

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR M.Ch. IN HEPATO PANCREATO BILIARY (HPB) SURGERY

Preamble

The aims and objectives of M.Ch. training should be to train surgeons with adequate knowledge, skills, aptitude and attitudes in the specialty of HPB Surgery. They should be able to function as an independent clinician/consultant and a teacher with research skills.

SUBJECT SPECIFIC OBJECTIVES

During the course, the student should acquire the following knowledge/skills/expertise:

A. THEORETICAL KNOWLEDGE:

Should be able to understand and synthesize knowledge regarding HPB diseases, its diagnosis and management.

B. CLINICAL/PRACTICAL SKILLS:

Should be able to diagnose, investigate, manage and follow-up patients with HPB diseases using modern therapeutic methods.

C. TEACHING SKILLS:

Should be able to teach relevant aspects of HPB diseases to post graduate student doctors, junior colleagues, nursing and para-medical staff.

D. RESEARCH METHODOLOGY:

Should be able to identify and investigate a research problem in HPB diseases using appropriate methodology.

E. GROUP APPROACH:

Should participate in multi-disciplinary meetings with radiologists, pathologists, medical gastroenterologists, oncologists and experts from allied clinical disciplines.

F. ATTITUDES INCLUDING COMMUNICATION SKILLS

Should be able to communicate effectively with patients, colleagues and the community about HPB diseases as well as counsel patients and relatives about various decisions during management.

3. LEARNING OBJECTIVES

At the end of the M.Ch. (HPB surgery) training, the student should:

- a. Be able to diagnose, investigate, manage and follow up patients with HPB diseases using relevant current therapeutic methods with confidence.
- b. Have acquired the ability to interpret data from relevant clinical/laboratory investigations.
- c. Have learnt the indications/contra-indications of common HPB surgical procedures and have the skills to perform these operations (including minimal access).
- d. Be well acquainted with the current literature on relevant aspects of the investigative, clinical and operative management of HPB diseases.
- e. Be exposed to all sub-specialties of HPB surgery including transplantation.
- f. Be acquainted with allied and general clinical disciplines.
- g. Be capable of imparting basic HPB surgical training.
- h. Be able to identify, plan, conduct and communicate research in HPB diseases.
- i. Be aware about ethical issues involved in the relationship between patients and peers in the clinical practice and research.

SUBJECT SPECIFIC COMPETENCIES

Competencies to be acquired in the cognitive domain (knowledge)

The Liver

A. Anatomy, Embryology, Physiology, Investigations

Upon completion of this, the trainee should understand:

1. Intrahepatic and extrahepatic anatomy of the liver and the relationship with the adjacent structures
2. The embryology of the liver and biliary tract and the potential anomalies
3. The physiology of the liver
4. Clinical haematologic and biochemical tests relevant to the liver and their indications and interpretation.
 - Tests of hepatocellular injury
 - Tests of liver function
5. Hepatic imaging techniques and their indications and interpretation

6. Implications of investigations and surgical procedures on the liver

B. Congenital and Acquired Non-neoplastic Liver Disease

Upon completion of this, the trainee should understand:

1. The pathophysiology, presentation and natural history of the congenital and acquired non-neoplastic diseases of the liver.
2. The investigative procedures available to efficiently diagnose the disease/disorder.
3. The treatment options available for the condition and the results, including the risks and benefits of the operative and non-operative procedures.
4. The pre-, intra- and post-operative management, including the management of complications of therapy.

C. Neoplastic Liver Disease

Upon completion of this, the trainee should understand:

1. The pathophysiology, presentation and natural history of benign, primary and secondary malignant neoplasms of the liver.
2. The investigative procedures available to efficiently diagnose the disease/disorder.
3. The staging of malignancies of the liver including histologic assessment.
4. The treatment options available for the neoplasm and the results, including the risks and benefits of the operative and non-operative procedures.
5. The pre-, intra- and post-operative management, including the management of complications of therapy.
6. The role of neoadjuvant and adjuvant therapy of malignant liver neoplasms.

D. Liver Surgery

Upon completion of this, the trainee should understand:

1. The types of and techniques for liver resections
2. Preoperative patient assessment and the cumulative risks of the proposed procedure
3. Preoperative management
4. Intra-operative management during a liver resection
5. Post-operative management including complications.

The Biliary Tract including Gallbladder

A. Anatomy, Embryology, Physiology, Investigations

Upon completion of this, the trainee should understand:

1. The anatomy of the biliary tract including the intra- and extra-hepatic ducts, the gallbladder and cystic duct, the ampulla of Vater, and their relationships with the adjacent structures
2. The embryology of the liver and biliary tract and the potential anomalies
3. The physiology of bile metabolism and biliary tract epithelium
4. Clinical biochemical tests relevant to the biliary tract and their interpretation
5. Biliary imaging techniques and their indications and interpretation
6. Implications of investigations on surgical procedures on the bile duct

B. Congenital and Non-neoplastic Biliary Disease

Upon completion of this, the trainee should understand:

1. The pathophysiology, presentation and natural history of the congenital and acquired non-neoplastic diseases of the biliary tract including the gallbladder
2. The investigative procedures available to efficiently diagnose the disease/disorder
3. The treatment options available for the condition, and the outcomes, including the risks and benefits of the operative and non-operative treatments
4. The pre-, intra- and post-operative management, including the management of complications of therapy

C. Neoplastic Biliary Disease

Upon completion of this, the trainee should understand:

1. The presentation and natural history of benign and malignant neoplasms of the bile duct and gallbladder
2. The investigative procedures available to efficiently diagnosis the neoplasm.
3. The staging of adenocarcinoma of the bile duct and gallbladder including histologic assessment
4. The treatment options available for the neoplasm, and the indications and outcomes, including the risks and benefits of the operative and non-operative treatments
5. The pre-, intra- and post-operative management, including the management of complications of surgery.
6. The role of neoadjuvant and adjuvant chemotherapy and radiation in malignant biliary neoplasms

The Pancreas & Duodenum

A. Anatomy, Embryology, Physiology, Investigations

Upon completion of this, the trainee should understand:

1. Anatomy of the pancreas and its relationship with portal structures, retroperitoneal structures and the adjacent organs
2. Anatomy of the pancreatic duct and its relationship with the bile duct, sphincter of Oddi and the ampulla of Vater
3. Anatomy of duodenum and its relationship with portal structures, retroperitoneal structures and the adjacent organs
4. The embryology of the pancreas, pancreatic duct and duodenum and potential anomalies
5. The physiology of pancreatic endocrine and exocrine functions and duodenal physiology
6. Clinical biochemical tests of pancreatic function and injury and their interpretation
7. Pancreatic and duodenal imaging techniques and their indications and interpretation
8. Implications of investigations on surgical procedures on the pancreas and duodenum

B. Congenital and Acquired Non-neoplastic Pancreatic Disease

Upon completion of this, the trainee should understand:

1. The pathophysiology, presentation and natural history of congenital and acquired non-neoplastic diseases of the pancreas
2. The investigative procedures available to efficiently diagnose the disease/disorder

3. The treatment options available for the condition, and results, including the risks and benefits of the operative and non-operative procedures
4. The pre-, intra- and post-operative management, including the management of complications of therapy

C. Neoplastic Diseases of the Pancreas

Upon completion of this, the trainee should understand:

1. The pathophysiology, presentation and natural history of benign, primary and secondary malignant neoplasms of the pancreas
2. The investigative procedures available to efficiently diagnose the disease/disorder
3. The staging of malignancies of the pancreas including histologic assessment
4. The treatment options available for the neoplasm, and the outcomes, including the risks and benefits of the operative and non-operative procedures
5. The pre-, intra- and post-operative management, including the management of complications of therapy

C. Diseases of the Duodenum

Upon completion of this unit the trainee should understand:

1. The pathophysiology, presentation and natural history of the diseases of the pancreas
2. The investigative procedures available to efficiently diagnose the disease/disorder
3. The treatment options available for the condition, and the results, including the risks and benefits of the operative and non-operative procedures
4. The pre-, intra- and postoperative management, including the management of complications of therapy

Imaging

Upon completion of this, the trainee should understand:

1. Understand the physics and technology of Ultrasound and Doppler, CT scan, MRI scan, PET scan and the other nuclear medicine imaging procedures including biliary excretion scan (HIDA), RBC scan, octreotide scan, and liver/spleen scan
2. Understand the relative advantages, disadvantages and indications of each
3. Read and interpret the detailed information provided by imaging of the liver biliary tract, pancreas and duodenum
4. Perform and interpret intra-operative ultrasound

Oncology

Upon completion of this, the trainee should understand:

1. Understand the basic pathophysiology of neoplasia and the currently understood mechanisms of carcinogenesis
2. Understand the mechanisms of action of the classes of chemotherapeutic agents currently available for HBP malignancies
3. Understand the physics, mechanism of action and technology of radiation therapy
4. Apply this understanding to the multidisciplinary management of HBP malignancies

Trauma

Upon completion of this unit the trainee should understand:

1. The pathophysiology of blunt and penetrating trauma to the liver, biliary tract and portal structures, pancreas, duodenum and adjacent structures
2. The methods of assessment and diagnosis
3. The principles and techniques available to manage traumatic injuries
4. The management of complications of trauma to the liver, biliary tract, pancreas and duodenum

Transplantation

Upon completion of this, the trainee should understand:

1. Organ procurement and preservation
2. Indications for liver transplantation
3. Outcomes including complications of transplantation
4. Immuno-suppression and its toxicities

AFFECTIVE DOMAIN (ATTITUDE AND COMMUNICATION DOMAIN)

The trainee in M.Ch. in HPB Surgery course is expected to acquire following attitudes and values.

The student:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

Psychomotor Domain (Skills domain)

The trainee in M.Ch. HPB Surgery course is expected to acquire the following procedural and non-procedural skills in HPB diseases and perform these independently:

1. Clinical examination

2. Minor surgery
3. Major surgery
4. Endoscopic procedures
5. Physiological studies
6. Radiological procedures

Psychomotor domain (skills domain) will overlap with the cognitive and affective domains as the performance of any skill will require all three domains

Liver

A. Clinical Skills: General

1. Identify, recognize, and describe anatomic structures in and around the liver
 - a) By reading and interpreting images of the liver
 - b) Intraoperatively
2. Perform and interpret intraoperative ultrasound of the liver and porta hepatis
3. Perform liver biopsy: percutaneous, laparoscopic or open
4. Identify anatomic anomalies and explain their embryologic origin
5. Understand the indications for and be able to interpret the haematologic and biochemical tests and explain the underlying physiology
6. Interpret dynamic tests of liver function
7. Apply relative advantages and disadvantages to the application of different modalities of hepatic imaging
8. Determine the appropriate abdominal wall incisions for open procedures on the liver
9. Determine the appropriate port site placements and patient positions for laparoscopic procedures on the liver, and the relative indications for each and the need for a hand-port
10. Evaluate liver function and portal hypertension (including Child's score and its variations)
11. Assess the overall risk and the hepatic risk of surgery by recognizing the implications of abnormalities of haematologic and biochemical investigations on both hepatic and non-hepatic procedures.
12. Develop a detailed operative strategy for liver resections based on preoperative assessment and imaging
13. Diagnose and treat patients with cystic diseases of the liver
14. Diagnose and manage patients with liver abscess(es)
15. Perform laparoscopic and open drainage of liver cyst or abscess (deroofting, resection)
16. Diagnose and classify acute and chronic liver failure.
17. Diagnose, investigate and manage patients with portal hypertension
18. Perform portosystemic shunts: portocaval, mesocaval, splenorenal and their variants.
19. Perform devascularisation procedures and their variants

B. Clinical Skills: Neoplasms

1. Evaluate patients with benign neoplasms of the liver, including interpretation of imaging and indications for biopsy
2. Manage patients with benign hepatic neoplasms
3. Evaluate patients with hepatocellular carcinoma (HCC), including screening for potential HCC and staging
4. Evaluate patients with primary and secondary adenocarcinoma and other metastatic lesions of the liver including staging
5. Manage patients with primary and secondary hepatic malignancies

6. Participate in multidisciplinary tumour review board meetings
7. Perform liver resections
8. Provide pre- and postoperative therapy following liver resection including the diagnosis and management of complications
9. Recommend appropriate therapy for unresectable hepatic malignancies
10. Recommend appropriate adjuvant radiation and/or chemotherapy following resection for hepatic malignancies
11. Interact with medical and radiation oncologists

Biliary Surgery

A. Clinical Skills: General

1. Identify and describe biliary tract structures (normal and abnormal)
 - a. By reading and interpreting images of the biliary tract
 - b. Intraoperatively
2. Perform and interpret intraoperative ultrasound of the biliary tract
3. Identify anatomic anomalies and explain their embryologic origin
4. Understand the indications for and be able to interpret the biochemical tests and explain the underlying physiology
5. Apply understanding of the relative advantages and disadvantages of the different modalities of biliary tract imaging to determine optimal investigation
6. Determine the abdominal wall incisions that are appropriate for open procedures on the biliary tract and the relative indications for each
7. Determine the appropriate port site placements and patient positions that are useful for laparoscopic procedures on the biliary tract and the relative indications for each
8. Develop a detailed operative strategy for biliary surgery based on preoperative assessment and imaging

B. Clinical Skills: Non-Neoplastic

1. Investigate the jaundiced patient by determining the most efficient modalities, and interpret the results of biochemical investigations and imaging
2. Apply understanding of the relative advantages and disadvantages of non-operative biliary manipulation (PTBD and endoscopic stenting) to treat biliary tract obstruction.
3. Manage the patient with complex gallstone disease
4. Manage biliary injuries resulting from cholecystectomy and other trauma
5. Perform resection and reconstruction for choledochal cysts, intrahepatic stones and benign strictures
6. Evaluate and manage the patient with complications of primary sclerosing cholangitis

C. Clinical Skills: Neoplastic

1. Investigate and manage patients with gall bladder polyps and benign neoplasms of the ampulla of Vater
 - a. Perform extended cholecystectomy for potential oncologic indication
 - b. Perform transduodenal resection of the ampulla of Vater with reconstruction of the bile and pancreatic ducts
2. Investigate and manage patients with hilar cholangiocarcinoma
 - a. Perform extended resection of the biliary bifurcation with the caudate and ipsilateral lobes of the liver, portal lymphadenectomy, and biliary reconstruction
3. Investigate and manage patients with distal bile duct tumours

- a. Perform pancreatoduodenectomy
- 4. Participate in multidisciplinary tumour review board meetings
- 5. Provide postoperative management including the diagnosis and treatment of complications of biliary resection and/or bypass
- 6. Recommend appropriate adjuvant radiation and/or chemotherapy following resection and interacts with medical and radiation oncologists
- 7. Recommend appropriate therapy for unresectable carcinoma of the gall bladder or bile duct

Pancreas and Duodenum

A. Clinical Skills: General

- 1. Identify, recognize, and describe anatomic structures in and around the pancreas and duodenum
 - a. By reading and interpreting images of the duodenum, pancreas and its duct
 - b. Intraoperatively
- 2. Perform and interpret intraoperative ultrasound of the pancreas and surrounding structures
- 3. Identify anatomic anomalies and explain their embryologic origin
- 4. Understand the indications for and interpret biochemical tests and explain the underlying physiology including the tests of pancreatic function
- 5. Apply the relative advantages and disadvantages of different modalities of pancreatic imaging to efficiently investigate diseases and disorders of the pancreas and duodenum
- 6. Determine the appropriate abdominal wall incision for open procedures on the pancreas and/or duodenum
- 7. Determine the appropriate port site placements and patient positions for laparoscopic procedures on the pancreas and/or duodenum and the relative indications for each and the need for a hand-port
- 8. Develop a detailed operative strategy for pancreatic and duodenal surgery based on preoperative assessment and imaging

B. Clinical Skills: Non Neoplastic

- 1. Manage patients with acute pancreatitis, including complications
 - a. Determine the need for surgical intervention
 - b. Perform open and/or laparoscopic procedures for acute pancreatitis
- 2. Investigate and manage patients with chronic pancreatitis
 - a. Determine the need for operative intervention
 - b. Perform: pseudocyst-enterostomy, lateral pancreaticojejunostomy with/without limited resection of the head of the pancreas (Frey procedure), pancreatic resection

C. Clinical Skills: Neoplastic

- 1. Investigate and manage patients with benign cysts and neoplasms of the pancreas
 - a. Determine need for biopsy/aspiration and resection
 - b. Perform resections including enucleation of neuroendocrine tumours and spleen preserving distal pancreatectomy
- 2. Investigate and manage patients with adenocarcinoma of the pancreas
 - a. Stage the tumour pre- and intraoperatively and determine resectability
 - b. Perform pancreatoduodenectomy with or without portal vein resection and reconstruction
 - c. Perform distal pancreatectomy and regional lymphadenectomy
 - d. Perform palliative procedures for unresectable tumours

3. Participate in multidisciplinary tumour review board meetings
4. Provide postoperative management including the diagnosis and treatment of complications of pancreatic resection and/or bypass
5. Recommend appropriate therapy for unresectable pancreatic carcinoma
6. Recommend appropriate neo- and adjuvant radiation and/or chemotherapy and interact with medical and radiation oncologists

D. Clinical Skills: Duodenum

1. Investigate and manage patients with benign lesions of the duodenum
2. Determine need for operative intervention
3. Perform acid-reduction procedures, limited resection and duodenal bypass procedures
4. Investigate and manage patients with malignant neoplasms of the duodenum
 - a. Stage the tumour pre- and intraoperatively and determine resectability
 - b. Perform appropriate resection (including pancreatoduodenectomy with or without portal vein resection and reconstruction when necessary) with regional lymphadenectomy
 - c. Perform palliative procedures for unresectable tumours
 - d. Participate in multidisciplinary tumour review board meetings
 - e. Recommend appropriate therapy for unresectable duodenal malignancies
 - f. Recommend appropriate neo- and adjuvant radiation and/or chemotherapy and interact with medical and radiation oncologists
5. Provide postoperative management including the diagnosis and treatment of complications of duodenal resection and/or bypass

Imaging

Clinical Skills

1. Apply understanding of the relative merits of each imaging modality to efficiently investigate (including stage) lesions of the liver, biliary tract and pancreas
2. Interpret images to correctly identify normal structures, anomalies and pathologic abnormalities
3. Correlate and integrate the findings of the various imaging studies during the investigation of a patient
4. Perform and interpret intraoperative ultrasound
5. Interact with diagnostic radiologists with expertise in HPB diseases and body imaging

Oncology

Clinical Skills

1. Apply knowledge of tumour biology, chemotherapy and radiation therapy to recommend an appropriate treatment strategy for the management of individual HBP malignancies
2. Participate regularly in multidisciplinary tumour board meetings
3. Interact with interventional radiologists, medical oncologists, radiation oncologists, oncology nurses and allied health professionals, palliative care physicians and nurses

Trauma

Clinical Skills

1. Consult and manage patients with blunt and penetrating trauma to the upper abdomen
2. Evaluate injuries to the liver, biliary tract, pancreas and duodenum

3. Evaluate post-cholecystectomy injuries to the bile duct and determine a management strategy
4. Perform emergency and elective operative procedures to resole and/or repair injuries to the liver, bile duct, portal structures, pancreas and duodenum
5. Manage complications of operative interventions

Transplantation

Clinical Skills

1. Apply understanding of liver transplantation to recommend a liver transplant to the appropriate patient at the appropriate time.
2. Recognize the oncologic impact of immunosuppression on recurrence of hepatocellular carcinoma following liver transplantation and the increased risk of de-novo malignancies

SYLLABUS

The Liver

A. Anatomy, Embryology, Physiology, Investigations

1. Embryology of the liver and relationship to other foregut structures
2. Extrahepatic anatomy of the liver
 - Lobes, sectors, segments
 - Nomenclature systems
 - Ligaments, fissures and incisures
 - Anomalies
3. Anatomy of the porta
 - Portal vein, hepatic artery
 - Bile duct, gall bladder
 - Variants of normal and anomalies
 - Lymphatic drainage and nodal anatomy
 - Nerves
4. Anatomy of the retrohepatic space
 - IVC and its branches
 - Adrenal, kidney, diaphragm
5. Intrahepatic anatomy
 - Hepatic veins and variants of normal
 - Portal triad structures and segmental anatomy
 - Histology of the normal liver
6. Physiology of the liver
 - Bilirubin metabolism
 - Coagulation
 - Other clinically relevant metabolic pathways
7. Haematologic, biochemical, and histologic investigations(assessment) of the liver
 - Transaminases and markers of cholestasis
 - Measures of liver function
 - (a) Static – including INR (PT), Factors V and VII, bilirubin, albumin
 - (b) Dynamic – including clearance tests, e.g. ICG, galactose, aminopyrine, lidocaine (MEGX)
 - (c) Indicators of portal hypertension including hepatic venous pressure gradient

- Indications for liver biopsy
- 8. Imaging of the liver
 - Ultrasound (U/S) and Doppler, Computerized Tomography (CT) Scans, Magnetic Resonance Imaging (MRI) Scans
 - Nuclear tests: Proton Emission Tomographic (PET) Scans, Liver/Spleen scans, Biliary excretion (e.g. HIDA) scans, RBC scans
- 9. Application of investigations to hepatic surgery

B. Congenital and Acquired Non-neoplastic Liver Disease

1. Paediatric liver diseases, Biliary atresia and Alagille's syndrome
 - (a) Presentation, evaluation and natural history
 - (b) Treatment options and indications for intervention
2. Liver cysts and abscesses
 - a. Solitary liver cysts
 - Presentation, evaluation and natural history
 - Distinguish from cystic neoplasm
 - Treatment options and indications for intervention
 - b. Polycystic liver disease
 - Associated abnormalities
 - Presentation, evaluation and natural history
 - Treatment options and indications for intervention
 - c. Pyogenic and fungal liver abscess
 - Potential bacterial and fungal pathogens and sources
 - Presentation, evaluation
 - Treatment and indications for surgical drainage of liver abscess including amoebic abscess
 - d. Tuberculous abscess
 - TB Presentation, evaluation and natural history
 - Treatment options and indications for intervention
 - e. Echinococcal liver cyst
 - Life cycle, epidemiology, target organs
 - Presentation, evaluation and natural history
 - Treatment options and indications for intervention
3. Liver failure
 - Hepatitis and acute liver failure
 - Causes of acute liver failure
 - Investigation and prognosis
 - Classification systems including MELD and King's College criteria
 - Treatment strategies
 - Role of liver support systems
 - Role of liver transplantation
4. Cirrhosis and portal hypertension
 - (a) Causes of cirrhosis, diagnosis and natural history, staging and treatment options (including indications for liver transplantation) for each
 - i. Viral hepatitis B, C, D
 - ii. Alcoholic liver disease
 - iii. Non-alcoholic fatty liver disease and steatohepatitis
 - iv. Autoimmune liver disease
 - v. Primary biliary cirrhosis

- vi. Primary sclerosing cholangitis
- vii. Haemochromatosis, Wilson's disease, alpha-1 antitrypsin deficiency
- viii. Budd-Chiari syndrome

(b) Portal hypertension

- i. Pathophysiology
- ii. Interpretation of haematologic and biochemical tests and imaging
- iii. Non-operative treatment options and strategies
- iv. Portosystemic decompression
 - 1. Indications and sequelae
 - 2. Risks and benefits of TIPS
 - 3. Surgical shunts, types
 - 4. Devascularisation procedures
- v. Indications for liver transplantation

C. Neoplastic Liver Disease

a. Benign neoplasms of the liver

- Presentation, investigation, diagnosis, and natural history of hemangioma, hamartoma, adenoma, focal nodular hyperplasia
- Histology and indications for biopsy
- Treatment options and indication for ablation or resection

b. Primary malignancies of the liver

- 1. Hepatocellular carcinoma (HCC)
 - Aetiology, presentation, investigation, diagnosis, and natural history of HCC
 - Role of screening and staging systems for HCC
 - Treatment options and the risk: benefit-ratio for each: resection, transplantation, ablation, chemotherapy with or without embolization, radiation
- 2. Cholangiocarcinoma (intrahepatic or peripheral)
 - Diagnosis, investigation and staging
 - Treatment options including palliative procedures
- 3. Epithelioid haemangioendothelioma, lymphoma, sarcoma and other neoplasms
 - Diagnosis, investigation and staging
 - Treatment options

c. Secondary malignancies of the liver

- ❖ Colorectal primary
 - Pathogenesis, staging of colorectal cancer
 - Investigation and staging
 - Treatment options
 - Indications, and risk-benefit ratio of ablation / resection
 - Neo-adjuvant, downstaging, and adjuvant chemotherapy
- ❖ Neuroendocrine and other primary
 - Investigation and staging
 - Treatment options
 - Indications, and risk-benefit ratio of ablation / resection
 - Neoadjuvant and adjuvant therapy

D. Liver Surgery

Types of liver resection

- Nomenclature of liver resections (Brisbane system)
- Laparoscopic, laparoscopic-assisted, open laparotomy

- Nonanatomic, segmental, lobectomy, extended lobectomy
- Vascular control: none, Pringle manoeuvre, total vascular isolation
- Vascular resection and reconstruction
- Staged resections
- Combination with ablation

Preoperative assessment and the cumulative risks to the proposed procedure

- Patient comorbid condition (cardiopulmonary and other)
- Hepatic risk
 - (a) Assessment of liver function, portal hypertension
 - (b) Volumetric assessment of liver remnant
 - (c) Portal vein embolization

Preoperative management

- Prophylaxis against common complications such as DVT, infection
- Neuroendocrine hormonal blockade
- Detailed operative plan based on preoperative imaging

Liver resection

1. Anaesthetic considerations: Agents, coagulation, CVP
2. Blood loss conservation including cell saver and blood product administration
3. Laparoscopic techniques
 - (a) Patient and port placement
 - (b) Hand port
4. Parenchymal transection techniques
 - (a) Relative advantages and disadvantages
 - (b) Normal, fatty, fibrotic and cirrhotic parenchyma
 - (c) Laparoscopic or open use
 Concomitant resection and reconstruction of the (i) Diaphragm (ii) IVC (iii) Portal vein (iv) Bile duct and (v) hepatic artery

Post-operative management

Complications and management, including liver failure

The Biliary Tract including Gallbladder

A. Anatomy, Embryology, Physiology, Investigations

1. Embryology of the biliary tract
 - Relationship to liver, pancreas and other portal and foregut structures
2. Anatomy of the hepatic duct and biliary plate
 - Segmental anatomy and variants of normal
 - Blood supply and lymphatic drainage
 - Relationship with other portal structures
3. Anatomy of the gallbladder and cystic duct
 - Blood supply and lymphatic drainage
 - Variants of normal and anomalies
4. Anatomy of the bile duct
 - Blood supply, lymphatic drainage and regional lymph nodes
 - Variants of normal and anomalies
 - Relationship with other portal structures and the pancreatic duct
 - Sphincter of Oddi and ampulla of Vater
5. Bile metabolism and biliary physiology

- Bile-salt dependent and independent bile production
 - Hormonal influences
 - Biliary epithelium and gallbladder function
 - Sphincter of Oddi motility
6. Interpretation of biochemical investigations
 7. Imaging
 - Axial and body imaging techniques: U/S, CT scan and MRI scan, including MRCP
 - Endoscopic U/S
 - Direct contrast imaging
 - (a) Percutaneous transhepatic cholangiogram (PTC) and cholecystography
 - (b) Endoscopic retrograde cholangio- pancreatography (ERCP)
 - Endoscopic assessment of ampulla of Vater
 - Nuclear biliary excretion imaging (HIDA scan) – qualitative and quantitative

B. Congenital and Non-neoplastic Biliary Disease

- a. Congenital and paediatric
 - Choledochal cyst, Caroli’s disease, congenital hepatic fibrosis, biliary atresia and Alalegille’s syndrome**
 1. Presentation, classification, evaluation and natural history
 2. Treatment options and indications for intervention
- b. Gallstones
 - 1 Pathogenesis
 - 2 Presentation and investigation of biliary colic, cholecystitis, cholangitis, Mirrizzi’s syndrome, gallstone ileus
 - 3 Treatment: Percutaneous, laparoscopic and open
 - 4 Cholecystectomy-related biliary injuries
 - (a) Mechanism of injury and classification
 - (b) Associated injuries
 - (c) Management
- c. Benign strictures
 1. Primary sclerosing cholangitis (PSC)
 - (a) Aetiology, pathophysiology, natural history and non-operative management
 - (b) Complications and management
 - i. Screening for cholangiocarcinoma
 - ii. PTC with biliary drainage (PTBD), ERCP with endobiliary stent
 - iii. Resection
 - iv. Transplantation
 2. Post-traumatic and idiopathic
 - (a) Mechanism of injury and classification
 - (b) Management options
- d. Intrahepatic stones
 1. Pathophysiology, presentation and investigation
 2. Common infectious bacteria
 3. Surgical options including liver resection and biliary access (Hutson) choledochojejunostomy, hepaticojejunostomy with transhepatic stents

C. Neoplastic Biliary Disease

a. Gallbladder

(1) Polyps

1. Presentation, natural history
2. Indications for resection
3. Principles of resection

(2) Adenocarcinoma

1. Presentation, staging (including histology) and natural history
2. Investigation
3. Surgical options: Extent and timing of resection
4. Chemo and radiotherapy including neo- and/or adjuvant therapy
5. Palliative care options

b. Bile duct

(1) Adenoma of ampulla of Vater

1. Presentation, natural history, investigation
2. Resection options: Endoscopic, transduodenal resection and reconstruction

(2) Adenocarcinoma

1. Location: Hilar (Klatskin), intrapancreatic, ampulla
2. Type: papillary, sclerosing
3. Presentation, investigation and staging, including laparoscopic staging
4. Resection and reconstruction: indications and contraindication
5. Palliative options
 1. PTBD or endoscopic stent
 2. Surgical bypass

The Pancreas and Duodenum

A. Anatomy, Embryology, Physiology, Investigations

- Embryology of the pancreas and duodenum
 - (1) Relationship to liver, bile duct and other foregut structures
 - (2) Aetiology of anomalies including pancreas divisum and annular pancreas
- Anatomy of the pancreas
 - (1) Spectrum of normal anatomy and variants
 - (2) Arterial supply and venous drainage
 - (3) Lymphatic drainage and regional lymph nodes.
 - (4) Relationship with:
 - Portal structures: duodenum, bile duct, hepatic artery, portal vein, splenic and superior mesenteric veins and their branches
 - Retroperitoneum: IVC and its branches, aorta and SMA and their branches, adrenal gland, kidneys
 - Adjacent organs: stomach, spleen, colon, small intestine
- Anatomy of the pancreatic duct
 - Variants of normal and anomalies
- Anatomy of the duodenum
 - (1) Spectrum of normal anatomy and variants
 - (2) Arterial supply and venous drainage
 - (3) Lymphatic drainage and regional lymph nodes.
 - (4) Relationship with:
 - Portal structures: bile duct, hepatic artery, portal vein, splenic and superior mesenteric veins and their branches

- Retroperitoneum: IVC and its branches, aorta and SMA and their branches, adrenal gland, kidneys
- Adjacent organs: pancreas, stomach, spleen, colon, small intestine
- Pancreatic metabolism and physiology
 - (1) Exocrine enzyme physiology
 - (a) Synthesis, excretion and activation
 - (b) Neural and hormonal influences
 - (2) Endocrine metabolism
 - (a) Islet cell function, neuroendocrine hormones
- Duodenal physiology
 - (1) Motility
 - (2) Neuroendocrine (“gut”) hormone physiology
 - (3) Biochemical investigation and interpretation
- Biochemical investigations
 - (1) Markers of pancreatic injury
 - (2) Measures of pancreatic exocrine function
 - (3) Urinary and serum neuroendocrine hormones
- Imaging
 - (1) Axial and body imaging techniques:U/S, CT scan and MRI scan, including MRCP
 - (2) Endoscopy and endoscopic U/S
 - (3) Direct contrast imagingEndoscopic retrograde cholangio-pancraetography (ERCP)
 - (4) Nuclear studies:
 - PET scan
 - Neuroendocrine imaging (Octreotide scan)
 - (5) Application of investigations and imaging to pancreatic and duodenal surgery

B. Congenital and Acquired Non-neoplastic Pancreatic Disease

1. Pancreatitis
 - (1) Acute
 1. Pathogenesis, staging and prognosis
 2. Management, including surgical options and complications
 3. Indications for surgical intervention
 - (2) Chronic
 1. Pathogenesis, complications and nonoperative management
 2. Pancreatic stents and endoscopic/percutaneous drainage procedures
 3. Surgical options and indications
 4. Pain control
2. Pancreas Divisum
 - (1) Pathogenesis, staging and prognosis
 - (2) Management, including surgical options and complications
 - (3) Indications for surgical intervention
3. Annular pancreas
 - (1) Pathogenesis, staging and prognosis
 - (2) Management, including surgical options and complications
 - (3) Indications for surgical intervention

C. Neoplastic Diseases

Benign cysts and neoplasms of the pancreas

- (1) Microcystic serous cystadenoma
 - (a) Presentation, investigation, diagnosis, and natural history
 - (b) Histology and indications for biopsy
 - (c) Treatment options and indication for resection
- (2) Mucinous cystic neoplasm
 - (a) Presentation, investigation, diagnosis, and natural history
 - (b) Histology and indications for aspiration/biopsy
 - (c) Treatment options and indication for resection
- (3) Intraductal papillary mucinous neoplasm (IPMN)
 - (a) Presentation, investigation, diagnosis, and natural history
 - (b) Histology and indications for aspiration / biopsy
 - (c) Treatment options and indication for resection
- (4) Solid pseudopapillary neoplasms
 - (a) Presentation, investigation, diagnosis, and natural history
 - (b) Histology and indications for aspiration / biopsy
 - (c) Treatment options and indication for resection
- (5) Cystic neuroendocrine tumors
 - (a) Presentation, investigation, diagnosis, and natural history
 - (b) Histology and indications for aspiration / biopsy
 - (c) Treatment options and indication for resection
- (6) Von Hippel Lindau syndrome
 - (a) Pathology, associated lesions, investigation
 - (b) Management

Malignancies of the pancreas

(A) Primary

- (1) Adenocarcinoma
 - a) Presentation, investigation and staging
 - b) Assessment of resectability
 - c) Pre-, peri- and postoperative management
 - d) Palliative procedures
- (2) Neuroendocrine tumours
 - a) Presentation, investigation and staging
 - b) Assessment of resectability
 - c) Pre-, peri- and postoperative management
- (3) Lymphoma
 - a) Presentation, staging
 - b) Role of surgery

(B) Secondary

- (a) Renal cell carcinoma: Presentation and management
- (b) Melanoma: Presentation and management

D. Diseases of the Duodenum

1. Congenital disorders of the duodenum
 - (1) Duodenal atresia and duplication
 - (2) Duodenal diverticulae
2. Duodenal ulcer disease

- (1) Pathogenesis, investigation and diagnosis
- (2) Nonoperative treatment
- (3) Operative management

3. Benign neoplasms

- (1) Adenoma
- (2) Hereditary Familial Polyposis: Genetics, presentation, investigation and management

4. Malignant neoplasms of the duodenum

- (1) Adenocarcinoma: Presentation, investigation, staging and management
- (2) Gastrointestinal stromal tumour (GIST) and sarcomas: Presentation, investigation, staging and management
- (3) Neuroendocrine tumour: Presentation, investigation, staging and management
- (4) “Secondary” to direct invasion of adjacent malignancy
 - Carcinoma of the stomach or colon
 - Renal cell carcinoma
 - Investigation, staging
 - Operative management

Imaging

1. The applied physics and technology of Ultrasound and Doppler, CT Scan, MRI Scan, PET Scan and the other nuclear medicine imaging procedures
2. The clinical protocols available for each technology
 - (1) The information provided by each protocol
 - (2) The interpretation of images
 - (3) The application to clinical investigation
3. Imaging algorithm for the investigation of hepatobiliary and pancreatic lesions including:
 - (1) Liver cyst or tumour
 - (2) Jaundice
 - (3) Periapillary tumour
 - (4) Cyst or mass in the pancreas

Oncology

1. Basic pathophysiology of neoplasia
 - (1) Mechanisms of carcinogenesis
 - (2) Genetic alterations
 - (3) Viral carcinogenesis
 - (4) Chronic inflammation
 - (5) Tumour biology including the potential for metastases
2. Chemotherapy
 - (1) Classes of drugs
 - (2) Mechanisms of action
 - (3) Toxicities
 - (4) Combination therapy and available protocols
3. Radiation therapy
 - (1) Applied physics and technology
 - (2) Mechanism of action
 - (3) Toxicity
 - (4) Combination protocols with chemotherapy
4. Multidisciplinary management: Relative roles of surgery, ablation, chemotherapy and radiation therapy as:

- (a) Definitive management
 - (b) Neo- and adjuvant therapy
 - (c) Therapy for recurrent disease
5. Palliative therapy

Trauma

1. Liver trauma
 - (1) Mechanisms of injury and presentation
 - (2) Diagnosis and classification of liver lacerations
 - (3) Management
 - Angiography and embolization
 - Liver parenchyma haemostasis techniques
 - Total vascular exclusion with or without IVC shunt or veno-venous bypass for retrohepatic IVC and/or hepatic vein injuries
 - Resection
 - (4) Complications: diagnosis and management
2. Biliary tract and portal structures
 - (1) Mechanisms of injury and presentation
 1. “External” trauma
 2. Operative injury during cholecystectomy
 - (2) Investigation, diagnosis and classification of bile duct injuries : Identification of associated injuries
 - (3) Management
 - (a) Timing and role of ERCP + stent and PTBD
 - (b) Principles and techniques of biliary reconstruction
 - (4) Complications: diagnosis and management
3. Pancreatic and duodenal trauma
 - (1) Mechanisms of injury and presentation
 - (2) Investigation, diagnosis
 - (a) Identification of pancreatic duct disruption
 - (b) Identification of duodenal injury
 - (3) Management
 - (a) Indications for pancreatic resection
 - (b) Techniques for repair of duodenal injuries
 - (4) Complications: diagnosis and management

Transplantation

- a. Organ procurement
 - Brain death and donor management
 - Deceased donor hepatectomy and pancreatectomy
 - Living donor assessment
 - (a) Living donor left or right hepatectomy
 - Organ preservation: Principles and application
- b. Transplantation
 - (1) Indications for liver transplantation
 - (a) Acute and chronic liver failure
 - (b) Hepatocellular carcinoma and other liver tumours
 - (c) Childs’ and MELD scores and organ allocation
 - (2) Liver
 - (a) Transplant hepatectomy

- (b) Liver transplant techniques
- (3) Pancreas
 - (a) Back bench reconstruction
 - (b) Pancreas transplant
- (4) Immunosuppression: Drugs, mechanisms of action, toxicities and combination therapy
- (5) Complications of transplantation (a) Surgical (b) Infectious (c) Immunologic

TEACHING AND LEARNING METHODS

Teaching programs will need to be held on all working days (One hour per day)

Activities
Journal Club
Didactic lectures
Seminars
Hospital (Grand Rounds/Clinical meeting/Audit meet)
Clinical Case Presentation

The M.Ch. in HPB Surgery training will include two main arms:

- Formal training and learning
- Experiential learning

Formal training and learning

will include:

1. Clinical HPB surgery (including history taking, physical examination, diagnosis, selection and planning of investigations and management).
2. Essentials of gastroenterology.
3. Basic medical science applicable to HPB surgery.
4. Principles and interpretation of relevant investigations.
5. Performance of common HPB operations.
6. Knowledge of history and recent advances in HPB surgery.
7. Preparation of scientific papers for publication and presentation in conferences, statistics and research methodology.
8. Familiarity with the principles and practice of Evidence Based Medicine.
9. Behavioural and ethical skills training.

The modalities for formal training will be as follows:

1. **Seminars:** To be held once a week and presented by the trainee under supervision of teaching faculty.
2. **Journal Clubs:** To be held once a week under supervision of teaching faculty. It should include discussion on recent articles, which relate to various topics in HPB surgery.

3. **Treatment Planning Sessions:** The trainee is to discuss the planning of a given patient who is being worked up for surgery. The idea of this academic exercise is to familiarize the trainee with the objectives of planning in a given patient through a group discussion based on evidence-based medicine.
4. **Clinical grand rounds:** A clinical grand round, involving presentation of unusual and difficult cases, to be done by a post graduate student, once a week, in the presence of all the clinical staff belonging to the department of HPB surgery. The exercise is to develop the clinical acumen of the trainee.
5. **Teaching and training responsibilities (Pedagogy skills):** A final year M.Ch. trainee should be entrusted with the responsibilities of teaching post-graduate students of general surgery and surgical gastroenterology.
6. **Attending CME (Mandatory):** The trainee must attend one accredited national CME/conference of HPB surgery per year, during the second and third year of the training period.
7. **Research Publication (Research skills):** The trainee is to be encouraged to publish clinical or original research material in scientific journals. This is to be done under the direct supervision of the supervisor or his associate(s). Through this exercise the trainee would learn how to collect and analyze data, make observations in a scientific manner, and use appropriate statistical methodology. The trainee would learn the art of putting the outcome of observations and results in an appropriate format of a scientific paper that is relevant to a particular journal.
8. **Training in research methodology:** All M.Ch. trainees must complete (6 months before the final examination) at least one research projects as per requirement of concerned universities, under the supervision of a principal supervisor and appropriate number of co-supervisors which would enable the trainee to attain proficiency in collecting clinical / experimental data and analyze them in a scientific way using appropriate statistical methods. The purpose of the exercise is imparting proficiency to the trainee in research methodology.
9. **Lecture/discussion: Lectures on newer topics** by faculty, in place of seminar as per need.
10. **Case presentation:** Post graduate students will present a clinical case for discussion before a faculty and discuss the management
11. **Radiology conference** should be held one a week in which the radiological features of various problems are discussed.
12. **Surgico-pathological conference:** Special emphasis is made on the surgical pathology and the radiological aspect of the case in the pathology department.
13. Department should encourage e-learning activities.

Experiential learning

The training should consist of a programme that provides learning experience to the trainees by being posted in routine and emergency wards, outpatient departments (OPD), and operation theatres (OT). The following are the various areas of patient care and management during the M.Ch. training period:

1. **Emergency postings:** All these are done under direct supervision. The clinical acumen of the trainees and their ability and promptness to deal with emergencies is well developed during this posting. These would include:
 - a. Resuscitation of emergency patients.
 - b. Initial assessment and prioritization of the problems.
 - c. Planning appropriate investigations.
 - d. Initiating treatment as per management plan.
 - e. Liasing with ancillary departments for planning further work up and/or management
2. **Routine postings:** In this posting the candidate is posted in various subunits of the department of HPB surgery in the form of regular postings, namely main HPB surgery ward, HPB surgery operation theatre, routine HPB surgery OPD.
3. **Clinical Postings:** In addition to posting to ward, OPD, operation theatre, emergency and investigative facilities of HPB Surgery, it is desirable to rotate the trainees to various allied/ancillary disciplines including medical gastroenterology, hepatology, interventional radiology, pathology, etc.
4. **Administrative experience:** The senior-most trainee should be entrusted with administrative responsibilities including academic programme, patient management, functioning of the ward and outpatient department. These may include:
 1. Admission of patients.
 2. Preparing the operation theatre lists.
 3. Improving the functioning in the ward through the supervisor.
 4. Preparing list of topics for teaching of junior trainees posted in the department.
 5. Organizing the posting of trainees in various work stations of the department as per the demand of the situation
5. **Log Book**

The trainees must maintain a log book of the work carried out by them and the training program undergone during the period of training including details of surgical operations assisted or done independently. The log book should be checked and assessed periodically by the faculty members imparting the training.

The trainee is required to work full time in the department of HPB surgery participate in the patient care and academic and research activities as described below.

First six months

- Orientation programme including exposure to casualty.
- Learn bedside history taking in ward, OT exposure, casualty, ICU requirement and visit related disciplines such as radiology and pathology
- Care of indoor patients and monitoring of ICU patients
- Attend operation theatre and emergency operations for acclimatization
- Assist ward round and visit other wards with senior colleagues to attend call/consultation from other departments.
- Participate in teaching sessions in wards for bedside clinical teaching in the afternoon seminar/journal club and case conferences.
- Participate in the teaching and training programme of UG students and interns.

Next thirty months

Attend OPD every week, as delegated by the Head of the Department.

- Discuss problematic cases with consultant(s) in OPD/ward.
- Attend operation room/theatre 3 days in a week.
- Attend morning rounds.
- Care of the indoor patients on beds allotted to them.
- Attend weekly teaching activities and present the same by rotation
- It is desirable to attend specialty clinics such as transplant follow up, liver clinic and pancreas clinic if available at the institute
- During the two and half years, the trainee must attend the combined teaching programme of the departments of gastroenterology, radiology and hepatology (if available), clinical meetings, CPC's of students and staff of the whole hospital.
- Surgico-pathological conference in pathology department
- 24 hours emergency duty once a week as per roster of the department.
- Attends lectures by visiting faculty to the department/college from India/abroad.
- Attend/participate/present papers in state/zonal national conferences.
- Actively participate/help in organization of departmental workshop, courses in specialized areas like transplantation

- **Trainee should have dedicated postings in ancillary departments such as**
 - o **Gastroenterology/Hepatology including endoscopy: Six weeks**
 - o **Radiology including interventional radiology: 3 weeks**
 - o **Pathology: one week**

- Departments of HPB surgery should have facility for organ transplantation. However in the transition period, if department does not have such facility, trainee must be posted to a transplant centre for a period of 3 months.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in the medical colleges is mandatory.

ASSESSMENT

Assessment should be comprehensive & objective. It should address the stated competencies of the course. The assessment needs to be spread over the duration of the course.

FORMATIVE ASSESSMENT, i.e., assessment during the training would include:

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. Internal Assessment should be conducted in theory and clinical examination.

Quarterly assessment during the MCh. training should be based on following educational activities:

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

Additional sessions on basic sciences, biostatistics, research methodology, teaching methodology, medical ethics and legal issues related to HPB Surgery are suggested.

Summative assessment, at the end of the course,

Post Graduate Examination

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The summative assessment examination shall include two heads:

- A. Theory examination.
- B. Practical, Clinical examination and Viva-voce.

Theory examination and Practical/Clinical, Viva-voce shall be separate heads of passing.

Theory examination shall comprise of four papers. Passing percentage shall be cumulatively 50% with minimum of 40% marks in each theory paper.

Practical /Clinical examination consisting of at least one long case, three short cases and viva-voce. Passing percentage shall be 50%.

Passing shall be separate for each head and failing shall be common, meaning thereby that clearance at theory and failure at practical / clinical shall amount to failure at Summative examination and vice versa.

The M.Ch. examination shall be in two parts:

1. **Theory:** There shall be four theory papers as follows:
 - Paper I:** Basic Sciences as applied to HPB surgery
 - Paper II:** Clinical and operative HPB surgery
 - Paper III:** HPB surgery including Transplantation and Minimal access.
 - Paper IV:** Recent advances in HPB surgery
2. **Practical:** The practical examination should consist of the following and should be spread over two days, if the number of candidates appearing is more than one.
 1. One long case and three short cases from various sections of HPB surgery: History taking, physical examination, interpretation of clinical findings, differential diagnosis, investigations, prognosis and management
 2. Ward rounds comprising of discussion of practical problems in the management of patients undergoing HPB surgery
 3. Viva-voce examination
 - Instruments
 - Radiology

- Surgical Pathology
- Videos
- Logbook and Thesis

Other recommendations

Systematic and periodic formative assessment should be done every 6 months and feedback should be given to trainee.

RECOMMENDED READING

A. Text books (latest edition):

1. Blumgart's text book of HPB surgery
2. Begers Pancreatic surgery

B. Journals

3-5 International and 02 national (all indexed) journals

Postgraduate Student Appraisal Form

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks* _____

*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD