.** Motivation **8. Higher Functions of the Nervous System** a. Introduction b. Methods c. Learning & Memory d. Higher functions of nervous system: conditioning, learning, short-term and long- term	**DSE 2B: SI** **EXERCISE** 1. Impo exer well 2. Basi Bioe sour (Pho syst syst 3. Card resp grad 4. Con exer cons phys reco 5. Aero Mea phys appl 6. 42 7. Trai phys Trai aero pow over detra 8. Nutr and

		memory. Speech and Aphasia. Asymmetrical organization of certain cognitive functions-split brain e. Functions of the Neocortex f. Electrophysiology of brain: spontaneous electrical activity of brain, EEG and ECoG, evoked potential, DC potential. Isolated cortex. g. Disorders relating learning and memory	9. Spor man 10. Basi reha med
ManojChaowdhury	–	–	
Chandan Banerjee	**CC2** **1. A Study of Units for Measuring Concentration of Solutes: Moles, Equivalents, Osmoles** **2. Principles of Dilution, pH, Buffers** a. Proteolysis of water, pH, acid-base neutralization curves **3. Bonds and Forces in Biomolecules** **4. Colloids, Properties, Importance** a. Colloids: Classification, properties–optical, electrical, electro kinetic. Biological importance of colloids **5. Surface tension, Specific Gravity** a. Surface tension and Specific Gravity: characteristics, factors influencing and biological applications **6. Viscosity and Resistance** a. Viscosity and Resistance characteristics, factors influencing and biological applications	**CC6** **1. Origin of the Heartbeat & the Electrical Activity of the heart a.** Introduction **b.** Origin & Spread Of Cardiac Excitation Cardiac action potential. Origin and propagation of cardiac impulse. **c.** The Electrocardiogram Electrocardiography –the normal electrocardiogram, electrocardiographic leads,vectorial analysis, the vectorcardiogram, the mean electrical axis of heart. The His bundle electrogram.	**1. Visi** b. Anatomic c.The Image Mechanism visual acuity d. The Photo Mechanism: Electrical R e.Visual Pat lesions of th f. Color Vis g. Other Asp Function

	7. Acids, Bases, Buffers and pH a. Buffer action: Henderson-Hasselbalch equation. Regulation of pH by blood buffers. Determination of pH– Basic concept of indicators, principle of pH meter- hydrogen electrode and glass electrode **8. Flow and Pressure** **9.** Diffusion and Osmosis: osmotic pressure–laws. **10. Dialysis and Ultracentrifugation** a. Dialysis and ultrafiltration **11. Chromatography** **12. Electrophoresis** **13. Autoradiography** **14. Cell Fractionation and Tracer Techniques** **15. Nanoparticles and its application in Physiology** **16. Laminar and Streamline Flow** **17. Poiseuille- Hagen Formula** **18. Laws of Laplace** **19. Thermodynamics** a. Thermodynamics: Typeofsurroundingsandsystems,First Law–Internal energy,enthalpy.Second Law–Entropy,Freeenergychange,EndergonicandExergonicreactions,Reversiblea nd Irreversible processes, Equilibrium constant Physiological steady-state, Living body as a Thermodynamic system. **20. Laws** **21. ApplicationinPhysiology** **22. Osmosisand Diffusion** a. DiffusionandOsmosis:osmoticpressure–laws. **23. AStudyofEnzymes** **24.** Structures,coenzymesandProstheticGroups **25.** Classification- EC nomenclature, Concept of apoenzyme, holoenzyme, coenzyme,cofactors and prosthetic group.	**d.** Cardiac Arrhythmias Cardiac Arrhythmias – Normal cardiac rate. Myocardial Infarctions. Cardioplegic solutions. **e.** Electrocardiographic Findings in Other Cardiac & Systemic Diseases, hypertrophy and cardiac myopathy 19 **2. The Heart as a Pump a.** Introduction Anatomy of the heart. Properties of cardiac muscle. Cardiac Innervation. Stannius ligature. **b.** Mechanical Events of the Cardiac Cycle The cardiac cycle- pressure and volume changes. Heart sounds. Murmurs. **c.** Cardiac Output Cardiac output– measurement by application of Fick's principle and dye dilution method, factors affecting. Starling's law of heart. **3. Dynamics of Blood & Lymph Flow** **a.** Introduction **b.** Anatomic Considerations Functional morphology of arteries, arterioles, capillaries, venules and veins, sinusoids. General pattern of circulation and significance of branching of blood vessels. **c.** Biophysical Considerations	h. Eye Move i. Errors in v 2. **Hearing** a.Introductio b. Anatomic c.Hair cells d. Mechanis e.Vestibular f. Loss of he 3. **Smell &** b. Smell c.Receptors d. Physiolog e.Taste i. Re Pathways ii. Physiolog

	26. MechanismofEnzymeAction **27.** Mechanismof enzyme action: Activation energy, Enzyme-substrate complex, Transition state and Products.Modelsofenzyme-substrateinteractions.Specificityofenzymes. Kinetics **28.** Conceptofinitialrate,maximumvelocityandsteady-statekinetics. **29.** MichaelisConstant **30.** Michaelis constant, Michaelis-Menten equation,Graphical representation of hyperbolic kinetics--Lineweaver-Burk plot. Significance of Km and V_{max}. **31.** ModulationofEnzymeActivities **32.** Competitive, non-competitive and uncompetitive inhibitions.Regulation of enzyme activitiescovalentmodifications,allostericmodifications–SigmoidkineticsandHill equation: K-and M-series, Feed-back inhibition. Rate-limiting enzymes **33.** FactorscontrollingEnzymeActivities **34.** Factorsinfluencingenzyme-catalyzedreactions: substrateconcentration,enzyme concentration, Max pH, temperature. **35.** Isoenzymes,AllostericEnzymes **36.** Pro-enzymes **37.** Ribozymes,Abzymes **38.** ConceptofRateLimitingEnzymes	Hemodynamics of blood flow. **d.** Arterial & Arteriolar Circulation **e.** Capillary Circulation **f.** Lymphatic Circulation & Interstitial Fluid Volume **g.** Venous Circulation **4. Cardiovascular regulatory Mechanisms** **a.** Introduction **b.** Local Regulatory Mechanisms Cardiac and vasomotor centers, baroreceptors and chemoreceptors, cardiac and vasomotor reflexes. **c.** Substances Secreted by the Endothelium **d.** Systemic Regulation by Hormones **e.** Systemic Regulation by the Nervous System Cardiovascular homeostasis–neural and chemical control of cardiac functions and blood vessels. **5. Circulation Through special Regions** **a.** Introduction **b.** Cerebral Circulation **i.** Anatomic Considerations **ii.** Cerebrospinal Fluid **iii.** Cerebrospinal Fluid **iv.** The Blood-Brain barrier **v.** Cerebral Blood Flow **vi.** Regulation of Cerebral Circulation **vii.** Brain Metabolism & Oxygen Requirements	

		c. Coronary Circulation **d.** Splanchnic Circulation **e.** Circulation of the skin **f.** Placental & Fetal Circulation **4. Cardiovascular Homeostasis in Health & Disease** a. Introduction b. Compensation for Gravitational Effects c. Exercise d. Inflammation & Wound Healing e. Shock ,Cardiovascular adjustment after haemorrhage. Hypovolemic and hypervolemic shock. RTI and atherosclerosis. f. Hypertension ,The pulse – arterial and venous. Blood pressure– its measurement and factors affecting. g. Heart Failure, stroke	
AmaleshMondal	**CC1** **1. Body fluid components** **2. Organ systems, tissues and cells** **3. Functional morphology of cells** Microscopic structure and functions of eukaryotic endoplasmic reticuli, ribosome, golgi bodies, mitochondria, lysosomes, peroxisomes, cytoskeletal elements and centrosomes. Plasma membrane and subcellular rmembranes. **4. Transports accross cell membrane** Ionpores,ion pumps, ion channels ionophores. Passive transport. Facilitated diffusion, uniport, symport, antiport. Active transport**.**	**CC5** **a) Introduction** **b) Blood** Formed elements of blood– origin, formation, functions and fate. Blood volume –normal values, regulation and determination by dye and radioisotope methods. **c) Bone Marrow** **d) White Blood Cells** **e) Immune Mechanisms** **f) Platelets** **g) Red Blood Cells** Haemoglobin– Structure, reactions, biosynthesis and catabolism.	**CC12** 4. **Hormona** **Calcium M** **Physiology** Introduction b. Calcium Metabolism c. Bone Phy d. Vitamin I Hydroxycho e. The Parat f. Calcitonin g. Effects of &Humoral Metabolism

		Foetalhaemoglobin. Abnormal haemoglobins- Sickle-cell anemia and Thalassemia. Different types of anaemia and their causes. **h) Blood Types** i) **Blood group** – ABO and Rh. Erythroblastosisfoetalis. Blood transfusion and its hazards. **j) Plasma, Hemostasis** k) **Plasmaproteins**– normal values, origin and functions. Hemostasis– factors, mechanism, anticoagulants, procoagulants. Disorders of hemostasis. Hemophilia, thrombosis and embolism **l) Lymph** m) **Lymph and tissue fluids**– formation, circulation, functions and fate. Lymphatic organs- histological structures and functions of lymph gland and spleen. n) **Clinical implications**.	5. **The Pitu** Introduction . Morpholog c. Posterior d. Growth H e. Physiolog f. Pituitary I g. Pituitary Humans 6. **Endocrin** **Kidneys, H** **Gland** a. In b. The Reni System c. Erythropo d. The Endo Heart: Atria e. Pineal Gl f. Human ch biological rh concepts an 1. **Bacteria** morphologi b. Gram pos pathogenic bacteria. Ste pasteurizati antibiotics c. Bacterial d. Elementa bacteriostati bacteriocida genetics.

			e. Viruses- S Lytic and ly – basic idea 2. **Overview** a. Idea abou immunity. I Cells. b. Humoral immunity. c. Antigen-a d. Immunog classificatio function. 40 e. Antigen p Histocompa (MHC). f. Cytokines system. g. Vaccinati importance h. Basic prin immunologi pregnancy. i. Immuniza immunizatio Hepatitis-B, Measles,Wh Tuberculosi vaccine, AII mode of tra human body

			measures, p diagnostic t (ELISA). j. Immunop principles o and transpla

Distribution of Syllabus of Honours Practical Courses for even semester(2/4/6)

Name of Teacher	Second Semester	Fourth Semester	Sixth Semester
Subhasree Sana		**CC-8** **1.** Quantitativeestimationofaminonitrogen(Sorensen'sformoltitrationmethod [percentage as well as total quantity to be done]). **2.** Quantitativeestimationofglucoseandsucrosebybenedict'smethod. **3.** Estimationofpercentagequantityoflactose inmilk byBenedict's method. **CC-10** **1.** Measurementofpeakexpiratoryflowrate **2.** Measurementofoxygen saturationbypulseoxymeterbefore andafter exercise **3.** Measurementofforcedexpiratoryvolume(FEV)	**CC-14** **1.** Identificationofnormalandabnormalconstituentsof urine. **DSE-3A** **1.** Dietsurveyreport(hand-written)ofafamily(asperICMRspecification):Eachstudent has to submit a report on his/her own family. **2.** Areport(hand-written)onthebasis offield surveyfromONEofthefollowings: i. Physiologicalparameters ofhuman(atleastthreeparameters). ii. Anthropometricmeasurementsonhuman(atleast three parameters). iii. Epidemiologicalstudieson human.
ManojKumar Chawdhury	–	–	–
Chandan Banerjee	**CC-3** 1. Isolationandstainingofstainingofnervefiberswithnode(s)ofRanvier(Ag NO_3)and muscle fiber (H and E). 2. PreparationofSciaticnerveinnervate		**CC-13** 1 Studyof estrouscycle 2 Stainingandidentificationofkidneyandureters, Estimationofestrogenby spectrophotometric method 3 Pregnancytest from human urinebykit

	dGastrocnemiusmuscleof toad. 3. StudyofKymograph, Inductioncoil,Keyandotherinstrumentsusedtostudymechanical responses of skeletal muscle. 4. Kymographicrecordingofmechanicalresponsesof Gastrocnemiusmusclet oasingle stimulus and two successive stimuli. 5. Kymographicrecordingoftheeffectsofvariationsoftemperatureandload(after-load) on 6. singlemuscletwitch. 7. Calculationofworkdone bythemuscle. 8. Determinationofnerveconductionvelocity.		method. **DSE-4** **Physiological(experimental)Experiments** Kymographicrecordind of the effects of Hg, Pb and As compounds on: the contractionofperfusedheartoftoad,theintestinalmovementsofratsinDale's bath. **Histo-chemicalExperiments** Histochemicalstudies:chroniceffectsoffoodadditivesandarseniccompounds on liver, kidney, intestine, brain, muscle and lung tissues in rat.
Amalesh Mondal	**CC-4** 1. Qualitative tests for the identification of physiologically important substances: Hydrochloricacid,lacticAcid,UricAcid,Glucose,Galactose,Fructose,Sucrose, Lactose, Albumin, Gelatin, Peptone, Starch, Dextrin, Urea, Glycerol, Bile salts.	**CC-9** 1 Kymographicrecordingofnormalmovementsofrat'sintestineinDale'sapparatus. 2 Effectsofhypoxia,acetylcholineandadrenalineonnormalintestinalmovements	

Distribution of Syllabus of Honours Theory Courses for even semester(2/4/6)

Name of Teacher		Fourth Semester	Sixth Semester
Subhasree Sana	**CC-3** **ExcitableTissues:Nerve** **1.** Introduction **2.** Nerve cells **3.** Structure,classificationandfunctionsofneurons,Cytoskeletalelementsandaxoplasmicflow. **4.** ExcitationandConduction **5.** Measurementofelectrical events **6.** Propagationofnerveimpulseindifferenttypesofnervefibers. **7.** Ionicbasisofexcitationandconduction **8.** Therestingmembranepotential,actionpotential,electrotonicpotentials,currentofinjury and compound action potential. **9.** Propertiesof mixednerves Propertiesof nervefibers: excitability,conductivity,allornonelaw,accommodation, adaptation,summation,refractory period, Indefatigability, Chronaxie&rheobase and utilization time. Injurytoperipheralnerves– degeneration and regeneration in nerve fiber,	**CC-8** **1.** Introduction **2.** Energymetabolism **3.** Carbohydratemetabolism Glycolysis, R-L cycle Detail, TCAcycle. GluconeogenesisCori cycle, GlucoseAlaninecycle.Anaplerotic reactionsand AmphibolicnatureofTCA cycle.Pentose Phosphate Pathway.GlycogenesisandGlycogenolysis. (*Hormonalregulationoftheabovementionedbiochemicalpathways/cyclesnot required.)* **4.** Protein metabolism-AminoacidsAmino acid pool.Deamination,transamination,aminationand decarboxylation.SynthesisofUreaandNitricoxide.Basicideaofglucogenic andketogenicaminoacids.Metabolismofglycine,sulfur-containingamino acids, tryptophan and phenylalanine. (*Hormonalregulationoftheabovementionedbiochemicalpathways/cyclesnot required.)* **5.** Fatandcholesterol metabolism-ß-oxidation and biosynthesis of saturated and monounsaturated fatty acids. Carnitine shuttle. Metabolism of	**CC-13** **TheFemaleReproductive system** **1.** TheMenstrualCycle **2.** Histology of ovary,Oogenesis, folliculogenesis and ovulation. Formation, functionsofcorpusluteumandleuteolysis, Menstrualcycleanditsregulation **3.** OvarianHormones **4.** ControlofOvarianFunction **5.** AbnormalitiesofOvarianFunction **6.** Abnormalitiesinmenstrualcycle.Onsetofmenopauseandpost-menopausal changes, Postmenopausal syndromes **7.** DSE-3A **8.** Constituentsoffoodandtheirsignificance. **9.** Basalmetabolicrate-factors,determinationbyBenedict-Rothapparatus. **10.** Respiratoryquotient. **11.** Specificdynamicaction. **12.** Basic conceptof energyand units. **13.** Calorificvalueof foods. **14.** Bodycalorierequirements –adult consumption unit **15.** Dietaryrequirementsof

	changesinthenervecellbody,transneuronaldegeneration,changesinreceptorandmotor end-plates, denervationhypersensitivity.Thermal changes of nerveduringactivity **10.** Nervefibretypesandfunction **11.** Neurotropins **12.** NervegrowthfactorsandNeurotropins **13.** Glia **14.** Structure,classificationandfunctionsofneurogliacells **<u>ExcitableTissues: Muscle</u>** a) Introduction b) SkeletalMuscle c) Morphology d) Microscopic and electron microscopic structure of skeletal muscles.Thesarcotubular system.Redandwhitestriatedmusclefibers.Musclegroups:antagonistsandagonists. Muscle proteins. e) ElectricalphenomenaandIonic Fluxes f) Chemical,thermalandelectricalchangesinskeletalmuscleduringcontraction and relaxation. Electromyography. g) ContractileResponses h) Mechanismofskeletalmusclecontractionandrelaxation:Excitation-contraction coupling. Dihydropyridine receptors &	Triglycerides. Biosythesis of Lecithin, CephalinandCholesterol.MetabolismofAdiposeTissue.Roleoflipoproteins in transport and storage of lipids. Formation of Reactive Oxygen Species (ROSs) and the role of Catalase, Superoxide Dismutase, Glutathione Peroxidase and Glutathione Reductase in combatingoxidative stress– role of vitamins. *(Hormonalregulationoftheabovementionedbiochemicalpathways/cyclenot required).* **6.** Integration of carbohydrate, fatand proteinmetabolism-Biologicaloxidation–RedoxPotential.MitochondrialElectronTransport Chain.Oxidative Phosphorylation–Inhibitors and uncouplers. **7.** Nutrition–BMR,RQ,RDA,SDA,NPU,Biologicalvalueofproteins, vitamins and minerals,Basal metabolic rate-factors, determination by Benedict-Roth apparatus. biologicalvalueofproteins–measurementandfactorsaffecting.Proteinsparers. Supplementary value of protein. Protein efficiencyratio and net protein utilization of dietary proteins. Dietary fibres	carbohydrate,protein,lipidandother nutrients. **16.** Balanceddietandprinciplesofformulationofbalanceddietsforgrowingchild, adult man and woman, pregnant woman and lactating woman. **17.** Nitrogenbalance,essentialaminoacids,biologicalvalueof proteins. **18.** Supplementaryvalueofprotein. **19.** Proteinefficiencyratioand netprotein utilizationofdietaryproteins. **20.** Dietaryfibres. **21.** Vitamins. **22.** Principleofdietsurvey. **23.** Compositionandnutritionalvalueofcommonfoodstuffs. **24.** Physiologyofstarvationand obesity. **25.** Sourcesandphysiologicalsignificancesofvitaminsandminerals. **26.** Spacenutrition.

	Ryanodine receptors. i) EnergysourcesandMetabolism j) Mechanicalcomponentsofmuscle.Isometricandisotoniccontractions–musclelength, tension and velocity relationships. k) PropertiesofMuscleintheintact Organism l) Properties ofskeletal muscle: excitability, contractility,all or nonelaw, summation of stimuli,summationofcontractions,effectsofrepeatedstimuli,genesisoftetanus,onset offatigue,refractoryperiod,tonicity,conductivity,extensibilityandelasticity. Optimal load, optimal length of fibers. m) CardiacMuscle n) Morphology o) Microscopicandelectronmicroscopic structureofcardiacmuscles. p) ElectricalProperties q) MechanicalProperties r) Metabolism s) PacemakerTissue t) SmoothMuscle u) Morphology v) Microscopicandelectronmicroscopic structureofsmoothmuscles.Single-unit and multiunit smooth muscle w) VisceralsmoothMuscle		

	x) Multi-unitSmooth Muscle **CC=4** Classificationof Carbohydrates Definitionand classificationofCarbohydrates Structureof Carbohydrates Cyclicstructures-Pyranoseandfuranoseforms,structureofdisaccharides and polysaccharides. Propertiesof Carbohydrates stereoisomerism,opticalisomerism,opticalactivity,epimerism,anomerism, mutarotationand its mechanism. Chemical reactions of monosaccharides (Glucose & Fructose)– Reactionswithconcentratedmineralacids, alkali, phenylhydrazine and their biochemical importance Functionof Carbohydrates Derivatives of monosaccharides --Amino sugars, deoxysugars, sugar alcohols,sugaracids,sugaresters, theirbiochemicalandphysiological importance.		

Manoj Kumar Chawdhury	-	-	-
Chandan Banerjee	CC-3 NeuromuscularTransmission NeuromuscularJunction Theneuromuscularjunction:structure,transmission,end-platepotential,MEPP and post-tetanic potentiation. Motor unit and Motor point. DenervationHypersensitivity InitiationofImpulsesinSenseOrgans Introduction SenseOrgansand Receptors Classification ofgeneral and special senses. Receptorsas biologicaltransducers. General concept ofionotropic andmetabotropic receptors. Structure,sub-typesand functionsof nicotinic and muscarinic acetylcholinereceptors.Adrenoceptors, glutamate receptors (NMDA and AMPA receptors), GABA, opiate, serotonin, dopamine and histamine receptors. TheSenses	CC-9 Digestion&Absorption Introduction Anatomyandhistologyofalimentarycanal,DeglutitionandMovementsof alimentary canal and their regulations. Carbohydrates Proteins&NucleicAcids Lipids AbsorptionofWater& Electrolytes AbsorptionofVitamins& Minerals RegulationofGastrointestinalFunction Introduction Digestiveglands–histologicalstructuresofsalivaryglands,pancreasandliver. GeneralConsiderations Composition, functions and regulation of the secretion of salivary, gastric, pancreaticandintestinaljuicesandbile.Synthes	CC-13 Pregnancy Fertilization, Preliminary ideas of implantation. Structure and functions of placenta. Maintenanceofpregnancyandthebodilychangesduringpregnancy.Pregnancytests. Parturition. Lactation Mammogenesis,Galactopoesis:Hormonalcontrol. Physiologicalconcepts for aplannedfamily **DSE-4A** Toxins and Toxicology Factors Affectingtoxicity LD50, LOD50,ED50,NOEL,LOEL Concept of Acute andChronic Effects Birth defects and Teratogens Concepts ofBiomagnification and Bioconcentration PopularFood Additivesand FoodAdulterants

	ElectricalandIonicEventsinReceptors Muller's law of specific nerve energies. Weber-Fechner law, Steven's power law. SensorytransductioninPaciniancorpuscle.Adaptationofreceptors–phasicandtonic adaptations. "Coding"ofSensoryInformation CC=4 PropertiesofProteinsandlipids PropertiesofFatandFattyacids--Hydrolysis,Saponification,Saponification number, Iodine number,Acetylation-Acetyl number, Hydrogenation, Rancidity-Acidnumber, Reichert-Meisslnumber. Cis-transisomerism. Eicosanoids,Phospholipids,Glycolipids, Sphingolipids,Cholesterol&its ester-their structure and physiological importance. Protonicequilibria of Aminoacids–Zwitterions,Isoelectricpoint,titrationcurveofaminoacids. ReactionswithninhydrinandformaldehydeReactionswithSanger'sand Edman's reagent. Biuret reaction. Denaturation and Renaturation.	isofBileacids.Enterohepatic circulation,Feces and defecation.GALT, MALT. Basic concepts of Peptic Ulcer, Jaundice and Gall-stones Cholelithiasis. Gastrointestinalhormones Mouth & Esophagus Stomach ExocrinePortion ofthePancreas Liver& BiliarySystem SmallIntestine Colon	Prevention ofFood Adulteration Act,1954 OtherFoodToxicants:BPA,BPS,Pesticides,PAH, Dioxin,PCB,HeavyMetals:Pb,Hg, Cd,Asetc

	Functions of Proteins and lipids Physiologicalimportanceofproteinsandlipids		
Amalesh Mondal	**CC-3** SynapticandJunctionalTransmission Introduction Synaptic Transmission FunctionalAnatomy Synapses:types, structure, synaptictransmission oftheimpulse,. ElectricalEventsatSynapses synapticpotentials InhibitionandFacilitationatSynapses ChemicalTransmissionatSynapticActivity Neurotransmitters,cotransmittersandneuromodulators PrincipalneurotransmitterSystems SynapticPlasticityand learning NeuromuscularTransmission NeuromuscularJunction Theneuromuscularjunction:structure,tra	CC-10 PulmonaryFunction Introduction Propertiesof Gases Anatomyof theLungs Mechanicsofbreathing GasExchangeinthelungs PulmonaryCirculation OtherFunctions oftheRespiratorySystem GasTransportBetweentheLungs&the Tissues Introduction OxygenTransport CarbonDioxideTransport Respiratoryacidosisandalkalosis Regulationof Respiration Introduction Neuralcontrolof Breathing	CC-13 Introduction Primaryandaccessorysexorgansandsecondarysex characters,Physiologyof puberty. SexDifferentiation&Development Chromosomal Sex Embryologyof the HumanReproductive System Aberrant SexualDifferentiation Puberty Precocious&Delayed Puberty Menopause PituitaryGonadotropins&Prolactin Themale reproductive System Structure Histologyoftestis Gametogenesis &Ejaculation EndocrineFunctionof theTestes Control ofTesticular Function

	nsmission,end-platepotential,MEPP and post-tetanic potentiation. Motor unit and Motor point. <u>CC-4</u> ClassificationofProteinsandlipids Definition and classificationofproteins andFatty acids - Classification, systemicnomenclature.Mono,DiandTriglycerides.Classification,Structure, Nomenclature ofproteins and amino acids. StructureofProteinsandlipids Structureandpropertiesofpeptidebonds--PhiandPsiangles.Different levelsofproteinstructure--Primary,Secondary(α-helix andß-pleated sheet), Tertiary and Quarternary. Forces stabilizing the structures. Lipoproteins-Structureandclassification.	ChemicalControlof Breathing NonchemicalInfluenceson Respiration RespiratoryAdjustmentsinHealth& Disease Introduction EffectsofExercise OtherFormsof Hypoxia Oxygen Treatment e.Hypercapnia&Hypocapnia OtherRespiratoryAbnormalities Effectsof IncreasedBarometricPressure ArtificialRespiration	AbnormalitiesofTesticular Function CC-14 RenalFunctionsand Malnutrition: Introduction Anatomyofkidney.HistologyofNephron. FunctionofMalpighiancorpusclesandrenaltubule,counter-currentmechanism Formationofurine–glomerularfunctionandtubularfunctions.Counter-current multiplier and exchanger. Formation of hypertonic urine. Water Excretion Renalregulationofosmolarityandvolumeofbloodfluids AcidificationoftheUrine&Bicarbonate Excretion Renalregulationofacid-basebalance,acidificationofurine. RegulationofNa+&Cl- Excretion Renal Circulation peculiaritiesandautoregulation Diuretics DisordersofRenalFunctions Diabetesinsipidus.Renal functiontests–creatinine, inulin,ureaandPAHclearance tests. Abnormal constituents of urine, their detection and

			significance. Renal dialysis. ArtificialKidney. Filling of the Bladder Physiologyofurinarybladder EmptyingoftheBladder micturition. Non-excretoryfunction ofkidney

Distribution of Syllabus for General Practical Courses for odd semester(1/3/5)

Name of Teacher	First Semester	Third Semester
Subhashree Sana	-	-
ManojChawdhury	2. **Identification of permanent slides** : Bone, Lung, Trachea, Spleen, Lymphgland,Liver,Salivarygland,Pancreas,Adrenalgland,,Thyroid 3. gland, Spinal cord, Cerebellum, Cerebral cortex, Kidney, Skin, Testis, Ovary,Tongue,Oesophagus,Stomach,Smallintestine,Largeintestine. 4. Freshtissueexperiments: 5. Examination and staining of fresh tissues (other than blood) squamous,certified,ciliatedandcolumnarepithelium,skeletalmuscle, cardiac muscle by methylene blue stain. 6. StainingofadiposetissuebySudanIIIorIV.	7. HaematologicalexperimentsI 8. Leishman'sstaining ofhumanblood film and identification of different types of blood corpuscles. 9. PreparationofHaemincrystals. 10. HaematologicalexperimentsII 11. DCofWBC,estimationofhaemoglobin,bloodgroup determination, 12. Bleedingtimeandcoagulationtime. 13. Demonstration:Haematocrit,MCV,TCofRBCandWBC,ESR.
Chandan Banerjee	-	-
AmaleshMondal	-	-

Distribution of Syllabus for General Theory Courses for odd semester(1/3/5)

Name of Teacher	First Semester	Third Semester	Fifth Semester
Subhashree Sana	**CC-1A** **UnitsofHumanSystem** a. Structureandfunctionsofplasmamembrane,nucleusanddifferent cell organelles b. Endoplasmicreticulum,Golgibodies,Mitochondria,Lysosomeand Peroxisome. c. Structure,functionandclassificationofEpithelial,Connective, Muscular and Nervous tissues. d. Carbohydrates: Definitionandclassification. e. Monosaccharide– Classification,structure.Chemicalreactionsof monosaccharide (Glucose & Fructose) - Reactions with concentrated mineral acids, alkali, phenylhydrazine and their biochemical importance. f. Disaccharides– Maltose,LactoseandSucrose:Structure, occurrence and physiological importance. g. Polysaccharides– Starch,Glycogen,Dextrin,Cellulose. h. Lipids: Definition and classification. Fatty acids ----- Classification.PropertiesofFatandFattya	**CC-1C** 1. Anatomyandhistologyoftherespiratorypassageandorgans. 2. Roleofrespiratorymusclesinbreathing.Artificialrespiration. 3. Significanceofphysiologicalandanatomicaldeadspace. 4. Lungvolumesandcapacities. 5. Exchange of respiratory gases between lung and blood and between blood and tissues. 6. Transportofoxygenandcarbondioxide inblood. 7. Regulationofrespiration- neuralandchemical.Hypoxia.	

	cids—Hydrolysis, Saponification, Saponification number, Iodine number, Hydrogenation, Rancidity-Acid number. Phospholipids, Cholesterol & its ester - physiological importance. i. Amino acids, Peptides and Protein Classificationand structure. Structure of peptide bonds.		
ManojChawdhury		**CC-1C** **1. CardiovascularPhysiology** a. Anatomyandhistologyoftheheart. b. Propertiesofcardiacmuscle. c. Originandpropagationofcardiacimpulse. d. Cardiac cycle: events. Heart sounds. Heart rate. Cardiac output: methods of determination (dye dilution and Fick principle), factors affecting, regulation. **e.** Structureofarteries,arterioles,capillaries. venulesandveins. **f.** Pulse-arterialandvenous. **1. BloodandBodyFluids** **a.** Bloodpressureanditsregulationand factorscontrolling.Baro-and chemoreceptors. Vasomotor reflexes. Methods of measurement of blood pressure. Peculiarities of	**DSE-1A** **NervousSystem** **1.** A brief outline of organization and basic functions (sensory, motor and association) of the nervous system, central and peripheral nervous system. (emphasis on the structure of spinal cordandbrain stem). **2.** Ascending tracts carrying touch, kinaesthetic, temperature and pain sensations. Descending tracts: pyramidal tract and brief outline of the extra-pyramidal tracts. Pain. **3.** Reflexaction-definition,reflexarc,classification,properties. **4.** Functionsofthespinalcord.Outlineoffunctionsofbrainstem. **5.** Abriefideaofthestructure,connectionsandfunctionsof cerebellum. **6.** Differentnucleiandfunctionsofthalamus

		regionalcirculationscoronary,pulmonary,renal, hepatic and cerebral. **1. BloodandBodyFluids** **a.** Blood:compositionandfunctions. **b.** Plasmaproteins:originandfunctions.Plasmapheresis. **c.** Bonemarrow.Formedelements ofblood-theirmorphologyand functions. **d.** Erythropoiesisandleucopoiesis.	andhypothalamus.
Chandan Banerjee	**CC-1A** **1. BiophysicalandBiochemicalPrinciples** a. Physiologicalimportanceofthefollowing physicalprocesses: i. Diffusion ii. Osmosis iii. Dialysis iv. Ultrafiltration v. Surfacetension vi. Adsorption vii. Absorption. b. A brief idea about acids,bases, buffers and indicators.pH– definition,significanceandmaintenanceofpHintheblood. c. Colloids-definition, classificationandphysiologicalimportance		

	d. Enzymes:definition,classification,factorsaffectingenzymeaction. Concept of coenzymes and isozymes.		
Amalesh Mondal			**DSE-1A** **MuscleandNervePhysiology** **2.** Differenttypesofmuscleandtheirstructure.Redandwhite muscle. **3.** Musculacontraction:structural,mechanicalandchemicalchanges in skeletal muscle during contraction and relaxation. **4.** Isotonicandisometriccontractions. **5.** Propertiesofmuscle:allornonelaw,beneficialeffect, summation. refractoryperiod, tetanus, fatigue. **6.** Abriefideaaboutthemusclespindle. **7.** Structureandclassificationofnerves. **8.** Originandpropagationofnerveimpulse. **9.** Velocityofimpulseindifferenttypesofnervefiber. **10.** Propertiesofnervefibers:allornonelaw,rheobaseand chronaxie, refractory period. indefatiguability. **11.** Synapses: structure, differenttypes,mechanismofsynaptic transmission. **12.** Motorunit.Myoneuraljunction:structure, **13.** Mechanismofimpulse transmission.

			14. Degenerationandregenerationinnervefibres

Distribution of Syllabus for General Practical Courses for even semester(2/4/6)

Name of Teacher	Second Semester	Fourth Semester	Sixth Semester
Subhashree Sana	-	-	-
ManojChawdhury	**1.** QualitativeExperiments: **2.** Qualitativetestsforidentificationofstarch,dextrin,lactose,sucrose, **3.** glucose, fructose, albumin, gelatin, peptone, lactic acid, hydrochloric acid, uric acid, acetone, glycerol, bile salts, urea. **4.** QuantitativeExperiments: **5.** Quantitativeestimationofglucosebybenedict'smethod. **6.** Quantitativeestimationofamino-nitrogenbySorensen'sformol titration method.Percentage and total quantity to be done. **7.** Demonstration: **8.** QuantitativeestimationofSucrosebyBenedict'smethod. **9.** Analysisofwheat,rice,milkandoiltotestthepresenceof carbohydrate, protein and fat. **10.** Salivary amylase activity on starch at body temperature (37.5 C), above 40°C and in presenceofHCl.	**Biochemistry II** a) Identificationofnormalconstituentsofurine-chlorIde. sulphate, phosphate, creatinine andurea. b) Identificationofabnormalconstituentsofurine-glucose, protein, acetone blood and bile salts. c) **Demonstration:**Bloodsugarestimation(Folin-Wumethod)	**HumanExperimentsII** a) DeterminationofPhysicalFitnessIndex(PFI)ofanindividualby modified b) Harvardstep testandrecordingofrecoveryheart-rateafterstandard c) exercise. d) Pneumographicrecordingofrespiratorymovementsalongwiththe e) effectofdrinkingofwater,talking,forcedhyperventilationandbreathholding. f) Measurementofsomecommonanthropometricparameters:stature, weight, eye height, shoulder height, elbow height. sitting height, elbow rest height (sitting),knee height (sitting),arm reach from wall, mid-arm circumference, waist circumference, hip circumference, neck circumference, head circumference, chest circumference. g) CalculationofBodySurfaceArea(usinganomogram)andBody Mass Index from anthropometric measurements. h) Demonstration: i) Ergographicrecordingofmusculartfatiguebyy'Moss'sergograph. j) Clinical

			k) Classificationofreflexes:superficialreflex-planterreflex,Deep reflex – knee jerk, visceral reflex - pupillary light reflex.
Chandan Banerjee	-	-	-
Amalesh Mondal	-	-	-

Distribution of Syllabus for General Theory Courses for even semester(2/4/6)

Name of Teacher	Second Semester	Fourth Semester	Sixth Semester
Subhashree Sana	**CC-1A** **Nutrition** 1. Basicconstituentsoffoodandtheirnutritionalsignificance. 2. Vitamins:definition,classification, functions,deficiencysymptoms and daily requirements. Hypervitaminosis. 3. Mineralmetabolism-Ca.P,Fe. 4. BMR:definition,factorsaffecting,determinationbyBenedict-Roth apparatus. Respiratory quotient: definition, factors affecting and significance. 5. Biologicalvalueofproteins.Essentialandnon-essentialaminoacids, Nitrogen equilibrium. 6. Minimumproteinrequirement-Positiveand negativenitrogenbalance. 7. SDA:definitionand:importance.	**CC-1D** **EndocrineSystem** 1. Anatomy of endocrine system. Hormones - classification. Basic concept of regulation of hormone actions. Positive and negative feedback mechanism. Elementary idea of hormone action. 2. *Hypothalamus:*Basicconceptofneurohormone.Hypothalamo-hypophyseal tract and portal system. 3. *Pituitary:*Histologicalstructure,hormones,functions.Hypoandhyperactive states of pituitary gland. 4. *Thyroid:*Histological structure. Functions of thyroid hormones &thyrocalcitonin. Hypo and hyper-active states of thyroid.	
ManojChawdhury		**CC-1D** **RenalPhysiology** 1. ElementaryStructureofKidney&Location. 2. Relationshipbetweenstructureandfunctions of kidney. 3. Mechanismofformationofurine.	**ReproductivePhysiology** 1. Primaryandaccessorysexorgansandsecondarysexcharacters. 2. Testis:histology,spermatogenesis,testicularhormonesandtheir functions. 3. Ovary:histology,oogenesis,ovarianhormonesandtheirfunctions.

		4. Normalandabnormalconstituentsofurine. **5.** Physiologyofurinestorageandmicturition. **6.** Renal regulationofacid-basebalance. **7.** Non-excretoryfunctionsofkidney **<u>SkinandRegulationofBodyTemperature</u>** a) Structureandfunctionsofskin. b) Insensibleandsensibleperspiration c) Regulation of body temperature -- physicaland physiological processes involved in it. d) Physiologyofsweatsecretionanditsregulation	Spermatogenesis & Oogenesis– processes and factors controlling. **4.** Oestrusandmenstrualcyclesandtheirhormonalcontrol. **5.** Fertilization,implantationandstructureandfunctionsofplacenta. Maintenance of pregnancy – role of hormones. Development of mammary gland and lactation - role of hormones
Chandan Banerjee	**<u>DigestiveSystem</u>** a) Structureinrelationtofunctionsofalimentarycana1anddigestive glands. b) Composition,functionsandregulationofsecretionofdigestivejuices including bile. c) Digestionandabsorptionofcarbohydrate,proteinandlipid. d) Movementsofthestomachandsmall intestine	**<u>CC-1D</u>** **<u>EndocrineSystem</u>** **1.** P*arathyroid:*Histologicalstructure,functionsofparathyroidhormone. Tetany. *Adrenal Cortex:*Histological structure and functions of different hormones. Hypo and hyper-active states of adrenal cortex. **2.** *Adrenal Medulla:*Histological structure and functions of medullary hormones. The relation of adrenal medulla with the sympathetic nervous system. **3.** *Pancreas:*Histology of islets of Langerhans. Origin and functions of pancreatichormones.Diabetesmellitus.Briefideaoftheoriginandfunctions of renin-angiotensin, prostaglandins. Erythropoietin and melatonin. Elementary idea of gastrointestinal hormone.	

AmaleshMondal	**1. Metabolism** a) Glycolysis,TCAcycle,Glycogenesis,Glycogenolysis. Gluconeogenesis. b) Depotfat.Betaoxidationofsaturatedfattyacid c) Ketonebodies formationandsignificance. d) Deamination,Transamination.Aminoacidpool-fateandfunctions of amino acids in the body. e) Formationofureaanditsimportance. f) BrifideaofHMPshuntanditssignificance(detailedenzymatic reactions are not required). g) Lipoproteins-typesand functions. h) Purineandpyrimidinebases,nucleosides,nucleotidesand polynucleotides. i) Pathophysiological significance of the following blood constituents: glucose,urea,creatinine,uricacid,cholesterol,bilirubin,SGPTand SGOT, alkaline and acid phosphatases and ketone bodies.		**<u>SensoryPhysiology</u>** **1.** Classification of general and special senses and their receptors. Receptors as biological transducer. **2.** Olfaction and Gustation:Structure of sensory organ, neural pathway of olfactory and gustatory sensation. Physiology of olfactory and gustatory sensation. Olfactory and gustatory adaptation. After-taste. **3.** Audition:Structureofear,auditorypathway,mechanismof hearing. **4.** Vision:Structure of the eye. Histology of retina. Visual pathway. Light reflex. Chemical changes in retina on exposure to light. Accommodation - mechanism and pathway. Errors of refraction. Positive and negative after-image. Light and dark adaptation. Elementary idea of colour vision and colour blindness.