

# FORENSIC MEDICINE AND TOXICOLOGY

CURRICULUM OF SYLLABUS UNDER THE NEW REGULATIONS FOR THE MBBS.

COURSES OF STUDIES EFFECTIVE FROM THE SESSION: 2017-18 .

## **3<sup>RD</sup> SEMESTER:**

### **1.INTRODUCTION (1hr)**

- a. Definitions: forensic medicine, state medicine, legal medicine, medical jurisprudence, medical ethics, medical etiquette
- b. Various branches of forensic science.
- c. History and evolution of forensic medicine from ancient period to modern period

### **2.LEGAL PROCEDURE (2hr)**

- a. Definition: bill, act, code, court, law, statutory law
- b. Major codes and acts: Indian Penal Code (IPC), Criminal Procedure Code (Cr.PC), Indian Evidence Act
- c. Different Courts of Law, their structure and functions: Supreme Court, High Court, Sessions Court, Judicial Magistrate Courts
- d. Offences: cognizable/non-cognizable, bailable/non-bailable, warrant case, summon case
- e. Different types of punishments authorized by law
- f. Inquest: definition, types and procedure of different inquests [police inquest, magistrate inquest (executive and judicial magistrate inquest), coroner's inquest, medical examiner's system]
- g. Summon: definition, types, salient features
- h. Conduct money
- i. Medical evidence: definition, types (documentary and oral), documentary evidence (defn, types of medical documentary evidences), special emphasis on 'how to record dying declaration', oral evidence (defn, exception to oral evidence), direct evidence, indirect evidence (circumstantial and hearsay)
- j. Chain of custody
- k. Witness: definition, types, hostile witness and perjury

- l. Procedure of recording of evidence in Court of law: starting from receiving a summon, oath taking, examination in chief, cross examination, re-examination, question by the Judge, checking the written form of oral evidence by the doctor, Court attendance certificate
- m. Conduct and duties of a doctor in witness box
- n. Overview of duties of a doctor in investigation of scene of death (advantages of visiting and disadvantages of not visiting the scene, methods of search, crime scene photography)

### **3. IDENTIFICATION(5hr)**

- a. Definition
- b. Types of identification (complete and incomplete)
- c. Importance of identification in relation to civil and criminal cases
- d. Corpus delicti
- e. Data of identification: for living only and for both living and dead
- f. Race and ethnicity: different types of race and their differentiating features, different index from which race can be established with special emphasis on cephalic index
- g. Sex: definition of sex, gender, transsexual, transgender, intersex, preliminary ideas of disorders of sexual development, intersex and its different types (true and pseudohermaphroditism, different causes and features of male and female pseudohermaphroditism and there diagnosis), how to determine sex of an individual in case of disputed sex, determination of sex from skeletal remains (specially from skull, mandible, sternum, pelvis, long bones), secondary sexual characteristics in male and female
- h. Age: determination of age by: Eruption of teeth, Secondary changes in teeth after complete eruption, Bony Epiphyseal union, Closure of cranial sutures, From secondary sexual characteristics in male and female, Determination of age from skeletal remains(skull, mandible, sternum, pelvis, long bones), determination of age of fetus, medicolegal importance of various ages,  
Teeth: development and structure of tooth, temporary and permanent tooth- their structure and eruption, their differences, superadded teeth and successional teeth, period of mixed dentition, dental charting, secondary changes in teeth with special emphasis on Gustafson's

- method, different systems of charting of teeth, medicolegal importance of teeth, bite marks
- i. Stature: estimation of stature in living and dead, stature estimation from dismembered body parts and skeletal remains, name of different formulas for stature estimation from long bones with basic principle of Trotter and Glesser formula.
  - j. Scar: definition, characteristics, age determination of scar, medicolegal importance
  - k. Tattoo mark: definition, different dyes, complications, erasure of tattoo, medicolegal importance, medical tattoo
  - l. Hair and its medicolegal importance: structure of human hair, human hair vs. animal hair, determination of sex, age, race, blood group, parts of origin, evidence of dyeing or bleaching, naturally fallen or forcefully pulled out, linking the hair with crime, criminal, victim, weapon of offence, individual characteristics etc)
  - m. Anthropometry
  - n. Different prints in identification( special emphasis on fingerprint with overview of others like Poroscopy, foot prints, lip prints, nail prints, palate-prints, ear prints, frontal sinus prints, vascular grooves of skull, stomach prints, veins on back of hands, retinal scan, iris scan.  
Dactylography: different names, definition, history, fingerprint patterns, methods of recording fingerprints, fingerprinting of cadavers including decomposed bodies, maintenance of fingerprint records, types of evidentiary fingerprints, development of latent fingerprints, lifting of fingerprints, comparative study of two identical fingerprints, use of computer in fingerprint study, mutilation, permanent impairment and ridge atrophy of fingerprints, Advantages, disadvantages and MLI of fingerprint
  - o. DNA Profiling: history, overview of RFLP and PCR techniques, collection of specimens for DNA profiling in living and dead, Uses of DNA profiling, limitations, mitochondrial DNA and its application.

#### ***4. DEATH & ITS MEDICOLEGAL IMPORTANCE AND POST MORTEM CHANGES (5hr)***

##### ***Death:***

- a. Definition of death, types of death
- b. Brain death: types of brain death, brain stem- its function, brainstem reflexes, features in brainstem death, diagnosis of brain death

- (precondition, exclusion criteria, MLI, procedure of diagnosis of brain death, who can certify brain death.) relation with organ transplantation
- c. Overview of transplantation of human organ and tissue act 1994 amended in 2011 and 2014
  - d. Cause of death, manner of death and mode of death
  - e. Sudden death: definition, causes
  - f. Suspended animation.
  - g. Overview of coronary atherosclerosis and myocardial infarction death
  - h. Anaphylactic death: aetiology, signs and symptoms, diagnosis, autopsy findings
  - i. MCCD general overview

### ***Post mortem changes:***

- a. Definition of forensic taphonomy
- b. Classification of signs of death
- c. Early changes of death with special emphasis on changes in the eyes
- d. Algor mortis: definition, explanation of mechanism of cooling of dead body after death and inverted 's' shaped curve, methods of measurement of core body temperature, factors affecting cooling of dead body, MLI, postmortem calorcity
- e. Livor mortis: definition, mechanism, development, fixation, distribution, fate of PM staining, internal hypostasis, color in PM Staining in poisoning, MLI, difference between bruise and PM staining.
- f. Muscular changes after death
- g. Rigor mortis: definition, mechanism, onset, duration, order of appearance, breaking down of rigor mortis, factors affecting rigor mortis, conditions simulating rigor mortis with special emphasis on cadaveric spasm, difference between rigor mortis and cadaveric spasm, heat stiffening, cold stiffening.
- h. Decomposition: definition, types
- i. Putrefaction: definition, mechanism, external and internal signs of putrefaction, factors affecting putrefaction, decomposition in submerged dead bodies, skeletonisation.
- j. Adepocere formation: definition, time required, mechanism, properties and distribution, factors influencing Adepocere formation, MLI,
- k. Mummification: definition, mechanism, factors important for mummification, MLI.
- l. OVERVIEW of methods of preservation of dead bodies with special emphasis on embalming and plastination.

- m. Overview of forensic entomology
- n. Various methods of determination of time since death
- o. Presumption of death and presumption of survivorship

## **5. INJURY & ITS MEDICOLEGAL IMPORTANCE(7hr)**

### **Mechanical injury:**

- i. General principles and factors influencing mechanical injuries
- ii. Classification of mechanical injuries
- iii. Abrasion: definition, types, age of abrasion, differential diagnosis, circumstances of abrasions, MLI
- iv. Bruise: definition, factors influencing bruise, migratory, parallel and delayed bruise, age of bruise, MLI, difference between PM Staining and bruise, difference between true bruise and artificial bruise
- v. Laceration: definition, types, characteristics of lacerated wound, age of laceration, complication, MLI.
- vi. Incised wound: definition, characteristics, age of incised wound, MLI,
- vii. Chop wound: definition, characteristics, MLI,
- viii. Stab wound: definition, classification of stab wound, characteristics, MLI
- ix. Defense wounds and fabricated wounds

### **Medicolegal aspects of injuries:**

- a. Wound: medical definition, medicolegal definition and legal definition
- b. Definition of trauma, assault, battery
- c. Homicide: definition, classification and sub classification, related IPC
- d. Murder: definition, punishment, Related IPC
- e. Hurt: definition, types, related IPC
- f. Grievous hurt (Sec 320 IPC)
- g. Dowry death
- h. Causes of death from wounds
- i. Shock: definition, types with special emphasis on Acute neurogenic cardiovascular failure, hemorrhagic shock and vaso-vagal shock (vagal inhibition)
- j. Embolic death: causes, mechanism, clinical features, clinical diagnosis, autopsy diagnosis of embolic death with special emphasis on death following fat embolism, air embolism and amniotic fluid embolism

- k. Overview of vital reaction, antemortem injury vs. Postmortem injury, diagnosis of antemortem injury by naked eye, histochemical, biochemical and connective tissue histochemistry, determination of age of wound.

**Firearm injuries:** Definition of ballistics, types of forensic ballistics, classification of firearm, parts of firearm, choking, bore, bullet and its structures, different types of bullet, cartridge of shotgun and rifled firearm, different types of gun powder and tests for their identification, Mechanism of discharge of projectile, wound ballistics for both shotgun and rifled firearm (wound of entry, path, and wound of exit), characteristics of contact shot, firearm wounds on skull, peculiar effects of projectile (yawing, tumbling, ricochet effects etc) examination of gunshot injury cases in living and dead, MLI on examination of firearm injury

#### ***6. TORTURE AND CUSTODIAL DEATH (1hr)***

- a. Definition of torture, reasons of torture
- b. Ethical issues related to torture
- c. Types of torture
- d. Discuss different forms of torture with examples
- e. Sequel of torture
- f. Role of doctors in torture
- g. Custodial death: definition, patterns of injuries, sudden death during or immediately after a violent struggle, autopsy protocol in case of torture (NHRC guideline)

**Total hours in 3<sup>rd</sup> semester = 21 hrs**

### **4<sup>TH</sup> SEMESTER:**

#### ***1. REGIONAL INJURIES AND TRANSPORTATION INJURIES (3hrs)***

##### **a. Regional injury**

- i. Definition: traumatic brain injury, closed and open head injury, primary and secondary head injury
- ii. Injuries to scalp
- iii. Injuries to eyes
- iv. Skull fractures: mechanism and different types of skull fractures
- v. Coup and contre-coup injury

- vi. Brain injuries:
  - a. Primary brain injuries:
    - Cerebral concussion: definition, sign and symptoms, clinical diagnosis, autopsy findings, difference between concussion and drunkenness.
    - Diffuse axonal injury: definition, sign and symptoms, clinical diagnosis, autopsy findings,
    - Cerebral contusion, laceration: definition and types.
  - b. Secondary brain injuries:
    - Intracranial hemorrhages: classification
    - Different types of intracranial hemorrhages: definition, causes, sign and symptoms, clinical diagnosis, autopsy findings
    - Overview of brain herniation: different types, clinical diagnosis
- vii. Injuries to spinal cord:
  - whiplash injury: definition, causes, mechanism, signs and symptoms, clinical diagnosis and autopsy findings
  - railway spine: definition, causes, mechanism, signs and symptoms, clinical diagnosis and autopsy findings
- viii. Injuries to vertebral column: causes, different types
- ix. Injuries to chest:
  - Fracture of ribs: flail chest
  - Injury to lungs: different types and their mechanism with special emphasis to hemothorax, pneumothorax, respirator lung
  - Injury to heart: special emphasis on cardiac tamponade, cardiac concussion, stab injury over heart
- x. Injuries to abdomen: types, overview of injury to spleen, liver, kidneys and bladder.
- xi. Injuries to bone: bone fracture: types, AM fracture vs. PM fracture, age of fracture by naked eye and histological examination

#### **b. Transportation injuries:**

- i. Injuries to pedestrians: primary impact injuries, secondary impact injuries, secondary injuries, run over and rolling over injuries
- ii. Injuries to vehicle occupants



- Frontal impact, side impact, rear impact injuries with special emphasis on air-bag and seat belt injuries
- iii. Overview of motorcycle accidents: mechanism, different types of injuries, special emphasis on role of helmet

## **2. THERMAL INJURY AND STARVATION (4hrs)**

- i. Classification.
- ii. Injuries due to cold: sub classification, hypothermia (definition, clinical features, complications, PM findings, paradoxical undressing, hide and die syndrome, local effects of cold with special emphasis on immersion syndrome and frost bite.
- iii. Injuries due to heat:
  - Sub classification
  - General effects: types, definition, causes, mechanisms, signs and symptoms, management, PM findings
  - Burns: different types, classifications of burn injury due to heat in adult and in children, rule of 9 and its MLI, Causes of death in burn injury, postmortem examination (external, internal), MLI of thermal burn
  - Scalds: definition, characteristics, MLI
  - Difference between burns caused by dry heat, moist heat and chemicals

**Electrical injuries:** factors influencing electrical injury, low tension and high tension electrical injuries, local effects of electrical injuries with special emphasis on Joule burn, flash burn, systemic effects of electrical injuries, causes of death, PM findings, MLI

**Overview of Lightning injuries** with special emphasis on mechanism of Lichtenberg flowers appearance, causes of death, PM findings.

**Explosion injuries:** definition and types, mechanism of action, classification of explosion injuries, MLI.



### **3. VIOLENT ASPHYXIAL DEATH (4hrs)**

- a. Definition, types, pathophysiology, clinical effects of asphyxia
- b. Asphyxial stigmata, symptoms of asphyxia
- c. Postmortem appearances in asphyxial death: external, internal
- d. Definition of hypoxia, anoxia, types of anoxia

#### **Mechanical asphyxia:**

- a. Definition, types
- b. Hanging: definition, classification, causes of death, secondary effects, symptoms, fatal period, postmortem examination (external, internal), ligature mark, Medicolegal questions, lynching, postmortem suspension, judicial hanging
- c. Strangulation: definition, classification, causes of death, postmortem examination (external, internal) in each type of strangulation with special emphasis on ligature strangulation and manual strangulation, pseudostrangulation, difference between hanging and strangulation, medicolegal questions associated with strangulation
- d. Hyoid bone fracture: different types and their mechanism
- e. Suffocation: definition, classification, postmortem examination (external, internal) in different suffocation deaths
- f. Drowning: definition, classification, causes of death in each type, postmortem examination (external, internal), difference between fresh water and salt water drowning, laboratory investigations, medicolegal questions associated with drowning
- g. Sexual asphyxia: definition, methods, causes of death, methods of investigation at the scene.

### **4. IMPOTENCE, STERILITY (1hr)**

- a. Definition: impotence, sterility, impotence quodenhanc, frigidity
- b. MLI of impotence and sterility in civil and criminal cases
- c. Causes of impotence and sterility in males and females
- d. Procedure of examination in alleged case of impotence and sterility
- e. Procedures of sterilization in males and females
- f. Artificial insemination: definition, types, procedure, difference between AIH and AID, medicolegal aspects
- g. Overview of Assisted Reproductive techniques
- h. Surrogacy: definition, types, medicolegal issues

### **5. VIRGINITY AND DEFLORATION (1hr)**

- a. Definition of virgin, defloration, marriage, divorce
- b. Questions of virginity and defloration arises in which cases
- c. Hymen: definition, types, rupture of hymen, MLI
- d. Signs of virginity, difference between true and pseudo virgin

### **6. PREGNANCY AND DELIVERY (2hrs)**

- a. Pregnancy: definition, presumptive, probable and positive signs of pregnancy and complications of pregnancy
- b. Signs of pregnancy in dead
- c. MLI of pregnancy
- d. Pseudocyesis
- e. Superfecundation, superfetation
- f. Legitimacy and paternity: definition of legitimate child, illegitimate child
- g. Questions of legitimacy and paternity arises in which cases
- h. Methods to solve questions of legitimacy
- i. Delivery: stages of labor, precipitate labor, signs of recent and remote delivery in living and in dead
- j. MLI of pregnancy and delivery

### **7. ABORTION (1hr)**

- a. The Medical Termination of Pregnancy Act: indication, duration, qualification of doctors, place of termination, in emergency cases, consent, maintenance of register, punishments, methods
- b. Medical and legal definition of abortion, definition of abortus, abortifacient
- c. Classification of abortion
- d. Causes of natural or spontaneous abortion
- e. Abortion related law (312-316 IPC)
- f. Criminal abortion: definition, different methods, complications,
- g. Amniotic fluid embolism: causes, clinical features, clinical and autopsy diagnosis
- h. Duties of a doctor in suspected criminal abortion
- i. Examination of a case of criminal abortion in living and dead

### **8. INFANTICIDE AND CHILD ABUSE (2hrs)**

- a. Definition of infanticide, feticide, filicide, conceptus, embryo, fetus, infant, newborn

- b. Postpartum depression
- c. Procedure of postmortem examination of infants: external and internal
- d. Rule of Hase: age of fetus
- e. Development of fetus
- f. Viability of fetus
- g. Definition of stillborn, dead born, live birth
- h. Features of dead born fetus
- i. Difference between still born and dead born
- j. Live birth: signs of live birth in civil and criminal cases
- k. Establishment of live birth by Postmortem examination: external and internal
- l. Classification of causes of infant death
- m. Natural causes of infant death
- n. Sudden infant death syndrome: definition, epidemiology, causes, postmortem findings, MLI
- o. Unnatural causes of fetal death: discuss accidental perinatal and postnatal causes with emphasis on Precipitate labor and its MLI, Discuss unnatural criminal causes in terms of acts of commission and omission
- p. Battered baby syndrome: definition, precipitating factors, salient features, features arising suspicion of abuse, different form of injuries, diagnosis, cause of death
- q. Child abuse: definition, different types
- r. Shaken baby syndrome
- s. Munchausen syndrome by proxy

### **9, SEX OFFENCES (4hrs)**

- a. Classification of sex offences
- b. Natural sex offences: sub classification
  - I. Incest
  - II. Adultery
  - III. Rape: sec 375 IPC with related explanation, 376 IPC- Subsection 1 and 2, A,B,C,D,E, other legal sections related to rape and sexual assault like 228 A IPC, II4 IEA etc, duties of doctor in alleged case of rape, examination of survivor of rape-(prerequisite, preliminaries, actual examination, opinion formation, sample collection), corroborative signs of rape, rape

- on deflorated woman and child, overview of POCSO Act, rape kit, rape trauma syndrome, examination of accused of rape- -(prerequisite, preliminaries, actual examination, opinion formation, sample collection)
- c. Unnatural sex offences: definition, sub classification
    - I. Sodomy: Definition of sodomy, pederasty, catamite, gerontophilia, examination of non-habitual, habitual passive agent and active agent of sodomy- -( prerequisite, preliminaries, actual examination, opinion formation, sample collection)
    - II. Buccal coitus
    - III. Lesbianism
    - IV. Bestiality
  - d. Sexual perversions: definition of sexual perversion, paraphilia, DSM IV Coding of paraphilia, discuss different paraphilias like Pedophilia, transvestic fetishism, fetishism, exhibitionism, frotteurism, sexual sadism, lust murder, sexual masochism, BDSM, etc.
  - e. Sex linked offences: classification
    - I. Stalking
    - II. Voyeurism
    - III. Sexual harassment
    - IV. Indecent assault
    - V. Trafficking

### **10. FORENSIC PSYCHIATRY (3hrs)**

- a. Definition of psychiatry, forensic psychiatry, unsoundness of mind, mentally ill person.
- b. Role of forensic psychiatrists in civil and criminal cases
- c. Classification of mental and behavioural disorders
- d. Illusion: definition, examples
- e. Hallucination: definition, types with example
- f. Delusion: definition, types, Medicolegal aspects, doctrine of diminished responsibility
- g. Criminal responsibility: legal tests of insanity with special emphasis on Sec 84 IPC, McNaughten rules
- h. Schizophrenia: definition by hallmark features, Bleuler's fundamental symptoms of Schizophrenia( 4 A's), first rank symptoms, types of schizophrenia, etiology, MLI
- i. Impulse: definition, types with example, MLI
- j. Organic mental disorders with special emphasis on delirium (definition, seen in cases of, delirium tremens).

- k. Mood disorders: discuss features of mania, depression and bipolar disorder
- l. Neurotic and somatoform disorders: discuss features of anxiety disorder, phobic disorder, OCD, Dissociative and conversion disorder, somatoform disorder
- m. Eating disorders: discuss features of anorexia nervosa, bulimia nervosa, binge eating
- n. Sleep disorders: discuss features of dysomnias and parasomias with special emphasis on somnolentia, narcolepsy and somnambulism
- o. Mental retardation: definition of I.Q, mental age, chronological age, biological age, classification
- p. Insanity and law: difference between true and feigned insanity, rules of observation of mentally ill person, overview of Mental Health Act 1987 (discuss Admission and Detention of a mentally ill person in psychiatric hospitals and nursing homes, restraint of dangerous lunatic, Discharge of a mentally ill person from a psychiatric hospital and nursing home, Leave of a mentally ill person from a psychiatric hospital and nursing home, Judicial inquisition for appointment of a guardian and management of property)

## ***11. MEDICAL LAW AND ETHICS (5hrs)***

- a. THE OATH OF HIPPOCRATES
- b. Declaration of Geneva, amended in 2006
- c. Medical Council of India: constitution of MCI, Different schedules of MCI, Functions of MCI
- d. State Medical Council: constitution, function of SMC, judicial procedure of SMC, WARNING NOTICE, professional death sentence
- e. Professional secrecy: definition, different principals
- f. Privileged communication: definition, different examples
- g. Rights and Privileges of RMP, Privileges and Rights of Patients
- h. Red cross emblem
- i. The rod of Asclepius and the staff of Hermes
- j. Types of physician-patient relationship
- k. Duties of physician in relation to consultation
- l. Medical malpractice: types
- m. Infamous conduct: definition, examples, punishments
- n. Professional negligence: definition, 4 'D' s In relation to negligence, types of professional negligence with examples, difference between civil and criminal negligence, methods of preventing medical

- litigation, defences against negligence, concept of defensive medicine, degree of competence
- o. Medical Maloccurrence: definition with examples
  - p. Different misadventures with examples
  - q. Discuss the following doctrines with examples: The Doctrine of Res Ipsa Loquitur, Calculated risk Doctrine, Doctrine of Common Knowledge, Novus Actus Interveniens
  - r. Contributory negligence: definition with related explanation, Doctrine of Comparative Negligence, limitations of contributory negligence (The Last Clear Chance Doctrine, The Avoidable Consequences Rule)
  - s. Corporate negligence, composite negligence, product liability
  - t. Vicarious Liability: definition, definition with related explanation
  - u. Consent: definition, why to take consent, grounds of validity of consent, types of consent with explanation, blanket consent, Informed consent (criteria of informed consent, rule of full disclosure and therapeutic privilege, prudent patient rule, paternalism, informed refusal, consenting ages, rules of consent (discuss Sec 87,88,89,90,92,93 IPC and other related IPC and Cr.PC related to consent)
  - v. Overview of medical records: procedures of keeping records, maintenance, related rules
  - w. Different Penal provisions related to medical practice
  - x. Euthanasia: definition of euthanasia, history, types of euthanasia, legally accepted in which countries, active euthanasia vs passive euthanasia, ethical aspects of euthanasia, Indian law on euthanasia, overview of MEDICAL TREATMENT OF TERMINALLY ILL PATIENTS (PROTECTION OF PATIENTS AND MEDICAL PRACTITIONERS) Bill, 2006
  - y. The Consumer Protection Act: purpose of the act, procedure of lodging complaints, penalties, CPA and medical profession-arguments against and for CPA, medical indemnity insurance

### ***11. MEDICOLEGAL AUTOPSY (2hrs)***

- a. Definition and types of autopsy
- b. Objective of medicolegal autopsy
- c. Rules related to autopsy
- d. Rules related to autopsy
- e. Autopsy room photography

- f. External examination
- g. Methods of skin incision, evisceration methods
- h. Overview of internal examination with special emphasis on dissection of heart, neck structures, skull, brain, stomach
- i. Special technique in diagnosis of air, fat and amniotic fluid embolism, pneumothorax
- j. Collection of samples during autopsy
- k. Perseveration of viscera and different preservatives, procedure of preservation
- l. Obscure autopsy, negative autopsy
- m. Examination of decomposed and mutilated bodies
- n. Examination of bones to solve different medicolegal issues on its examination (is it a bone, human bone or not, belongs to same individual, sex, age, race, stature, blood group, individualistic identity, manner of separation, any injury, cause of death, manner of death, time since death, dating of skeletal remains etc)
- o. Exhumation: definition, indication, procedure, time limit
- p. Second autopsy
- q. Overview of autopsy room hazards: Autopsy in case of HIV and infectious diseases, universal work precautions
- r. Autopsy and disposal of radioactive corpse

**Total hrs in 4<sup>th</sup> semester = 32hrs**

## **5<sup>TH</sup> SEMESTER:**

### **1. GENERAL TOXICOLOGY (2hrs)**

- a. Definition: drug, medicine, over the counter drugs, poison, venom, xenobiotics, toxicology, , toxinology, toxicokinetics, toxicodynamics, acute-subacute-chronic-fulminate poisoning, fatal dose, fatal period, MAC, Therapeutic index
- b. Different branches of toxicology
- c. Name of different acts and laws on poisoning, related IPCs
- d. Poison Information Centers
- e. Classification of poisons with examples
- f. Factors modifying actions of poisons
- g. Actions of poison- local, remote, combined



- h. Diagnosis of poisoning in living: history, clinical signs and symptoms, laboratory investigations
- i. Diagnosis of poisoning in dead: history, postmortem examination- external, internal, specimen collection, preservatives, laboratory investigations, opinion formation
- j. Duties of a doctor in suspected case of poisoning- medical and legal
- k. Management of poisoning case: emergency care, methods of removal of unabsorbed poisons with special emphasis on gastric lavage, methods of removal of absorbed poisons from body with emphasis on hemodialysis, peritoneal dialysis, hemoperfusion and hemofiltration, administration of antidotes (types, example, mechanism of action), chelating agent- definition, examples with their mechanism of action, route of administration, indication, contraindication, dose (discuss BAL, EDTA, Penicillamine, DMSA, Desferrioxamine)
- l. Color of PM Staining in different poisoning
- m. Criteria of ideal homicidal and suicidal poison

## **2. DRUG DEPENDENCE AND ABUSE (1hr)**

- a. Definition: drug, drug habituation, drug addiction, drug dependence, difference between drug addiction and drug habituation, drug abuse, substance abuse, physical-psychological dependence, tolerance, cross-tolerance
- b. Withdrawal symptoms
- c. Management of drug dependence
- d. Psychotropic drugs: definition, classification
- e. Alcohol, opioids, cocaine, cannabis, barbiturates, benzodiazepines, antidepressants, antipsychotics- to be discussed later separately
- f. LSD, MDMA: mechanism of action, mode of administration, fatal dose, signs and symptoms, management
- g. Inhalant abuse: examples, risk groups, signs and symptoms in acute and chronic poisoning, cause of death
- h. BODY Packer and Body Stuffer syndrome
- i. Complication of drug abuse
- j. Postmortem examination in a case of death due to drug abuse

## **3. ALCOHOL (2hrs)**

- a. Physical properties of ethanol, common forms of alcohol

- b. Proof of spirit, units of alcohol
- c. Mechanism of action, absorption, distribution, metabolism, excretion of alcohol
- d. Acute poisoning: signs and symptoms, fatal dose, fatal period, management, cause of death, postmortem examination
- e. Chronic alcoholism: conditions seen in chronic alcoholism with emphasis on delirium tremens, wernicke's encephalopathy, korsakoff's psychosis, management of chronic alcoholism, cause of death, postmortem findings
- f. Alcohol dependence: types of alcohol dependence, alcohol withdrawal syndrome, management
- g. Drunkenness: definition, procedure of examination, collection of specimens, laboratory investigations, opinion formation, medicolegal aspects
- h. Methyl alcohol: physical properties, mechanism of action, signs and symptoms, fatal dose and period, management, cause of death, PM findings
- i. Ethylene glycol: physical properties, mechanism of action, signs and symptoms, fatal dose and period, management, cause of death, PM findings

#### **4. AGRICULTURAL POISON (1hr)**

- a. **Organophosphorus compounds:** classification, mechanism of action, fatal dose, fatal period, signs and symptoms, laboratory diagnosis, treatment, postmortem findings
- b. **Chlorinated hydrocarbons:** classification, mechanism of action, fatal dose, fatal period, signs and symptoms, treatment, postmortem findings
- c. **Paraquat:** mechanism of action, fatal dose, fatal period, signs and symptoms, treatment, postmortem findings
- d. **Naphthalene:** physical property, mechanism of action, signs and symptoms, treatment, postmortem findings
- e. **Carbamates:** mechanism of action, signs and symptoms, management

#### **5. ANIMAL POISON (2hrs)**

**Snakes:** classification of snakes, features of common venomous snakes, difference between venomous and non-venomous snakes, composition of snake venom, signs and symptoms of neurotoxic and vasculotoxic snake bite, diagnosis, management in details, postmortem findings

## **6. OPIOIDS (1hr)**

- a. Definition of narcotic, opiate, opioids
- b. Opium: toxic parts, active principles, mechanism of action, signs and symptoms, treatment, bedside diagnosis, postmortem findings, Chasing the dragon.

**7. MEDICINAL POISON (2hrs)** discusses the mechanism of action, signs and symptoms, fatal dose, fatal period, management of the following acute poisoning with:

- a. Non-steroidal anti-inflammatory drugs and antipyretic drugs
- b. Antihistaminic
- c. Antipsychotic and antidepressants
- d. Insulin
- e. Benzodiazepines
- f. Barbiturates

## **8. ALUMINIUM PHOSPHIDE AND ZINC PHOSPHIDE (1hr)**

Mechanism of action, absorption, excretion, signs-symptoms, laboratory diagnosis, treatment, complications, pm findings

## **9. CORROSIVE POISON (1hr)**

classification of corrosives, Vitriolage, physical properties, mechanism of action, signs and symptoms, complications, management, postmortem findings in cases of  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ ,  $\text{HCl}$ , oxalic acid and carbolic acid, mechanism of action of strong alkalis

## **10. METALLIC & NON METALLIC IRRITANT (3hrs)**

Discuss the different compounds, mechanism of action, features of acute and chronic poisoning, management, pm findings of Arsenic, lead, mercury, copper, zinc, and phosphorus.

## **11. ASPHYXIANTS (1hr)**

definition, different types, property, sources, mechanism of action, signs and symptoms, diagnosis, differential diagnosis, treatment and pm findings of  $\text{CO}$ ,  $\text{CO}_2$ ,  $\text{H}_2\text{S}$  poisoning.

**Total hrs in 5<sup>th</sup> semester = 17 hrs**

**Total Lecture Classes in F. M. T. =21(3rd) +32(4th) +17(5th)= 70.**

### **DEMONSTRATION/PRACTICAL CLASSES**

#### **3<sup>RD</sup> SEMESTER**

1. Age estimation from bones (2hrs)
2. Determination of sex and stature from bones (2hrs)
3. Estimation of age from x ray (2hrs)
4. Study of injuries from bones, photographs and models (2hrs)
5. Study of weapons (2hrs)

**Total Demonstration hours in 3rd Semester: 10(ten)**

#### **4<sup>TH</sup> SEMESTER**

1. Medical certification of cause of death (1hr)
2. Injury report writing (1hr)
3. Accused examination report of sexual assault cases (1hr)
4. Victim examination report of sexual assault cases (1hr)
5. Age estimation report (1hr)
6. Fitness and sickness certificates (1hr)
7. Written informed consent collection for medicolegal examination, medical and surgical intervention (1hr)
8. Post mortem examination (2 hrs)

**Total Demonstration hours in 4th Semester: 9(nine)**

#### **5<sup>TH</sup> SEMESTER**

1. Management of suspected poisoning case (1hr)
2. Corrosive poisons (1hrs)
3. Metallic and non metallic irritants (1hrs)
4. Vegetable irritants (1hr)
5. Snake (1hr)
6. Blood and seminal stain study (2hrs)
7. Opium, Datura, Cannabis (1hr)
8. Organophosphorus compounds and medicinal poisons (1hr)
9. Post mortem demonstration class (2hrs)

**Total Demonstration hours in 5th Semester: 11(eleven)**

**Total Demonstration hrs in F.M.T.: 10(3rd) + 9(4th) + 11(5th) = 30(thirty)**

## **FORENSIC MEDICINE & TOXICOLOGY**

### **Item Card for Day to Day Assessment**

#### **3<sup>RD</sup> SEMESTER**

##### **THEORY –**

Introduction and Indian legal system

Identification

Death and PM changes

Mechanical injury

Firearm injury

Medicolegal aspect of injury, torture

##### **PRACTICAL -**

Age estimation from bones

Sex and stature from bones

Age estimation from x- ray

Injury from bone, model, photograph

Study of weapons

**4<sup>TH</sup> SEMESTER****THEORY –**

Regional injury

Thermal injury

Asphyxia    Fitness/sickness certificate

Starvation

Impotence, sterility

Virginity, defloration

Pregnancy, delivery

Abortion

Infanticide

Sex offence

Forensic psychiatry

Medical law and ethics

Medicolegal autopsy

**PRACTICAL -**

Injury report

MCCD

Consent collection

Accused examination

Examination of rape victim

Post mortem report

**5<sup>TH</sup> SEMESTER****THEORY –**

General aspect of toxicology

Drug dependence and abuse

Alcohol

Agricultural poison

Animal poison

**PRACTICAL -**

Management of suspected poisoning case

Corrosive poisons

Metallic and non metallic irritant

Opium, datura, cannabis

Vegetable irritant

Metallic and non metallic irritant      Snake  
Medicinal poison      OP compound and medicinal poison  
Asphyxiants      Blood and seminal stain  
Opioid  
Corrosive poison  
Aluminium and Zinc phosphide

**Each theory and practical item carries 10 marks**

**Total theory marks 300**

**Total practical marks 200**

**50% of internal assessment marks will be average of day to day assessment marks**

### **2nd Professional MBBS Exam**

#### **Forensic Medicine & Toxicology**

**Total Marks- 150**

Theory: One Paper: 60 marks (Time 2.5 hours)

Oral: 20 marks

Practical: 40 marks

Internal assessment: - 30 marks (theory – 15, practical – 15)

#### **Practical Examination (40)**

**Five sections each carrying 8 marks & 8 minutes**

**Total time = 40 min**



1. Problem based spotting 4 in number each carrying 2 marks

2minutesX4=8min

2. Any one of the following: MCCD or Certification of fitness or sickness or dying declaration each carrying 8 marks 8 min

3. Any one of the following: Injury report, Age estimation report based on dental, skeletal and radiological data, Accused/Victim examination report, written informed consent for medico-legal examination/ surgical & medical intervention carrying 8 marks 8 min

4. Toxicological problem carrying 8 marks 8 min

5. Problem oriented questions (Bone/ weapon/ model/wet specimen/photograph) or medicolegal autopsy AS SPOT CASE carrying 8 marks 8 min

**A. Theoretical+ Oral** = 60marks + 20marks = 80 marks

Pass Marks: 40marks

**B. Practical** = 40marks

Pass Marks: 20marks

**C. Total marks** = 150

Pass marks = 75

**D. Internal Assessment** = 15marks (theory) + 15marks (practical) = 30marks

Eligibility

**Minimum marks to be obtained in Internal Assessment for appearing University Examination is 12marks (Theory 6marks +Practical 6marks)**

#### **Scheme of Examination F.M.T.**

**Theory full marks= 60 consisting of four (4) groups each carrying 15 marks**

Question No. 1 (Group – A

a)Problem based question 10 marks

b) Two short question

02 + 03 = 05 marks

Question No. 2 (Group – B)

- a) Two medicolegal importance (Total question three) 2 x 3 marks  
b) Three short notes (Total question four) 3 x 3 marks

Question No. 3 (Group – C)

- a) Two Differentiate between (Total question three) 2 x 3 marks  
b) Three Explanation (Total question four) 3 x 3 marks

Question No. 4 (Group – D) From Toxicology chapter

- a) One problem based long question 10 marks  
b) Two short questions 02 + 03 = 05 marks

**Subject: Model Question for 2nd Professional MBBS Examination in****Forensic Medicine & Toxicology. (THEORY)****Time: 2.5 hrs.****Full Marks: 60****There are four groups of questions****Use separate answer script for each group.****Group – A**

1. (a) A girl of above 18 years of age was found lying dead in a lonely place on road side with torn undergarments with some abrasions and contusions over neck, face and private parts.

How will you determine that (i) She died due to throttling and (ii) She was sexually violated before death? (iii) What physical and biological articles would you preserve in this case and why? 4 + 4 + 2 = 10

(b) What are the causes of death in case of burn injury? What are the common post mortem findings expected in a deceased who died within 24 hours of burn  
2 + 3 = 05

**Group – B**

2. (a) Write Medicolegal importances of (any two) 2 x 3 = 6

- i) Turner's Syndrome
- ii) Second life test
- iii) Diatoms

**(b) Write short notes on (any three): 3 X 3 = 9**

- i) Universal antidote
- ii) Illusion
- iii) Professional Secrecy
- iv) Examination – in – Chief.

**Group – C**

**3. (a) Differentiate between ( any two ) :**

**2 X 3 = 6**

- i) Gunshot wounds of entrance and exit in contact shot.
- ii) Respired and unrespired lung in a dead new born.
- iii) Somatic & molecular death

**(b) Explain why (any three) :**

**3 X 3 = 9**

- i) Covering is an infamous conduct
- ii) Hesitation cuts may be seen in suicidal cut throat injury
- iii) Quickening is not a sure sign of pregnancy
- iv) Lochia is seen in a recently delivered woman.

**Group – D**

Q.4. a) A 27 years old male patient while working in paddy field was bitten by a snake over his left ankle. After 4 hours he came at emergency with reddish urine.

(i) Which type of snake bite can present such symptom? (ii) What are the other signs/symptoms you expect in this patient? (ii) How will you treat this patient?

**1+3+6 = 10**

b) i) What is antidote? (ii) Mention briefly different types of antidotes with examples. **2+3=5**

**Subject: Model Question for 2nd Professional MBBS Examination in  
Forensic Medicine & Toxicology. (PRACTICAL)**

**Time: 40 minutes.**

**Full Marks: 40**

**There are four groups of questions each carrying 08 marks**

(Time - Spotting 2mins each, Exercise 8 mins each. Total- 40 mins.)

1. Spotting 8.
  - i) Identify the tooth marked 'A'. Write its age of eruption. What is the total number of teeth in the oral cavity at this age?  $1 + \frac{1}{2} + \frac{1}{2} = 2.$
  - ii) Identify the first carpal bone to appear in the given skiagram. Determine whether the individual is an adult or not with one point in favour of your opinion.  $1 + \frac{1}{2} + \frac{1}{2} = 2.$
  - iii) Identify the poison that causes constriction of the pupil. Write its antidote and route of administration.  $1 + \frac{1}{2} + \frac{1}{2} = 2.$
  - iv) Identify the photography showing the intracranial haemorrhage in which lucid interval is common. Name the commonest site and source of bleeding in such type of intra cranial haemorrhage.  $1 + \frac{1}{2} + \frac{1}{2} = 2.$
2. Draft a Medical certificate of cause of death from the given data. 8.

Mr. X a 65 yrs old hypertensive and diabetic male was admitted to the hospital in ICU last night with history of chest pain, respiratory distress and palpitation. On examination there was hypotension and tachycardia. Echocardiographic examination revealed cardiac tamponade with rupture of right ventricle. He had a past history of myocardial infarction 6 months ago. The patient died this morning at 5.30 AM.

3. Prepare an injury report from the given data (*with a projection/model/photograph*) 8.

Name – XYZ. Age – 30 yrs. Sex – Male. ID marks – Mole on right side face, scar over left eyebrow. Brought by - C/ 251 XY of ABC PS.

History of physical assault by wooden stick.

Injuries – 1.Abrasion on the right forearm.

2.Bruise on left scapular region.

3.Lacerated wound on right parietal region of head.

4. The following ligature materials were recovered from the scene of crime (nylon rope/ electric wire / dupatta). From the given photograph of the deceased determine which may be the possible ligature material used. Write the internal findings in the neck of such a case. **(Similar questions can be structured using Bones and X-rays, Photograph and Weapons, Autopsy related materials or Mannequins or Plasticine models)**

8.

5. A 40 yrs old male patient presented with a history of pain abdomen, constipation, features of encephalopathy and foot drop. Identify the poison from the supplied specimens given which may have caused the toxicity. Write the blood picture of such a case and the antidote used in the management.

8.

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