	PRACTICAL								
No.	**Competency & Learning Objectives**	**Domain K/S /A/C**	**Level K/ KH/ S H/ P**	**Core (Y/N)**	**Suggested Teaching learning method**	**Suggested Assessment method**	**Number required to certify P**	**Vertical integration**	**Horizontal Integration**
	Topic no: 11 BIOCHEMICAL LAB TESTS (24)								
BI 11.1	**Describe commonly used Laboratory apparatus and equipments, good safe laboratory practice and waste disposal.**	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	-------	----------	
	Learning Objectives								
BI 11.1.1	At the end of the session phase 1 MBBS student must be able to describe various commonly used Laboratory apparatus and discuss their application correctly.	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	-------	----------	
BI 11.1.2	At the end of the session phase 1 MBBS student must be able to describe the commonly used lab equipment and discuss their application correctly.	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	-------	----------	
BI 11.1.3	At the end of the session phase 1 MBBS student must be able to explain various bio-safety measures required for prevention of Laboratory accidents correctly.	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	-------	----------	
BI 11.1.4	At the end of the session phase 1 MBBS student must be able to discuss various Lab hazards along with the measure to be taken in case of Laboratory accidents correctly.	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	-------	----------	
BI 11.1.5	At the end of the session phase 1 MBBS student must be able to describe the disposal and segregation of biomedical waste precisely.	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	-------	----------	
BI 11.2	**Describe the preparation of buffers and estimate of pH.**	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	-------	----------	
	Learning Objectives								

BI 11.2.1	At the end of the session phase 1 MBBS student must be able to define pH and describe various methods of estimation of pH.correctly.	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	-------	----------	
BI 11.2.2	At the end of the session phase 1 MBBS student must be able to describe the preparation of buffers in general correctly.	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	-------	----------	
BI 11.3	**Describe the clinical components of normal urine.**	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	------	------	
	Learning Objectives								
BI 11.3.1	At the end of the session phase 1 MBBS student must be able to enumerate the clinical components present in normal urine along with the amount excreted in 24 hours urine correctly.	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	------	------	
BI 11.4	**Perform urine analysis to estimate and determine normal and abnormal constituents.**								
	Learning Objectives								
BI 11.4.1	At the end of the session phase 1 MBBS student must be able to enumerate the abnormal constituents of urine correctly.	S K k S S	P K kh SH p	Y Y Y Y y	DOAP Session Lecture ‘’’’’ Demonstrate Perform	Skill assessment Written/ Viva Voce ‘’’ ------- Skill assess	1 --- ---- ----- ----	General medicine ----- ----- ------ ------	Physiology
BI 11.4.2	At the end of the session phase 1 MBBS student must be able to describe the clinical conditions associated with appearance of abnormal constituents of urine correctly.	S K k S s	P K kh SH p	Y Y Y Y y	DOAP Session Lecture ‘’’’’ Demonstrate Perform	Skill assessment Written/ Viva Voce ‘’’ ------- Skill assess	1 --- ---- ----- ----	General medicine ----- ----- ------ ------	Physiology
BI 11.4.3	At the end of the session phase 1 MBBS student must be able to demonstrate the normal and abnormal constituents of urine correctly.	S	P	Y	DOAP Session	Skill assessment	1	General medicine	Physiology

		K k S s	K kh SH p	Y Y Y y	 Lecture ‘’’’’ Demonstrate Perform	 Written/ Viva Voce ‘’’ ------- Skill assess	--- ---- ----- ----	----- ----- ------ ------	
BI 11.4.4	At the end of the session phase 1 MBBS student must be able to perform analysis of urine to determine the presence of normal and abnormal constituents accurately.	S K k S s	P K kh SH p	Y Y Y Y y	DOAP Session Lecture ‘’’’’ Demonstrate Perform	Skill assessment Written/ Viva Voce ‘’’ ------- Skill assess	1 --- ---- ----- ----	General medicine ----- ----- ------ ------	Physiology
BI 11.4.5	Interpret the results of a given set of parameters correctly.	S K k S s	P K kh SH p	Y Y Y Y y	DOAP Session Lecture ‘’’’’ Demonstrate Perform	Skill assessment Written/ Viva Voce ‘’’ ------- Skill assess	1 --- ---- ----- ----	General medicine ----- ----- ------ ------	Physiology
BI 11.5	**Describe screening of urine for inborn errors and describe the use of paper chromatography.** To be covered in B1 5.4 and B1 11.16.	K	KH	Y	Lecture, Small group discussion	Written/ Viva Voce	-------	General medicine	----------
BI 11.6	**Describe the principles of colorimetry.**	K	KH	Y	Lecture, Small group discussion	Written/ Viva Voce	-------	---------	----------
	Learning Objectives								
BI 11.6.1	At the end of the session phase 1 MBBS student must be able to define & explain principle of colorimetery along with its application correctly.	K	KH	Y	Lecture, Small group discussion	Written/ Viva Voce	-------	---------	----------
B1 11.7	**Demonstrate the estimation of serum creatinine and creatinine clearance.**	S	P	Y	Practical	Skills assessment	1		
	Learning Objectives								

BI 11.7.1	At the end of the session phase 1 MBBS student must be able to describe the principle of the method for the estimation of serum creatinine correctly.	S	P	Y	Practical	Skills assessment	1		
BI 11.7.2	At the end of the session phase 1 MBBS student must be able to explain the estimation of urinary creatinine along with the calculation of creatinine clearance correctly.	S	P	Y	Practical	Skills assessment	1		
BI 11.7.3	At the end of the session phase 1 MBBS student must be able to describe the clinical condition associated with increase or decrease of serum creatinine levels and creatinine clearance correctly.	S	P	Y	Practical	Skills assessment	1		
BI 11.7.4	At the end of the session phase 1 MBBS student must be able to perform the estimation of serum creatinine and calculate the creatinine clearance from the given set of parameters along with its interpretation accurately.	S	P	Y	Practical	Skills assessment	1		
BI 11.8	**Demonstrate estimation of serum protein, albumin and A.G ratio.**	S	P	Y	Practical	Skills assessment	1	--------	---------
	Learning Objectives								
BI 11.8.1	At the end of the session phase 1 MBBS student must be able to describe the principle for estimation of serum protein correctly.	S	P	Y	Practical	Skills assessment	1		
BI 11.8.2	At the end of the session phase 1 MBBS student must be able to describe the clinical condition leading to hyper & Hypo proteinemia correctly.	S	P	Y	Practical	Skills assessment	1		
BI 11.8.3	At the end of the session phase 1 MBBS student must be able to perform the estimation of serum proteins accurately.	S	P	Y	Practical	Skills assessment	1		
BI 11.8.4	At the end of the session phase 1 MBBS student must be able to discuss the principle for estimation of serum albumin and A/G Ratio correctly.	S	P	Y	Practical	Skills assessment	1		
BI 11.8.5	At the end of the session phase 1 MBBS student must be able to describe the clinical condition resulting in hyper and hypo albuminemia and write down the significance of A/G ratio correctly.	S	P	Y	Practical	Skills assessment	1		
BI 11.8.6	At the end of the session phase 1 MBBS student must be able to perform estimation of serum albumin accurately.	S	P	Y	Practical	Skills assessment	1		
BI 11.8.7	At the end of the session phase 1 MBBS student must be able to interpret the results of the given set of parameters correctly.	S	P	Y	Practical	Skills assessment	1		

BI 11.9	**Demonstrate the estimation of serum total cholesterol and HDL cholesterol.**	S	P	Y	Practical	Skills assessment	----	-------	---------	
	Learning Objectives									
BI 11.9.1	At the end of the session phase 1 MBBS student must be able to describe the principle for the estimation of serum cholesterol correctly.	S	P	Y	Practical	Skills assessment	----	-------	---------	
BI 11.9.2	At the end of the session phase 1 MBBS student must be able to discuss the clinical conditions associated with hypo and hyper cholesterolemia correctly.	S	P	Y	Practical	Skills assessment	----	-------	---------	
BI 11.9.3	At the end of the session phase 1 MBBS student must be able to perform the estimation of serum cholesterol accurately.	S	P	Y	Practical	Skills assessment	----	-------	---------	
BI 11.9.4	At the end of the session phase 1 MBBS student must be able to describe the principle for estimation of HDL- cholesterol correctly.	S	P	Y	Practical	Skills assessment	----	-------	---------	
BI 11.9.5	At the end of the session phase 1 MBBS student must be able to discuss the clinical condition associated with decrease in HDL cholesterol levels correctly.	S	P	Y	Practical	Skills assessment	----	-------	---------	
BI 11.9.6	At the end of the session phase 1 MBBS student must be able to perform estimation of HDL cholesterol accurately.	S	P	Y	Practical	Skills assessment	----	-------	---------	
BI 11.9.7	At the end of the session phase 1 MBBS student must be able to interpret the results of the given set of parameters correctly.	S	P	Y	Practical	Skills assessment	----	-------	---------	
B1 11.10	**Demonstrate the estimation of serum triglycerides**	S	P	Y	Practical	Skills assessment	----	-------		
	Learning Objectives									
BI 11.10.1	At the end of the session phase 1 MBBS student must be able to describe the principle for the estimation of serum triglycerides correctly.	S	P	Y	Practical	Skills assessment	----	-------		
BI 11.10.2	At the end of the session phase 1 MBBS student must be able to discuss the clinical conditions associated with hypo and hyper triglyceridemia correctly.	S	P	Y	Practical	Skills assessment	----	-------		
BI 11.10.3	At the end of the session phase 1 MBBS student must be able to perform the estimation of serum triglycerides accurately.	S	P	Y	Practical	Skills assessment	----	-------		

BI 11.10.4	Interpret the results of the given set of parameters correctly.	S	P	Y	Practical	Skills assessment	----	-------		
BI 11.11	**Demonstrate estimation of Calcium and Phosphorous.**	S	P	Y	Practical	Skill assessment	---	------		
	Learning Objectives									
BI 11.11.1	At the end of the session phase 1 MBBS student must be able to describe the principle for the estimation of serum Calcium correctly.	S	P	Y	Practical	Skill assessment	---	------		
BI 11.11.2	At the end of the session phase 1 MBBS student must be able to discuss the clinical conditions associated with hypo and hyper calcium levels correctly.	S	P	Y	Practical	Skill assessment	---	------		
BI 11.11.3	At the end of the session phase 1 MBBS student must be able to perform the estimation of serum Calcium accurately.	S	P	Y	Practical	Skill assessment	---	------		
BI 11.11.4	At the end of the session phase 1 MBBS student must be able to describe the principle for the estimation of serum phosphorous correctly.	S	P	Y	Practical	Skill assessment	---	------		
BI 11.11.5	At the end of the session phase 1 MBBS student must be able to discuss the clinical condition associated with hypo and hyper phosphorous levels correctly.	S	P	Y	Practical	Skill assessment	---	------		
BI 11.11.6	At the end of the session phase 1 MBBS student must be able to perform the estimation of serum phosphorous accurately.	S	P	Y	Practical	Skill assessment	---	------		
BI 11.11.7	At the end of the session phase 1 MBBS student must be able to interpret the results of the given set of parameters correctly.	S	P	Y	Practical	Skill assessment	---	------		
BI 11.12	**Demonstrate the estimation of serum Bilirubin.**	S	P	Y	Practical	Skills assessment	----	-------	---------	
	Learning Objectives									
BI 11.12.1	At the end of the session phase 1 MBBS student must be able to describe the principle for the estimation of serum Bilirubin correctly.									
BI 11.12.2	At the end of the session phase 1 MBBS student must be able to discuss the clinical condition associated with hypo and hyper Bilirubinemia correctly.									
BI 11.12.3	At the end of the session phase 1 MBBS student must be able to perform the estimation of serum Bilirubin accurately.									

BI 11.12.4	At the end of the session phase 1 MBBS student must be able to interpret the results of the given set of parameters correctly.									
BI 11.13	**Demonstrate the estimation of SGOT/SGPT**	S	P	Y	Practical	Skills assessment	----	------		
	Learning Objectives									
BI 11.13.1	At the end of the session phase 1 MBBS student must be able to describe the principle for the estimation of serum SGOT correctly.									
BI 11.13.2	At the end of the session phase 1 MBBS student must be able to discuss the clinical conditions associated with hypo and hyper SGOT levels correctly.									
BI 11.13.3	At the end of the session phase 1 MBBS student must be able to perform the estimation of serum SGOT accurately.									
BI 11.13.4	At the end of the session phase 1 MBBS student must be able to describe the principle for the estimation of serum SGPT correctly.									
BI 11.13.5	At the end of the session phase 1 MBBS student must be able to discuss the clinical condition associated with hypo and hyper SGPT levels correctly.									
BI 11.13.6	At the end of the session phase 1 MBBS student must be able to perform the estimation of serum SGPT accurately.									
BI 11.13.7	At the end of the session phase 1 MBBS student must be able to interpret the results of the given set of parameters correctly.									
BI 11.14	**Demonstrate the estimation of alkaline phosphatase.**	S	P	Y	Practical	Skills assessment	---	------		
	Learning Objectives									
BI 11.14.1	At the end of the session phase 1 MBBS student must be able to describe the principle for the estimation of alkaline phosphatase correctly.	S	P	Y	Practical	Skills assessment	---	------		
BI 11.14.2	At the end of the session phase 1 MBBS student must be able to discuss the clinical conditions associated with hypo and hyper alkaline phosphatase levels correctly.	S	P	Y	Practical	Skills assessment	---	------		
BI 11.14.3	At the end of the session phase 1 MBBS student must be able to perform the estimation of serum alkaline phosphatase accurately.	S	P	Y	Practical	Skills assessment	---	------		

BI 11.15	**Describe & discuss the composition of CSF.**	K	KH	Y	Lecture, Small group discussion	Written/ Viva Voce	---	------		
	Learning Objectives									
BI 11.15.1	At the end of the session phase 1 MBBS student must be able to describe the composition of CSF correctly.	K	KH	Y	Lecture, Small group discussion	Written/ Viva Voce	---	------		
BI 11.15.2	At the end of the session phase 1 MBBS student must be able to differentiate between different types of meningitis based on the change in various biochemical parameters in CSF correctly.	K	KH	Y	Lecture, Small group discussion	Written/ Viva Voce	---	------		
BI 11.16	**Observe use of commonly used equipments/techniques in biochemistry laboratory including.** **pH Meter** **Paper chromatography of amino acid** **Protein electrophoresis** **TLC PAGE** **Electrolyte analysis by ISE** **ABG analyzer** **Elisa**	S	KH	Y	Demonstration	Skill assessment	----	-------		
	Learning Objectives									
BI 11.16.1	At the end of the session phase 1 MBBS student must be able to discuss the principle and applications of pH meter correctly.									
BI 11.16.2	At the end of the session phase 1 MBBS student must be able to discuss the various type of chromatography with application of paper chromatography and TLC of amino acids correctly.									
BI 11.16.3	At the end of the session phase 1 MBBS student must be able to describe the types of electrophoresis along with its application correctly.									
BI 11.16.4	At the end of the session phase 1 MBBS student must be able to explain the principle of ISE and observe the functionary of electrolyte analyzer and enumerate the various parameter and their clinical significance correctly.									
BI 11.16.5	At the end of the session phase 1 MBBS student must be able to observe the functioning of an ABG analyzer and discuss the various parameters and their significance in clinical practices correctly.									

BI 11.16.6	At the end of the session phase 1 MBBS student must be able to discuss the principle of Elisa and its application correctly.									
BI 11.16.7	At the end of the session phase 1 MBBS student must be able observe the functioning of ELISA Reader correctly.									
BI 11.16.8	At the end of the session phase 1 MBBS student must be able to explain the principle of immunodiffusion with its applications correctly.									
BI 11.16.9	At the end of the session phase 1 MBBS student must be able to observe the functioning of Autoanalyser and discuss the difference between an autoanalyser and semi autoanalyser correctly.									
BI 11.16.10	At the end of the session phase 1 MBBS student must be able to discuss the importance of maintaining QC in a Clinical Lab correctly.	S	KH	Y	Demonstration	Skill assessment	---	-------		
BI 11.16.11	At the end of the session phase 1 MBBS student must be able to discuss the process of Isolation of DNA from Tissue and blood and its significance correctly.									
BI 11.17	**Explain the basis and rationale of biochemical tests done in the following conditions.** • **Diabetes mellitus** • **Dyslipidemia** • **Myocardial infarction** • **Renal failure , gout** • **Proteinuria** • **Nephrotic syndrome** • **Edema** • **Jaundice** • **Liver diseases, Pancreatitis, disorders of acid-base balance.** • **Thyroid disorders.** **All topics covered during theory topic**	K	KH	Y	Lecture, Small group discussion	Written/ Viva Voce	----	General Medicine ,Pathology	----------	

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BI 11.18	**Discuss the principle of Spectrophotometry.**	K	KH	Y	Lecture, Small group discussion	Written/ Viva Voce	----------	---------	
	Learning Objectives								
BI 11.18.1	At the end of the session phase 1 MBBS student must be able to discuss principles and applications of Spectrophotometry correctly.								
BI 11.18.2	At the end of the session phase 1 MBBS student must be able to enlist the differences between colorimeter and Spectrophotometer accurately.								
BI 11.19	**Outline the basic principles involved in the functioning of instruments commonly used in a biochemistry laboratory and their applications.** **Already covered in 11.6 , 11.16 , and 11.1**	K	KH	Y	Lecture, Small group discussion	Written/V iva Voce	----------	----------	
BI 11.20	**Identify abnormal constituents in urine, interpret the findings, and correlate these with pathological states.** Already covered in 11.4	S	SH	Y	DOAP Sessions	Skill assessment	1	----------	
BI 11.21	**Demonstrate estimation of glucose, creatinine, urea and total protein in serum.**	S	SH	Y	DOAP Sessions	Skill assessment	1	---------	----------
	Learning Objectives								
BI 11.21.1	At the end of the session phase 1 MBBS student must be able to describe the principle for the estimation of blood glucose correctly.								
BI 11.21.2	At the end of the session phase 1 MBBS student must be able to discuss the clinical conditions associated with hypo and hyperglycemia correctly.								
BI 11.21.3	At the end of the session phase 1 MBBS student must be able to perform the estimation of blood glucose correctly.								

BI 11.21.4	At the end of the session phase 1 MBBS student must be able to describe the principle for the estimation of blood urea correctly.								
BI 11.21.5	At the end of the session phase 1 MBBS student must be able to discuss the clinical condition associated with hypo and hyper uremia correctly.								
BI 11.21.6	At the end of the session phase 1 MBBS student must be able to perform the estimation of blood urea correctly.								
BI 11.21.7	Demonstration of estimation of serum creatinine & total protein (already covered in B1 11.7 & B1 11.8)								
BI 11.22	**Calculate albumin: globulin (AG) ratio and creatinine clearance.** Already covered in 11.7 and 11.8	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	----------	General Medicine	
BI 11.23	**Calculate energy content of different food items, identify food items with high and low glycemic, index, and explain the importance of these in the diet.** Already covered in B1 8.1.4	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	----------	General Medicine	---------
BI 11.24	**Enumerate advantages and/or disadvantages of use of unsaturated, saturated and trans fats in food.** Already covered in B1 8.5.2	K	KH	Y	Lecture, Small group discussion	Written/Viva Voce	----------	General Medicine	