| Number | COMPETENCY<br>The student should be able to | Domain K/S/A/C | Level K/KH/SH/P | Core (Y/N) |
|---|---|---|---|---|
| BI1.1 | Describe the molecular and functional organization of a cell and its sub- cellular components. | K | KH | Y |
| BI2.1 | Explain fundamental concepts of enzyme, isoenzyme, alloenzyme, coenzyme & co-factors. Enumerate the main classes of IUBMB nomenclature. | K | KH | Y |
| BI2.2 | Observe the estimation of SGOT & SGPT | K | K | Y |
| BI2.3 | Describe and explain the basic principles of enzyme activity | K | KH | Y |
| BI2.4 | Describe and discuss enzyme inhibitors as poisons and drugs and as therapeutic enzymes | K | KH | Y |
| BI2.5 | Describe and discuss the clinical utility of various serum enzymes as markers of pathological conditions. | K | KH | Y |
| BI2.6 | Discuss use of enzymes in laboratory investigations (Enzyme-based assays) | K | KH | Y |
| BI2.7 | Interpret laboratory results of enzyme activities & describe the clinical utility of various enzymes as markers of pathological conditions. | K | KH | Y |
| BI3.1 | Discuss and differentiate monosaccharides, di-saccharides and polysaccharides giving examples of main carbohydrates as energy fuel, structural element and storage in the human body | K | KH | Y |
| BI3.2 | Describe the processes involved in digestion and assimilation of carbohydrates and storage. | K | KH | Y |
| BI3.3 | Describe and discuss the digestion and assimilation of carbohydrates from food. | K | KH | Y |
| BI3.4 | Define and differentiate the pathways of carbohydrate metabolism, (glycolysis, gluconeogenesis, glycogen metabolism, HMP shunt). | K | KH | Y |
| BI3.5 | Describe and discuss the regulation, functions and integration of carbohydrate along with associated | K | KH | Y |
| BI3.6 | Describe and discuss the concept of TCA cycle as a amphibolic pathway and its regulation. | K | KH | Y |
| BI3.7 | Describe the common poisons that inhibit crucial enzymes of carbohydrate metabolism (eg; fluoride, | K | KH | Y |
| BI3.8 | Discuss and interpret laboratory results of analytes associated with metabolism of carbohydrates. | K | KH | Y |
| BI3.9 | Discuss the mechanism and significance of blood glucose regulation in health and disease. | K | KH | Y |
| BI3.10 | Interpret the results of blood glucose levels and other laboratory investigations related to disorders of | K | KH | Y |

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| BI4.1 | Describe and discuss main classes of lipids (Essential/non-essential fatty acids, cholesterol and hormonal steroids, triglycerides, major phospholipids and sphingolipids) relevant to human system and their major functions. | K | KH | Y |
| BI4.2 | Describe the processes involved in digestion and absorption of dietary lipids and also the key features of their metabolism | K | KH | Y |
| BI4.3 | Explain the regulation of lipoprotein metabolism & associated disorders. | K | KH | Y |
| BI4.4 | Describe the structure and functions of lipoproteins, their functions, interrelations & relations with | K | KH | Y |
| BI4.5 | Interpret laboratory results of analytes associated with metabolism of lipids | K | KH | Y |
| BI4.6 | Describe the therapeutic uses of prostaglandins and inhibitors of eicosanoid synthesis. | K | KH | Y |
| BI4.7 | Interpret laboratory results of analytes associated with metabolism of lipids. | K | KH | Y |
| BI5.1 | Describe and discuss structural organization of proteins. | K | KH | Y |
| BI5.2 | Describe and discuss functions of proteins and structure-function relationships in relevant areas eg, hemoglobin and selected hemoglobinopathies | K | KH | Y |
| BI5.3 | Describe the digestion and absorption of dietary proteins. | K | KH | Y |
| BI5.4 | Describe common disorders associated with protein metabolism. | K | KH | Y |
| BI5.5 | Interpret laboratory results of analytes associated with metabolism of proteins. | K | KH | Y |
| BI6.1 | Discuss the metabolic processes that take place in specific organs in the body in the fed and fasting | K | KH | Y |
| BI6.2 | Describe and discuss the metabolic processes in which nucleotides are involved. | K | KH | Y |
| BI6.3 | Describe the common disorders associated with nucleotide metabolism. | K | KH | Y |
| BI6.4 | Discuss the laboratory results of analytes associated with gout & Lesch Nyhan syndrome. | K | KH | Y |

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| BI6.5 | Describe the biochemical role of vitamins in the body and explain the manifestations of their deficiency | K | KH | Y |
| BI6.6 | Describe the biochemical processes involved in generation of energy in cells. | K | KH | Y |
| BI6.7 | Describe the processes involved in maintenance of normal pH, water & electrolyte balance of body fluids and the derangements associated with these. | K | KH | Y |
| BI6.8 | Discuss and interpret results of Arterial Blood Gas (ABG) analysis in various disorders. | K | KH | Y |
| BI6.9 | Describe the functions of various minerals in the body, their metabolism and homeostasis. | K | KH | Y |
| BI6.10 | Enumerate and describe the disorders associated with mineral metabolism. | K | KH | Y |
| BI6.11 | Describe the functions of haem in the body and describe the processes involved in its metabolism and describe porphyrin metabolism. | K | KH | Y |
| BI6.12 | Describe the major types of haemoglobin and its derivatives found in the body and their physiological/ pathological relevance. | K | KH | Y |
| BI6.13 | Describe the functions of the kidney, liver, thyroid and adrenal glands. | K | KH | Y |
| BI6.14 | Describe the tests that are commonly done in clinical practice to assess the functions of these organs (kidney, liver, thyroid and adrenal glands). | K | KH | Y |
| BI7.1 | Describe the structure and functions of DNA and RNA and outline the cell cycle. | K | KH | Y |
| BI7.2 | Describe the processes involved in replication & repair of DNA and the transcription & translation mechanisms | K | KH | Y |
| BI7.3 | Describe gene mutations and basic mechanism of regulation of gene expression. | K | KH | Y |
| BI7.4 | Describe applications of molecular technologies like recombinant DNA technology, PCR in the diagnosis and treatment of diseases with genetic basis. | K | KH | Y |
| BI7.5 | Describe the role of xenobiotics in disease | K | KH | Y |
| BI7.6 | Describe the anti-oxidant defence systems in the body. | K | KH | Y |
| BI7.7 | Describe the role of oxidative stress in the pathogenesis of conditions such as cancer, complications of diabetes mellitus and | K | KH | Y |

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| BI8.1 | Discuss the importance of various dietary components and explain importance of dietary fibre. | K | KH | Y |
| BI8.2 | Describe the types and causes of protein energy malnutrition and its effects. | K | KH | Y |
| BI8.3 | Provide dietary advice for optimal health in childhood and adult, in disease conditions like diabetes mellitus, | K | KH | Y |
| BI8.4 | Describe the causes (including dietary habits), effects and health risks associated with being overweight/ obesity. | K | KH | Y |
| BI8.5 | Summarize the nutritional importance of commonly used items of food including fruits and vegetables.(macro-molecules & its importance) | K | KH | Y |
| BI9.1 | List the functions and components of the extracellular matrix (ECM). | K | KH | Y |
| BI9.2 | Discuss the involvement of ECM components in health and disease. | K | KH | Y |
| BI9.3 | Describe protein targeting & sorting along with its associated disorders. | K | KH | N |
| BI10.1 | Describe the cancer initiation, promotion oncogenes & oncogene activation. Also focus on p53 & apoptosis | K | KH | Y |
| BI10.2 | Describe various biochemical tumor markers and the biochemical basis of cancer therapy. | K | KH | Y |
| BI10.3 | Describe the cellular and humoral components of the immune system & describe the types and structure of antibody | K | KH | Y |
| BI10.4 | Describe & discuss innate and adaptive immune responses, self/non-self recognition and the central role of T-helper cells in immune responses. | K | KH | Y |
| BI10.5 | Describe antigens and concepts involved in vaccine development. | K | KH | Y |
| BI11.1 | Describe commonly used laboratory apparatus and equipments, good safe laboratory practice and waste disposal | K | KH | Y |
| BI11.2 | Describe the preparation of buffers and estimation of pH. | K | KH | Y |

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| BI11.3 | Describe the chemical components of normal urine. | K | KH | Y |
| BI11.4 | Perform urine analysis to estimate and determine normal and abnormal constituents | S | P | Y |
| BI11.5 | Describe screening of urine for inborn errors & describe the use of paper chromatography | K | KH | Y |
| BI11.6 | Describe the principles of colorimetry | K | KH | Y |
| BI11.7 | Demonstrate the estimation of serum creatinine and creatinine clearance | S | P | Y |
| BI11.8 | Demonstrate estimation of serum proteins, albumin and A:G ratio | S | P | Y |
| BI11.9 | Demonstrate the estimation of serum total cholesterol and HDL- cholesterol | S | P | Y |
| BI11.10 | Demonstrate the estimation of triglycerides | S | P | Y |
| BI11.11 | Demonstrate estimation of calcium and phosphorous | S | P | Y |
| BI11.12 | Demonstrate the estimation of serum bilirubin | S | P | Y |
| BI11.13 | Demonstrate the estimation of SGOT/ SGPT | S | P | Y |
| BI11.14 | Demonstrate the estimation of alkaline phosphatase | S | P | Y |
| BI11.15 | Describe & discuss the composition of CSF | K | KH | Y |
| BI11.16 | Observe use of commonly used equipments/techniques in biochemistry laboratory including:<br>•pH<br>meter<br>•Paper chromatography of amino acid<br>•Protein electrophoresis<br>•TLC, PAGE | S | KH | Y |
| BI11.17 | Explain the basis and rationale of biochemical tests done in the following conditions:<br>- diabetes mellitus,<br>- dyslipidemia,<br>- myocardial infarction,<br>- renal failure, gout,<br>- proteinuria,<br>- nephrotic syndrome,<br>- edema, | K | KH | Y |
| BI11.18 | Discuss the principles of spectrophotometry. | K | KH | Y |
| BI11.19 | Outline the basic principles involved in the functioning of instruments commonly used in a biochemistry laboratory and their applications. | K | KH | Y |
| BI11.20 | Identify abnormal constituents in urine, interpret the findings and correlate these with pathological states. | S | SH | Y |
| BI11.21 | Demonstrate estimation of glucose, creatinine, urea and total protein in serum. | S | SH | Y |

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| BI11.22 | Calculate albumin: globulin (AG) ratio and creatinine clearance | K | KH | Y |
| BI11.23 | Calculate energy content of different food Items, identify food items with high and low glycemic index | K | KH | Y |
| BI11.24 | Enumerate advantages and/or disadvantages of use of unsaturated, saturated and trans fats in food. | K | KH | Y |

| Suggested Teaching Learning method | Suggested Assessment method | Number required to certify P | Vertical integration | Horizontal Integration |
|---|---|---|---|---|
| Lecture, Small group discussion | Written assessment/ Viva voce | | | Physiology |
| Lecture, case discussion | Written assessment/ Viva voce | | | |
| Demonstration | Viva voce | | | |
| Lecture, case discussion | Written/ Viva voce | | | |
| Lecture, Small group discussion | Written/Viva voce | | Pathology, General Medicine | |
| Lecture, Small group discussion | Written/Viva voce | | Pathology, General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | Pathology, General Medicine | |
| Lecture, Small group discussion, DOAP sessions | Written/ Viva voce | | Pathology, General Medicine | |
| Lecture, Small group discussion | Written/Viva voce | | | |
| Lecture, Small group discussion | Written/Viva voce | | | |
| Lecture, Small group discussion | Written/Viva voce | | | |
| Lecture, Small group discussion | Written/Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/Viva voce | | | |
| Lecture, Small group discussion | Written/Viva voce | | | Physiology |
| Lecture, Small group discussion | Written/Viva voce | | Pathology, General Medicine | |
| Lecture, Small group discussion | Written/Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/Viva voce | | General Medicine | |

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| Lecture, Small group discussion | Written/Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| Lecture, Small group discussion | Written/ Viva voce | | Pathology, General Medicine | Physiology |
| Lecture, Small group discussion | Written/ Viva voce | | Pediatrics | |
| Lecture, Small group discussion | Written/ Viva voce | | Pediatrics | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| Lecture, Small group discussion | Written/ Viva voce | | | Physiology |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |

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| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | Physiology |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | Physiology |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | Pathology, General Medicine | Physiology |
| Lecture, Small group discussion | Written/ Viva voce | | Pathology, General Medicine | Physiology |
| Lecture, Small group discussion | Written/ Viva voce | | Pathology, General Medicine | Physiology, Human Anatomy |
| Lecture, Small group discussion | Written/ Viva voce | | Pathology, General Medicine | Physiology, Human Anatomy |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| Lecture, Small group discussion | Written/ Viva voce | | Pediatrics | |
| Lecture, Small group discussion | Written/ Viva voce | | Pediatrics, General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine, Pathology | |

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| Lecture, Small group discussion | Written/ Viva voce | | General Medicine, Pediatrics, Pathology | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine, Pediatrics, Pathology | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine, Pathology | |
| Lecture, Small group discussion | Written/ Viva voce | | Community Medicine, General Medicine, Pediatrics | |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| Lecture, Small group discussion | Written/ Viva voce | | Obstetrics & Gynaecology, General Surgery, Pathology | |
| Lecture, Small group discussion | Written/ Viva voce | | Obstetrics & Gynaecology, General Surgery, Pathology | |
| Lecture, Small group discussion | Written/ Viva voce | | Obstetrics & Gynaecology, General Surgery, Pathology | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine, Pathology | Physiology |
| Lecture, Small group discussion | Written/ Viva voce | | Pathology, Pediatrics, Microbiology | |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| Lecture, Small group discussion | Written/ Viva voce | | | |

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| Lecture, Small group discussion | Written/ Viva voce | | | |
| DOAP session | Skill assessment | 1 | General Medicine | Physiology |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine | |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| Practical | Skills assessment | 1 | | |
| Practical | Skills assessment | 1 | | |
| Practical | Skills assessment | | | |
| Practical | Skills assessment | | | |
| Practical | Skills assessment | | | |
| Practical | Skills assessment | | | |
| Practical | Skills assessment | | | |
| Practical | Skills assessment | | | |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| Demonstration | Skill assessment | | | |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine, Pathology | |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| Lecture, Small group discussion | Written/ Viva voce | | | |
| DOAP sessions | Skill assessment | 1 | | |
| DOAP sessions | Skill assessment | 1 | | |

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|---|---|---|---|
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine |
| Lecture, Small group discussion | Written/ Viva voce | | General Medicine |