SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH
(A Deemed to be University Declared under Section 3 of UGC Act, 1956)
Comprising Sri DevarajUrs Medical College
[Constituent Unit of Sri DevarajUrs Educational Trust for Backward Classes (Regd.)]
TAMAKA, KOLAR-563103, KARNATAKA, INDIA
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(With effect from 2019-2020 batches)

Competency Based Postgraduate Curriculum for Doctor of Medicine Anesthesia

Dean Faculty Of Medicine
Sri Devaraj Urs Academy of Higher
Education & Research, Tamaka, Kolar.

Approved as per BOM-56-2019, (Resolution No-LVI.06) Dated-20/12/2019

REGULATIONS GOVERNING

POST GRADUATE DEGREE PROGRAMMES

CURRICULUM 2019-2020

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH

Comprising Sri Devaraj Urs Medical College

A Deemed To Be University

Declared under section 3 of UGC, Act,1956,
MHRD GOI NO.F,9-36/2006-U.3(A), Dt.25th may 2007
Post box No.62, Tamaka, Kolar-563101, Karnataka, INDIA
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REGULATIONS AND CURRICULA
FOR
POST GRADUATE DEGREE PROGRAMMES
IN
MEDICAL SCIENCES
2019-2020

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VISION:

"UNIVERSITY OF EXCELLENCE - KNOWLEDGE FOR POSTERITY"

MISSION:

1. To be a global centre of excellence for Teaching, Training and Research in the field of Higher education.
2. To inculcate scientific temper, research attitude and social accountability amongst faculty and students.
3. To promote with value based education for the overall personality development and leadership qualities to serve the humanity.

OBJECTIVES:

1. To provide need based infrastructure and facilities to students to become responsible professionals with social commitment and accountability.
2. To implement effectively innovative programs in teaching learning and evaluation.
3. To impart scientific and socio cultural temperament among students to forge national identity and needs.
4. To provide instruction and training in Basic and advanced branches of learning.
5. To provide facilities for research for the advancement and dissemination of knowledge.
6. To undertake extra mural studies, consultancy, extension programmes and field outreach services for the development of society.
7. To collaborate with other Universities, Institutions of excellence and research organizations within the country and outside for the purpose of teaching, training and research.
8. To undertake need based activities for the betterment of socially and educationally backward society.

At a glance this logo is abstract, yet it contains the vital ingredients for an institution like Sri Devaraj Urs Academy of Higher Education and Research, Tamaka, Kolar.

The institution's medical background, Humanitarian values, Compassion,

Approachability, Social Commitment and the subsequent research towards the most precious thing, the human life, is the core theme.

The graphic form of a person in the centre of a bud represents the humanity. It denotes the growing process of life and its existence. And the two hands safeguarding them show the care and a sense of security. It is also capable of holding something within the vast expanse of knowledge by the University for the People's benefit. Hence, the motto "Knowledge for Posterity" is very appropriate and gives a punch in Red. The four light blue half circles (smaller to bigger) depict the unending quest for knowledge and imparting it to a wider horizon, growing higher and higher.
And finally, the whole unit is embedded in a "D" shaped graphic template as background to give it a corporate identity.

COLORS USED:

Deep Blue: Credible, Confident and Dependable. Represents Peace, Tranquility, Stability, Harmony, Trust, Security, Cleanliness and Loyalty

Light Blue: For Sky and Water (color scheme for 4 half circles)

Red: A dominant color for strengths.

Green: For Nature, Health and Generosity. It is cool quality soothes and has great healing powers

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No. SDUAHER/KLR/ADMN/1322/2020-21 Date:12/10/2020

NOTIFICATION

Sub: Regulations, curricula and syllabi of Postgraduate medical degree programmes in Preclinical, Paraclinical and clinical subjects- reg

Ref.

I. **Proceedings of the Academic Council meetings**
II. **Proceeding of the Board of Management meetings**
III. **MCI notifications**
IV. **SDUAHER notification:**

Academic Council Meetings		**Board of Management Meetings**	
19th	17.11.2014	34th	19.06.2015
21st	25.04.2015	36th	04.12.2015
22nd	18.11.2015	44th	23.06.2017
27th	29.04.2017	45th	09.11.2017
28th	04.11.2017	48th	20.06.2018
30th	05.05.2018	50th	22.12.2018
31st	03.11.2018	54th	06.07.2019
33rd	04.06.2019	56th	20.12.2019
34th	15.11.2019	59th	09.10.2020
36th	30.09.2020		

Agenda discussed:

- Objectives of external postings of Post Graduates
- Internal & External postings of PG's with assessment tools
- Minimum marks to be scored in PG theory examinations
- Topics to be included in Forensic medicine and toxicology in paper 4 for PG students
- Work placed based assessment for PG students
- Introduction of Assessment of AETCOM in formative/summative assessment
- Design and development of E-portfolio for all PG's
- Patient handover as common EPA for all departments
- Preparation of Question paper from question bank using software

- Coding of answer booklet by software enabled barcoding
- Development of CBME in PG programmes
- Quarterly formative assessment as an assessment tool for all PGs
- Start course in MD psychiatry
- Implement E- Portfolio of PG's
- Discontinuation of practice for 5th evaluation in PG exam
- Post graduate training programme MCI-PG Medical Education Regulations 2000, amended upto May 2018
- Approval of EPA's as competency based medical training for PG's
- Work placed based assessment as part of quarterly assessment for PG's
- PLO's for all programmes

V. MCI Notifications

- MCI Notification dated 09-12-2009, vide No.MCI.18(1)/2009-Med.55455
- No. MCI-23(1)/2014/Med/153433 Dated 28-01-2015
- MCI Guidelines 2017(CBME based)
- MCI postgraduate medical education regulations 2000 amended upto 2018
- (clause 13.2,gazette notification dated 05/04/2018)
- Basic Programme in Biomedical Research(MCI-23(1)/2019-Med./141602 dated 27-08-2019).
- MCI-12(2)/2019-Med.Misc./189334.- Dated:12th February 2020
- MCI-18(1)/2020-Med./121415.-date 16/09/2020- (District Residency Programme' (DRP)

VI. Office Memorandum No. SDUAHER / KLR/ ADMN /8071/2019- 20 Dated 22/06/2019

VII. SDUAHER / KLR/ ADMN /1571/2019-20 dated 12/09/2019

REGULATIONS FOR POST GRADUATE DEGREE PROGRAMME IN MEDICAL SCIENCES

CHAPTER- I

1. Branches of Study

1.1 Postgraduate Degree Programme
The following programmes may be pursued.

A. M.D. (Doctor of Medicine)

1. Anatomy
2. Physiology
3. Biochemistry
4. Pharmacology
5. Pathology
6. Microbiology
7. Forensic Medicine
8. Community Medicine
9. General Medicine
10. Dermatology, Venereology and Leprosy
11. Anesthesiology
12. Paediatrics
13. Radio-Diagnosis
14. Psychiatry

B. M.S. (Master of Surgery)

1. General Surgery
2. Obstetrics and Gynecology
3. Orthopedics
4. Ophthalmology
5. OTO-Rhino-Laryngology

1.2. Eligibility for Admission

1.2.1 MD / MS Degree Programme: A candidate affiliated to this academy and who has passed final year M.B.B.S. examination after pursuing a study in a medical college recognised by the Medical Council of India, from arecognised Medical College affiliated to any other Academy recognised as equivalent thereto, and has completed one year compulsory rotating internship in a teaching Institution or other Institution recognised by the Medical Council of India, and has obtained permanent registration of any State Medical Council will be eligible foradmission.

1.2.2 A Candidate seeking admission should have successfully cleared the qualifying examination – NEET (National Eligibility cum Entrance Test) conducted by NBE (National Board of Examination).

1.3. Obtaining Eligibility Certificate by the Academy before making Admission

No candidate will be admitted for any postgraduate degree programme unless the candidate has obtained and produced the eligibility certificate issued by the Academy. The candidate has to make an application to the Academy with the following documents along with the prescribed fee:

1. S.S.L.C Marks card
2. 10+2 Certificate
3. All MBBS Marks Cards
4. Internship Completion Certificate
5. Attempt / Academic certificate
6. Degree Certificate
7. Transfer Certificate
8. Migration Certificate
9. Study/Bonafide Certificate
10. Character & Conduct certificate
11. MCI Recognisized Certificate by college
12. Karnataka Medical Council/State medical council
13. MCC Allotment Letter
14. NEET Admission Ticket
15. NEET Rank card
16. Caste (SC/ST) /OBC certificate (domicile) & Income Certificate
17. Aadhar card of both candidate and parents / sponsors
18. Bond for SR Ship
19. Remaining years fee bond

NOTE: The NRI/NRI Sponsor students have to submit the documents as per the MCC/DGHS Criteria for NRI status

Candidates should obtain the Eligibility Certificate before the last date for admission as notified by the Academy.

A candidate who has been admitted to postgraduate programme should register his / her name in the Academy within a month of admission after paying the registration fee.

1.4. Intake of Students

The intake of students to each programme will be in accordance with the ordinance in this behalf.

1.5. Duration of Study

a) M.D /M.S Degree Programme

The programme of study will be for a period of 3 years consisting of 6 academic terms.

1.6. Method of training

The training of postgraduate for degree will be residency pattern with graded responsibilities in the management and treatment of patients entrusted to his/her care. The participation of the students in all facets of educational process is essential. Every candidate should participate in seminars, group discussions, grand rounds, case demonstration, clinics, journal review meetings, CPC and clinical meetings. Every candidate should participate in the teaching and training programme of undergraduate students. Training includes involvement in laboratory and experimental work and research studies.

1.6.1. Teaching methodology

1.6.1.1 Includes Didactic lectures, small group discussion such as seminars, journal clubs, symposia, reviews and guest lectures for acquiring theoretical knowledge.

1.6.1.2 Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning with appropriate emphasis on e-learning. Student should have hand-on training in performing various procedures and ability tointerpret varioustests/investigations.

1.6.1.3 Exposure to newer specialized diagnostic/therapeutic procedures concerning her/his subject should be given.

1.6.4 Self-learning tools like assignments and case-based learning should be promoted.

1.6.2. Clinical postings and Rotation of posting

Basic medical sciences students will be posted to allied and relevant clinical departments or institutions. Students working in clinical departments will be posted to basic medical sciences and allied speciality departments or institutions. It should be done as concurrent studies during the 1st year of training Similarly Inter-unit rotation in the department should be done for a period of up to one year. Rotation in appropriate related subspecialties **should not extend for a period exceeding 06 months.** Postings to other specialty departments will be during the second year.

All postgraduates' students pursuing MD/MS in broad specialities shall undergo a compulsory residential rotation of three months in District Hospital / District Health system as a part of the course curriculum. Such rotation shall take place in the 3rd or 4th or 5th semester of the postgraduates programme. This rotation shall be termed as District residency programme and the postgraduate medical student undergoing training shall be termed as a District Resident.

Satisfactory completion of the District Residency shall be an essential condition before the candidate is allowed to appear in the final examination of the respective postgraduate course. The District Residency Programme Coordinator (DRPC) shall issue certificate of satisfactory completion of DRP and report on the performance of the District Resident on a prescribed format to the concerned Medical College and the Government of State/Union Territory. No. MCI-18(1)/2020-Med./121415.—date16/09/2020

1.6.3. Clinical meetings:

Clinical meetings will be conducted within the department weekly and also inter departmental meetings will be conducted monthly to discuss uncommon/interesting cases.

1.6.4 Log book:

Each student should maintain a logbook and document day to-day activities like documentation of ward work, teaching and learning activities , clinical case discussion, procedures performed , seminars, journal clubs, symposium ,CPC meets, inter-unit/interdepartmental teaching sessions, mortality meets, workshops, CME/conferences .The Log books will be checked and assessed periodically by the faculty members imparting the training. This will in turn be evaluated/assessed by an external reviewer appointed by the Director of PG Studies biannually during the months of July and January. The log book should be preserved and presented at the time of summative examinations conducted by the Academy.

1.6.5 Research activities:

1.6.5.1 The student should know the basic concepts of research methodology plan a research project and be able to retrieve information from the library. The student should have a basic knowledge of statistics.

1.6.5.2 A postgraduate student of a postgraduate degree programme in broad specialities should present one poster presentation, read one paper at a national/state conference and publish one research paper which should be published /accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination. MCI Notification No.18(1)/2009/ medicine/55455 Dated:09-12-2009

1.6.5.3 Department should encourage e-learning activities.

1.6.6 Basic Programme in Biomedical Research:

In order to improve the research skills of post-graduate students, the Board of Governors (BoG) has recommended a uniform research methodology programme across the country, the online programme, "Basic programme in Bio-medical Research", will be offered by ICMR-National Institute of Epidemiology (ICMR-NIE), Chennai (www.nie.gov.in). The programme will explain fundamental concepts in

Research methodology. This programme is being offered through SWAYAM programme of ministry of human resource development through SWAYAM NPTEL (http://swayam.gov.in/nc details/NPTEL)

1.6.7 Synopsis and Dissertation:

Every candidate will submit to the Registrar of the Academy in the prescribed proforma, a synopsis containing particulars of proposed dissertation work within six months from the date of commencement of the programme on or before the dates notified by the Academy. The synopsis will be sent through the properchannel.

Such synopsis will be reviewed and the dissertation topic will be registered by the Academy. No change in the dissertation topic or guide will be made without prior approval of the Academy.

Every candidate pursuing MD/MS degree programme is required to carry out work on a selected research project under the guidance of a recognized post graduate teacher. The results of such a work will be submitted in the form of a dissertation.

The dissertation is aimed to train a post graduate student in research methods and techniques. It includes identification of a problem, formulation of a hypothesis, search and review of literature, getting acquainted with recent advances, designing of a research study, collection of data, critical analysis and comparison of results and drawingconclusions.

The dissertation should be written under the following headings:

- Introduction
- Aims or Objectives of study
- Review of Literature
- Material and Methods
- Results
- Discussion
- Conclusion
- Summary
- References
- Tables
- Annexures

The written text of dissertation will be not less than 50 pages and will not exceed 150 pages excluding references, tables, questionnaires and other annexures. It should be neatly typed in double line spacing on one side of paper (A4 size, 8.27" x 11.69") and bound properly. Spiral binding should be avoided. The dissertation will be certified by the guide, Head of the department and Head of theInstitution.

Six hard copies of dissertation and one soft copy thus prepared will be submitted to

the Controller of Examination (CoE), six months before final examination on or before the dates notified by the Academy.

The dissertation will be valued by examiners appointed by the Academy. Approval of dissertation work is an essential precondition for a candidate to appear in the Academy examination.

Guide: The academic qualification and teaching experience required for recognition by this Academy as a guide for dissertation work is as per Medical Council of India, Minimum Qualifications for Teachers in Medical Institutions Regulations, 1998. Teachers in a medical college/institution having a total of eight years teaching experience out of which at least four years teaching experience as Assistant Professor with at least one research publication in indexed journals gained after obtaining post graduate degree will be recognized as post graduate teachers. (No.MCI- 12(2)/2019-Med.Misc./189334.- Dated: 12th February 2020)

Co-guide: may be included provided the work requires substantial contribution from a sister department or from another medical institution recognized for teaching/training by Sri Devaraj Urs Academy /Medical Council of India. The co- guide will be a recognized post graduate teacher of Sri Devaraj Urs Academy.

Change of guide: In the event of a registered guide leaving the college for any reason or in the event of death of guide, guide may be changed with prior permission from the academy.

1.6.8 Journal Club:

Journal club will be conducted once a week. All the PG students are expected to attend and actively participate in discussion and enter the relevant details in the log book. Further, every candidate must make a presentation from the allotted journal(s), selected articles, at least four times a year and a total of 12 presentations in three years. The presentations would be evaluated using check lists and would carry weightage for internal assessment (See checklist - I in Chapter V). A time table with names of the student and the moderator should be announced periodically, (Quarterly).

1.6.9 Subject Seminar:

Subject seminar will be conducted once a week. All the PG students are expected to attend and actively participate in discussion and enter the relevant details in the log book, Further, every candidate must present selected topics at least four times a year and a total of 12 seminar presentations in three years. The presentations would be evaluated using check lists and would carry weightage for internal assessment (See checklist-II in Chapter V). A timetable for the subject with names of the student and the moderator should be announced periodically, (Quarterly).

1.6.10 Student Symposium:

Student Symposium as an additional inter departmental programme will be conducted periodically, once in three months. The evaluation may be similar to that described for subject seminar.

1.6.11 Ward Rounds:

Ward rounds are service or teaching rounds.

i. ***Service Rounds:*** Postgraduate students and Interns will do every day for the care of the patients. Newly admitted patients should be worked up.by the PGs and presented to the seniors the following day.

ii. ***Teaching Rounds:*** Every unit will have 'grand rounds' for teaching purpose.
A diary should be maintained for day to day activities by the students.
Entries of (i) and (ii) should be made in the Log book.

1.6.12 Clinico-Pathological Conference:

CPC will be conducted once in two months for all post graduate students. Presentation will be done by rotation. If cases are not available due to lack of clinical postmortems, it could be supplemented by published CPCs.

1.6.13 Inter Departmental Meetings:

These will be conducted once a month. These meetings will be attended by post graduate students and relevant entries must be made in the Log Book.

1.6.14 Teaching & Learning Skills:

Post graduate students must teach under graduate students (Eg. medical, nursing) by taking demonstrations, bed side clinics, tutorials, lectures etc.

Assessment is made using a checklist by surgery faculty as well as students. (See model checklist -III in Chapter V). Record of their participation should be documented in the Log book. Training of post graduate students in Educational Science and Technology is recommended.

Further, all postgraduate students are required to attend at least about 35 hours of didactic lecture as notified by the individual departments.

1.6.15 Entrustable Professional Activity:

EPAs are units of professional practice, defined as tasks or responsibilities to be entrusted to the unsupervised execution by a trainee once he or she has attained sufficient specific competence. EPAs are independently executable, observable, and measurable in their process and outcome, and therefore, suitable for entrustment decisions. The Entrustable professional activity (EPA) concept allows faculty to make competency-based decisions on the level of supervision required by trainees. The Academy has identified few such EPA's for all students in various degree programme. These are:

1. EPA 1: Gather a history and perform a physical examination

2. EPA 2: Prioritize a differential diagnosis following a clinical encounter
3. EPA 3: Recommend and interpret common diagnostic and screening tests
4. EPA 4: Obtain informed consent for tests and / or procedures
5. EPA 5: Recognize a patient requiring urgent or emergent care and initiate evaluation and management
6. EPA 6: Give or receive a patient handover to transition care responsibility
7. EPA 7: Undertake complete patient monitoring including the preoperative and post-operative care of the patient.
8. EPA 8: Provide basic and advanced lifesaving support services in emergency situations
9. EPA 9: Collaborate as a member of an inter-professional team
10. EPA 10: Perform general procedures of a physician
11. EPA 11: Enter and discuss orders and prescriptions
12. EPA 12: Prepare a comprehensive discharge summary.
13. EPA 13: Form clinical questions and retrieve evidence to advance patient care.

However in addition to these common EPA's individual departments are advised to develop their own EPA's.

1.7. Continuing Medical Education (CME):

Every PG student must attend at least 2 CME programes either at state/regional /zonal/national levels.

1.8. Conferences:

Attending conferences is optional. However it has to be encouraged. All students are encouraged to attend conferences (at state/national/international levels) to enable them to make paper/poster presentations, which is a mandatory requirement to fulfill before appearing for final examinations.

1.9. Attendance, Progress and Conduct:

- A candidate pursuing degree programme will work in the concerned department of the institution for the full period as a full time student. No candidate is permitted to run a clinic/laboratory/nursing home while studying postgraduate programme.
- Academic term of 6 months will be taken as a unit for the purpose of calculating attendance. The candidate should have 80% attendance in each academic term of 6 months.

- Every student will attend symposia, seminars, conferences, journal review meetings, grand rounds, CPC, case presentation, clinics and lectures during each year as prescribed by the department and not absent himself / herself from work without valid reasons.
- Every candidate is required to attend a minimum of 80% of the training during each academic term of the post graduate programme. Provided further, leave of any kind will not be counted as part of academic term without prejudice to minimum 80% attendance of training period every term.
- All the candidates joining the Post Graduate training programme will work as 'Full Time Residents' during the period of training and will attend not less than 80% (Eighty percent) of the imparted training during each academic term. Including assignments, full time responsibilities and participation in all facets of the education process.
- Any student who fails to complete the programme in the manner stated above will not be permitted to appear for the Academy Examinations.
- A Postgraduate student of a postgraduate degree programme would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published / accepted for publication/sent for publication during the period of postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
  Ref: As MCI Notification dated 09-12-2009, vide No.MCI.18 (1)/2009- Med.55455 and Para No.4.

Procedure for defaulters:

Every department will have a committee containing Head of the department and PG guides to review such situations. The defaulting candidate is counseled by the guide and head of the department. In extreme cases of default the departmental committee may recommend that defaulting candidate be withheld from appearing the examination, if she/he fails to fulfill the, requirements in spite of being given adequate chances to set himself or herself right.

2 Monitoring Progress of Studies:

It is essential to monitor the learning progress of each candidate through continuous appraisal and regular assessment. It not only helps teachers to evaluate students, but also students to evaluate themselves. The monitoring will be done by the staff of the department based on participation of students in various teaching / learning activities. It may be structured and assessment be done using checklists that assess various aspects. Checklists are given in Chapter V.

The learning out comes to be assessed should include:

- Personal Attitudes,
- Acquisition of Knowledge,
- Clinical and operative skills,
- Teaching skills and
- Dissertation.

a. Personal Attitudes:

The essential items are:

- Caring attitudes
- Initiative
- Organisational ability
- Potential to cope with stressful situations and undertake responsibility
- Trustworthiness and reliability
- To understand and communicate intelligibly with patients and others
- To behave in a manner which establishes professional relationships with patients and colleagues
- Ability to work in team
- A critical enquiring approach to the acquisition of knowledge

The methods used mainly consist of observation. It is appreciated that these items require a degree of subjective assessment by the guide, supervisors, self, peers, faculty from the unit and nurses. (Multi source feedback MSF)checklistXII

b. Acquisition of Knowledge:

The methods used comprise of

2.1 Log book: (Check List – XIII Chapter – V)

'Log Book' which records participation in various teaching / learning activities by the students. The number of activities attended and the number in which presentations are made must be recorded. The log book will periodically be validated by the supervisors. Some of the activities are listed. During the training period, the post graduate student should maintain a Log Book indicating various teaching / learning activities, duration of the postings/work done in Wards including super specialty, OPDs and Casualty. This should indicate the specified number of cases for clinical discussion, procedures and operations observed, assisted and performed /presented seminars and review articles from various journals in inter- unit/inter departmental teaching sessions.

The purpose of the Log Book is to:

- Help maintain a record of the work done during training,
- Enable Consultants to have direct information about the work; intervene if necessary,
- Use it to assess the experience gained periodically.

The log book will be used to aid the internal evaluation of the student.
The Log books will be checked and assessed periodically, monthly basis by guide / head of the unit/ head of the department and biannually by external reviewer.

Procedure for defaulters:
Every department will have a committee to review such situations. The "defaulting candidate is counseled by the guide and head of the department. In extreme cases of default the departmental committee will recommend that defaulting candidate be withheld from appearing the examination, if she/he fails to fulfill the requirements in spite of being given adequate chances to set himself or herself right

2.2 Journal Review Meeting (Journal Club):
The ability to do literature search, in depth study, presentation skills, and use of audio-visual aids are to be assessed. The assessment is made by faculty members and peers attending the meeting using a checklist (see Model Checklist -I, in Chapter V)

2.3 Seminars / Symposia:
The topics will be assigned to the student well in advance to facilitate in depth study. The ability to do literature search, in depth study, presentation skills and use of audio- visual aids will be assessed using a checklist (see Model Checklist -II, Chapter V)

2.4 Clinico'-Pathological conferences:
This will be a multidisciplinary case study of an interesting case to train the candidate to solve diagnostic and therapeutic problems by using an analytical approach. The presenter(s) are to be assessed using a check list similar to that used for seminar.

2.5 Surgical Audit:
Periodic morbidity and mortality meeting must be held. Attendance and participation in these must be insisted upon. This may not be included in assessment.

2.6 Clinical skills
Day to Day work: Skills in outpatient and ward work will be assessed periodically. The assessment should include the candidates' sincerity and punctuality, analytical ability and communication skills (see Model Checklist -V, Chapter V). – Mini CEX (Model check list VII, Chapter V)

2.7 Clinical meetings (Clinical Presentations :) *:*
Candidates should periodically present cases to his peers and faculty members. This should be assessed using a check list (see Model checklist V, Chapter V).

2.8 Clinical and Operative skills:

The candidate will be given graded responsibility to enable learning by apprenticeship. The performance is assessed by the guide by DOPS (Model check list VI, Chapter V). Particulars are recorded by the student in the log book.

2.9 Teaching skills:

Post graduates are required to teach undergraduate medical students and paramedical students, if any *(as a part of Post graduate training)*. This performance should be based on assessment by the faculty members of the department and from feedback from the undergraduate students (See Model checklist III, Chapter V) - Microteaching Pedagogy (Model check list VIII, Chapter V)

2.10 Dissertation in the Department:

Periodic presentations must be made in the department. Initially the topic selected is to be presented before submission to the Academy for registration and again before finalization for critical evaluation and before final submission of the completed work (See Model Checklist IX & X, Chapter V)

2.11 Periodic tests:

The concerned departments will conduct quarterly tests. The final test will be held three months before the final examination. The tests may include written papers, practical's / clinical and viva voce. Records and marks obtained in such tests will be maintained by the Head of the Department and sent to the Academy, when called for.

2.12 Work diary / Log Book-

Every candidate will maintain a work diary and record his/her participation in the training programmes conducted by the department such as journal reviews, seminars, etc. Special mention must be made of the presentations by the candidate as well as details of clinical or laboratory procedures, if any conducted by the candidate.

2.13 Records:

Monthly and quarterly reviews of records, log books and marks obtained in tests will be maintained by the Head of the Department and will be made available to the Academy, when called for.

3. ASSESSMENT:

3.1 Formative Assessment

It is essential to monitor the learning progress of each candidate through **continuous appraisal and regular assessment.** It not only helps teachers to evaluate students, but also students to evaluate themselves. The monitoring to be done by the staff of the department based on participation of students in various teaching /learning

activities. It may be structured and assessment be done using checklists that assess, various aspects. This includes assessment of patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

Checklists are given in Chapter-V

Assessment during the MS/MD training should be based on:

Assessment at end of rotation (Quarterly Postgraduate Student's Appraisal Form) by the Unit Head. The student to be assessed periodically as per categories listed in **Postgraduate Student Appraisal Form** (See Model checklist-X, Chapter V).

Multisource Feedback (MSF) – Quarterly

MSFs should be obtained quarterly from:- 2 from faculty of the unit/department; 2 from peers posted in the unit; 2 from interns,2 from staff nurses from the areas attached to the unit,2 from patient/patient relative. (Checklist XII – Chapter V)

Periodic assessment –The Quarterly tests may include written papers (theory), practical's / clinical and viva voce.

Quarterly Postgraduate Student's Appraisal Form (See Model checklist-X I, Chapter V).

- Journal based/ recent advances learning
- Patient based or Skill based learning
- Self-directed learning and teaching
- Departmental & interdepartmental learning activity
- External & Outreach activities/ Continuing Medical Education (CME)
- Attendance, Progress and Conduct

A candidate pursuing degree programme should work in the concerned department of the institution for the full period as a full time student. No candidate is permitted to run a clinic/laboratory/nursing home while studying postgraduateprogramme.

Academic term of 6 months will be taken as a unit for the purpose of calculating attendance. Every student will attend symposia, seminars, conferences, journal review meetings, grand rounds, CPC, case presentation, clinics and lectures during each year as prescribed by the department and not absent himself / herself from work without valid reasons.

Every candidate is required to attend a minimum of 80% of the training during each academic term of the post graduate programme. Provided further, leave of any kind will not be counted as part of academic term without prejudice to minimum 80% attendance of training period every term.

All the candidates joining the Post Graduate training programme will work as 'Full Time Residents' during the period of training and will attend not less than 80% (Eighty percent) of the imparted training during Academic Term of 6 months including assignments, full time responsibilities and participation in all facets of the education process.
Any student who fails to complete the programme in the manner stated above will not be permitted to appear for the Academy Examinations.

A Postgraduate student of a postgraduate degree programme in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published / accepted for publication/sent for publication during the period of postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
Ref: As MCI Notification dated 09-12-2009, vide No.MCI.18 (1)/2009-Med.55455 and Para No.4.

Procedure for defaulters:

Every department should have a committee containing Head of the department and PG guides to review such situations. The defaulting candidate is counseled by the guide and head of the department. In extreme cases of default the departmental committee may recommend that defaulting candidate be withheld from appearing the examination, if she/he fails to fulfill the, requirements in spite of being given adequate chances to set himself or herself right.

3.2 Scheme of examinations

Summative assessment

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000 and amended up to 2018. (The Clause 14 under the heading "EXAMINATION" shall be substituted in terms of Gazette Notification published on 05.04.2018).
The examination will be in three parts:

3.2.1 DISSERTATION

Every post graduate student will carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which will be written and submitted in the form of a dissertation. Work for writing the dissertation is aimed at contributing to the development of a spirit of enquiry, besides exposing the candidate to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature. Dissertation will be submitted at

least six months before the Theory and Clinical / Practical examination. The dissertation will be examined by a minimum of three examiners; one internal and two external examiners, who will not be the examiners for Theory and Clinical examination. A candidate will be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the dissertation by the examiners.

3.2.2. THEORY

There will be four question papers, each of three hours duration. Each paper will consist of ten questions each question carrying 10 marks, so the total marks for each paper will be 100. Questions on recent advances maybe asked in any or all the papers. The examinations will be organised on the basis of 'Grading'or 'Marking system' to evaluate and to certify candidate's level of knowledge, skill and competence at the end of the training. The Clause 14 under the heading "EXAMINATION" shall be substituted in terms of Gazette Notification published on 05.04.2018 and the same is as under:-

Obtaining a minimum of 40% marks in each theory paper and not less than 50% cumulatively in all the four papers for degree examinations and three papers in diploma examination. Obtaining of 50% marks in Practical examination shall be mandatory for passing the examination as a whole in the said degree/diploma examination as the case may be. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately will be mandatory for passing examination as a whole. The examination for MS/MD will be held at the end of 3rd academic year.

3.2.3. Clinical / Practical and viva voce Examination

Clinical examination will be conducted to test the knowledge, skills, attitude and competence of the post graduate students for undertaking independent work as a specialist/Teacher, for which post graduate students will examine a minimum one long case and two short cases.

The Oral examination will be thorough and will aim at assessing the post graduate student's knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the specialty, which form a part of the examination.

Assessment may include Objective Structured Clinical Examination (OSCE) Oral/Viva-voce examination needs to assess knowledge on X-rays, instrumentation, operative procedures. Due weightage should be given to Log Book Records and day to-day observation during the training.

ALLOTMENT OF MARKS

THEORY	MARKS ALLOTMENT	MAXIMUM MARKS	
PAPER-I	10 X 10	100	400
PAPER-II	10 X 10	100	
PAPER-III	10 X 10	100	
PAPER-IV	10 X 10	100	

CLINICALS/ PRACTICALS		200
VIVA VOCE	80	100
PEDAGOGY	20	
TOTAL		**700**

3.2 Examiners:

There will be at least four examiners in each subject. Out of them two will be external examiners and two will be internal examiners. The qualification and teaching experience for appointment as an examiner will be as laid down by the Medical Council of India. No person will be appointed as internal examiner in any subject unless he/she has three years' experience as recognized PG teacher in the concerned subject. For external examiners he/she should have minimum six years of experience as recognized PG teacher in the concerned subject.

3.2.4 Criteria for declaring as pass in Academy Examination:

A candidate should score minimum 40% marks in each theory paper and not less than 50% marks cumulatively in all the papers in postgraduate degree/diploma, to be declared as pass in the examinations. A candidate shall secure not less than 50% marks in each head of passing which shall include (1) Theory, (2) Practical including clinical and viva voce examination. A candidate securing less than 50% of marks as described above shall be declared to have failed in the examination. (No. MCI-23(1)/2014/Med/153433 Dated 28-01-2015) A failed candidate may appear in any sub-sequent examination upon payment of fresh fee to the Registrar of the University.

3.2.5* Declaration of distinction*:

A successful candidate passing the Academy examination in first attempt will be declared to have passed the examination with distinction, if the grand total aggregate marks are 75 percent and above. Distinction will not be awarded for candidates passing the examination in more thanone attempt.

3.2.6 Number of Candidates per day.

The maximum number of candidates for practical/clinical and viva-voce examination will be as under: MD / MS Programme: Maximum of 8 per day

4. ELIGIBILITY CRITERIA FOR APPEARING FOR EXAMINATIONS 4.1 ATTENDANCE

All the candidates joining the Post Graduate training programme will work as 'Full Time Residents' during the period of training and will attend not less than 80% (Eighty percent) of the imparted training during Academic Term of 6 months including assignments, full time responsibilities and participation in all facets of the education process.

- Every student will attend all teaching programmes during each year as prescribed by the department and not absent himself / herself from work without valid reasons
- Every candidate is required to attend a minimum of 80% of the training during each academic year of the post graduate programme. Provided further, leave of any kind will not be counted as part of academic term without prejudice to minimum 80% attendance of training period every term.
- Any student who fails to complete the programme in the manner stated above will not be permitted to appear for the Academy Examinations.

4.2. PROGRESS AND CONDUCT

- Every student will attend symposia, seminars, conferences, journal review meetings, grand rounds, CPC, case presentation, clinics and lectures during each term as prescribed by the department and not absent himself / herself from work without valid reasons.
- Every candidate is required to attend a minimum of 80% of the training during each academic term of the post graduate programme. Provided further, leave of any kind will not be counted as part of academic term without prejudice to minimum 80% attendance of training period every term.

4.3. RESEARCH ACTIVITIES-PAPER/POSTER/PUBLICATIONS

- A Postgraduate student of a degree programme in broad speciality would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published / accepted for publication/sent for publication during the period of postgraduate studies so as to make him eligible to appear at the postgraduate degree examination. Ref: As MCI Notification dated 09-12-2009, vide No.MCI.18 (1)/2009-Med.55455 and Para No.4.
- It is mandatory for all postgraduate students to undergo training in online programme in "Basic Programme in Biomedical Research" Which should be completed by the end of second semester .Not completing the programme will make them ineligible for appearing for the final academy examinations.(MCI-23(1)/2019-Med./141602 dated 27-08-2019).

4.4 DISSERTATION

Every post graduate student will carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which will

be written and submitted in the form of a dissertation. Dissertation will be submitted at least six months before the Theory and Clinical / Practical examination. The dissertation will be examined by a minimum of three examiners; one internal and two external examiners, who will not be the examiners for Theory and Clinical examination. A candidate will be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the dissertation by the examiners.

4.5 District Residency Programme

All postgraduates students pursuing MD/MS in broad specialties shall undergo a compulsory residential rotation of three months in District Hospital / District Health system as a part of the course curriculum. Such rotation shall take place in the 3rd or 4th or 5th semester of the postgraduates programme. This rotation shall be termed as District residency programme and the postgraduate medical student undergoing training shall be termed as a District Resident.

Satisfactory completion of the District Residency shall be an essential condition before the candidate is allowed to appear in the final examination of the respective postgraduate course. The District Residency Programme Coordinator (DRPC) shall issue certificate of satisfactory completion of DRP and report on the performance of the District Resident on a prescribed format to the concerned Medical College and the Government of State/Union Territory. No. MCI-18(1)/2020-Med./121415.—date 16/09/2020

Procedure for defaulters:

Every department should have a committee containing Head of the department and PG guides to review such situations. The defaulting candidate is counseled by the guide and head of the department. In extreme cases of default the departmental committee may recommend that defaulting candidate be withheld from appearing the examination, if she/he fails to fulfill the, requirements in spite of being given adequate chances to set himself or herself right.

CHAPTER II

GOALS AND GENERAL OBJECTIVES OF POSTGRADUATE MEDICAL EDUCATION PROGRAM

GOALS:

The goal of postgraduate medical education will be to produce a competent specialist and /or a medical teacher:

i. Who will recognize the health needs of the community, and carry out professional obligations ethically and in keeping with the objectives of the national health policy;
ii. Who will have mastered most of the competencies, relating to the specialty, that are required to be practiced at the secondary and the tertiary levels of the health care delivery system:
iii. Who will be aware of the contemporary advances and developments in the discipline concerned;
iv. Who will have acquired a spirit of scientific inquiry and is oriented to the principles of research methodology and epidemiology; and
v. Who will have acquired the basic skills in teaching of the medical and paramedical professionals.

GENERAL OBJECTIVES:

At the end of the postgraduate training in the discipline concerned the student will be able to:

i. Recognize the importance of the concerned specialty in the context of the health need of the community and the national priorities in the health sector.
ii. Practice the specialty concerned ethically and in step with the principles of primary health care.
iii. Demonstrate sufficient understanding of the basic sciences relevant to the concerned specialty.
iv. Identify social, economic, environmental, biological and emotional determinants of health in a given case, and lake them into account while planning therapeutic, rehabilitative, preventive and promotive measures/strategies.
v. Diagnose and manage majority of the conditions in the specialty concerned on the basis of clinical assessment, and appropriately selected and conducted investigations.
vi. Plan and advice measures for the prevention and rehabilitation of patients suffering from disease and disability related to the specialty.
vii. Demonstrate skills in documentation of individual case details as well as morbidity and mortality data relevant to the assigned situation,
viii. Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behavior in accordance with the societal norms and expectations.
ix. Play the assigned role in the implementation of national health programmes, effectively and responsibly.

x. Organize and supervise the chosen/assigned health care services demonstrating adequate managerial skills in the clinic/hospital or the field situation.
xi. Develop skills as a self-directed learner, recognize continuing educational needs; select and use appropriate learning resources.
xii. Demonstrate competence in basic concepts of research methodology and epidemiology, and be able to critically analyse relevant published research literature.
xiii. Develop skills in using educational methods and techniques as applicable to the teaching of medical/nursing students, general physicians and paramedical health workers.
xiv. Function as an effective leader of a health team engaged in health care, research or training.

STATEMENT OF THE COMPETENCIES

Keeping in view the general objectives of postgraduate training, each disciplines will aim at development of specific competencies, which will be defined and spelt out in clear terms. Each department will produce a statement and bring it to the notice of the trainees in the beginning of the programme so that he or she can direct the efforts towards the attainment of these competencies.

COMPONENTS OF THE PG CURRICULUM

The major components of the PG curriculum will be:

- Theoretical knowledge
- Practical/clinical Skills
- Training in Thesis.
- Attitudes, including communication.
- Training in research methodology.

Source: Medical Council of India, Regulations on Postgraduate Medical Education, 2006 and 2008.

COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR M.D. ANESTHESIA

1. **VISION:**

    - To be a department of excellence through imparting Quality Anaesthesia training, offering Optimal Anaesthesia care for surgical patients including Critical Care and Pain relief and conducting research in the related areas.

2. MISSION:

    - To teach and train the undergraduate and postgraduate students, the Science and Art of Anaesthesia, Critical Care and Pain Medicine.
    - To teach and train the Science and Art of Cardio pulmonary Cerebral Resuscitation
    - To promote quality Research in the field of Anaesthesia, Critical care and Pain medicine

3. OBJECTIVES:

    - To demonstrate understanding of Basic Sciences relevant to Anaesthesia, Critical Care & Pain Management.
    - To perform Pre-Anaesthetic Evaluation, Administer and Monitor Anaesthesia to Surgical Operations (including super-specialty), perform Resuscitation and pain related blocks under supervision and independently.
    - To Show communication skills, understand medico-legal aspects and update themselves with attending CME's, Conferences and participate in Research activities.

4. ABOUT THE LOGO:

5. NOTIFICATIONS:

6. CONTENTS:

    a. GOALS

        i. GOALS/OBJECTIVES/REGULATIONS

The goals of three year degree course in Anaesthesiology would be to train a MBBS doctor who after the satisfactory completion of which shall:

- Practice independently, the art and science of Anaesthesiology and Resuscitation effectively and ethically, backed by scientific knowledge and skill base.
- Undertake responsibilities in critical care unit, trauma unit, and respiratory therapy unit of unconscious patients requiring ventilatory support.
- Undertake acute and chronic pain management.
- Continue to evince keen interest in continuous professional development irrespective of whether he is in a teaching institution or in private anaesthetic practice.
- Be a dedicated, motivated teacher who is always keen to train or to share his knowledge and skills with a colleague or junior or any learner.

ii. GENERAL OBJECTIVES

- To demonstrate understanding of basic sciences relevant to Anaesthesia, Critical Care & Pain Management.

- To perform Pre-Anaesthetic Evaluation, Administer and Monitor Anaesthesia to Surgical Operations (including super-specialty), perform Resuscitation and pain related blocks under supervision and independently.

- To Show communication skills, understand medico-legal aspects and update themselves with attending CME's, conferences and participate in Research activities.

b. REGULATIONS

i. Eligibility for Admission
ii. Obtaining Eligibility Certificate by the University before making Admission
iii. Intake of Students
iv. Duration of Study

- The student should be taught as per the following schedule to acquire the skills:

1. First 6 months:

- During the first 6 months, the student should be taught expertise in the management of uncomplicated cases not belonging to any broad specialty (ASA I and II cases). To start with, the student will observe and slowly become independent in giving general anaesthesia and spinal anaesthesia to ASA I and II cases for minor and major surgery, under graded supervision.

- The postgraduate student should learn the basic principles of safe and effective anaesthesia, resuscitation, and both the prevention and treatment of pain, perioperative care of the surgical patient, care of handling equipment's, basic techniques in anaesthesia, and anaesthetic pharmacology, and electrical safety.

- He/she should select the thesis topic and submit the protocol for his/her thesis.

2. Next 18 months

    - The student should widen his experience and should be able to undertake anaesthetic care of all routine cases, assist in the anaesthetic care for routine obstetric practice, understand basic principles of critical care, pain management, and participate in audit.

    - The student should be trained in administration of general anaesthesia and regional anaesthesia for ASA I to V under supervision. The student should be able to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks under supervision, and use of Ultrasound machine for giving blocks and venous cannulation. The student should learn Paediatric and trauma life supports and maintain skills for basic and advanced cardiac life support.

    - It is advised that they should be posted in the following specialties: general surgery including gastrointestinal surgery, transplant, ENT, Urology, Obstetrics, Dental Surgery, Eye, ICU, Pain Clinic and peripheral theatres like ECT, radio diagnostic and therapeutic procedures (CT scan, MRI scan, angiography).

    - The student should be able to analyze data and write a thesis. He/she should be able to present scientific data.

3. Last 12 months

    - Thesis should be submitted minimum of 6 months before the final MD examination.

    - The post graduate student should be given experience of various super- specialties like cardiothoracic and vascular surgery, neurosurgery and transplantation, and Paediatric surgery. The student should be able to plan and administer anaesthesia to all emergency patients under supervision including patients for Cardiac, Neurosurgery, Pediatric surgery, and for all major surgeries. The aim at the end is to be competent and independent

soon after the third year of junior residency in providing anaesthesia to elective and emergency cases.

- The post graduate student should be able to manage critically ill patients and treat intractable pain. They should also know how to organize resources in case of mass casualty. The curriculum should be able to provide 04 months of elective Intensive Care Unit posting (2 months during initial years under supervision and 2 months independently in the last six months).

4. At the end of 3 years, the post graduate student should have the skills to:

- Plan and conduct anaesthesia and provide post-operative care including pain relief for elective and emergency surgical procedures related to all surgical specialties.
- Carry out basic life support (BLS) and advanced life support (ALS) and train medical and paramedical staff in BLS and ALS.
- Manage patients admitted to an intensive care unit with the help of latest equipment.
    - Manage patients suffering from acute and chronic intractable pain.
- Organize the hospital environment to manage mass casualty situation and camp anaesthesia.
- Critically review and acquire relevant knowledge from the journals about the new development in the specialty.
- Should be able to participate in anaesthesia audit.

Overall the student should acquire skills in the following practical competencies:

- Information management in preoperative evaluation and outcome enhancement and communication skill to patient and relatives.

v. Method of training

1. Theory classes
2. Practical
3. Seminar/Symposium
    - Recommended to be held once a week. All the PG students are expected to attend and actively

participate in discussion and enter in the logbook relevant details. Further, every candidate must present on selected topics at least four times a year and a total of 8 seminar presentations in two years. The presentations would be evaluated using checklists and would carry weightage for internal assessment (See Checklist in Chapter IV). A timetable for the subject with names of the student and the moderator should be scheduled at the beginning of every month.

- Recommended as an optional multi-disciplinary Programme.
  The evaluation may be similar to that described for subject seminar.

4. Journal Clubs

- Recommended to be held once a week. All the PG students are expected to attend and actively participate in discussion and enter in the logbook relevant details. Further, every candidate must make a presentation from the allotted journal(s) of selected articles at least four times a year and a total of 8 presentations in two years. The presentations would be evaluated using checklists and would carry weightage for internal assessment (See Checklist in Chapter IV). A timetable with names of the students and the moderator should be announced at the beginning of every month.

5. Interdepartmental meeting

- Strongly recommended particularly with departments of surgery & medicine at least once a month. These meetings should be attended by postgraduate students and relevant entries must be made in the Logbook.

6. CPC
7. Group discussion
8. Grand Rounds

- May be service rounds or teaching rounds.

- <u>Service Rounds:</u> Postgraduate students should do ward rounds every day.

i) For pre anaesthetic evaluation of the patients posted for operation.

ii) And to do the post anaesthetic follow up of operated patients for alleviation of post-operative pain and for diagnosis and management if any of the post-operative sequelae.

- Teaching Rounds: Every unit should have grand round for teaching clinical
  methods and pre anaesthetic evaluation.

- Entries of (a) and (b) should be made in the Logbook.

9. Case discussion

10. UG Teaching

11. Postings – Basic/ Specialty

- The suggested schedule of the Operating Theatre can be as follows: This may change as per availability of specialties.

Operation theatre	Months
General Surgery	6
Urology	1
Ophthalmology	1
Otorhinology	2
Dental	1
Orthopedics/Trauma/casualty	3
Gynecology	3
Obstetrics	3
Pediatrics surgery	2
Burns/Plastic	1
CTVS	2
Neurosurgery	2
ICU	4
Pain	1
Recovery	1
Organ Transplant	(Radiology, Radiotherapy)
Posting in the other areas.	

ECT, Cardiac Cath)

The candidates on return from the external postings will be asked to produce a

I. Record of number of

- Cases Assisted
- Procedures assisted
- Procedures done independently

II. Will be asked to do seminars on the topics learnt

III. To do the following cases independently Assessment

of PG students following Jayadeva postings Cardiac

Anaesthesiology

Seminars on following topics:-

- Pulmonary artery Catheterization and its clinical implications.
- Invasive and non- invasive cardiac output monitoring.
- Anaesthetic management of cardiac surgeries.
- Post-operative intensive care management following cardiac surgeries.

Clinical assessment: -

1. Pre – operative Evaluation & Anaesthetic management of cardiac patient posted for non- cardiac surgery.

2. Post -operative management of cardiac patient posted for non -cardiac surgeries.

Assessment of PG students following NIMHANS postings

Neuro Anaesthesiology:-

After completion of external postings at NIMHANS, Bangalore the post Graduates students will be presenting seminars on the following topics.

1. Electro convulsive therapy.
2. Monitored anaesthetic care during interventional radiological procedures.
3. Post -operative management in intensive care unit.
4. Management of patients posted for intracranial surgeries & spinal surgeries.
5. Interpretation of somatosensory evoked potential and brain stem auditory evoked potentials.

Clinical Assessment:-

1. Anaesthetic considerations & management of patient posted for Electro convulsive therapy.
2. Management of patients posted for neurological surgeries.
3. Post -Operative intensive care management.

12. Workshop/CME/Conference

- At least 2 state / national level CME programs should be attended by each student in 2 years.

13. Paper/ Poster/ Publication

- A postgraduate student of a postgraduate degree course in broad specialties/super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

14. Synopsis/Thesis

- Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

- Thesis shall be submitted at least six months before the Theory and Clinical/Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

15. Teaching Skills

16. AETCOM module

vi. Attendance (Leave Policy)

- A candidate pursuing degree course should work in the concerned department of the institution for the full period as a full time student. No candidate is permitted to run a clinic/laboratory/nursing home while studying postgraduate course.
- Academic term of 6 months shall be taken as a unit for the purpose of calculating attendance
- Every student shall attend symposia, seminars, conferences, journal review meetings, grand rounds, CPC, case presentation, clinics and lectures during each year as prescribed by the department and not absent himself / herself from work without valid reasons.
- Every candidate is required to attend a minimum of 80% of the training during each academic term of the post graduate course. Provided further, leave of any kind shall not be counted as part of academic term without prejudice to minimum 80% attendance of training period every term.
- All the candidates joining the Post Graduate training programme shall work as 'Full Time Residents' during the period of training and shall attend not less than 80% (Eighty percent) of the imparted training during Academic Term of 6 months including assignments, full time responsibilities and participation in all facets of the education process.
- Any student who fails to complete the course in the manner stated above shall not be permitted to appear for the University Examinations.
- A Postgraduate student of a postgraduate degree course in broad specialties/super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published / accepted for publication/sent for publication during the period of postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
    - Ref: As MCI Notification dated 09-12-2009, vide No.MCI.18 (1)/2009-Med.55455 and Para No.4.

- <u>Procedure for defaulters:</u>
- Every department should have a committee containing Head of the department and PG guides to review such situations. The defaulting candidate is counseled by the guide and head of the department. In extreme cases of default the departmental committee may recommend that defaulting candidate be withheld from appearing

the examination, if she/he fails to fulfill the, requirements in spite of being given adequate chances to set himself or herself right.

vii) Progress and conduct

Basic Graduate Skills:

The student should have acquired the certain skills during his under graduation and internship. Their skills have to be reinforced at the beginning of the training period. There include;

Procedure	Category	Year	No.
Insertion of I.V. lines	PI	I	>100
Insertion of Nasogastric Tubes	PI	I	>100
Recording of Vital Signs.	PI	I	>100
Oro-tracheal Intubation	PI	I/II/III	>100
Nasotracheal Intubation	PI	I/II/III	>50
LMA insertion	PI	I/II/III	>50
Airway (Oral/Nasal) Insertion	PI	I/II/III	>100
Subarachnoid block	PI	I/II/III	>100
Epidural block (including caudal)	PI	I/II/III	>50
Brachial Plexus block	PI	II/III	>25
Intravenous Regional Analgesia	PI	II/III	>10
Three in One block	PI	II/III	>10
Rectus Sheath Block	PI	II/III	>5
Hernia Block	PI	II/III	>20
Other nerve blocks	PI	II/III	>20
Anaesthesia for major surgical procedures like radical neck dissection, etc.	PA/PI	II/III (Per year)	>100
Anaesthesia for minor surgical Procedures like fibro adenoma excision, etc.	PA/PI	II/III (Per year)	>200
c) Critical Care Procedures:	PI		>10
Insertion of Central Venous Lines	PI	II/III	>15
Intercostal Drainage	O	II/III	>10
Tracheostomy	O	III	>10

Ventilatory Management of Patients	PI	II/III	>100
Sampling for & Interpretation of ABG	PI	II/III	>50
Correction of Electrolyte imbalance	PI	II/III	>25
Fiberoptic Bronchoscopy	PA	III	>25
Mini tracheostomy	PA	III	>5
Insertion of S.W.G. Catheter	O	III	>5

d) Emergency Room Procedures:			
Cardiopulmonary Resuscitation (BLS & ACLS)	PI	I/II/III	>20
Management of Cardiac failure	PI	II/III	>10
Management of Respiratory Failure	PI	II/III	>20
Management of Shock	PI	II/III	>20
Management of Airway Obstruction	PI.	I/II/III	>25
e) Pain Alleviation Procedures:			
Stellate ganglion block	PA	III	>5
Coeliac ganglion block	PA	III	>2
Trigeminal Nerve block	PA	III	>2
Labour analgesia	PA	II/III	>10
Post-Operative Pain Management	PI	II/III	>100
Neurolysis, & Other nerve ablation procedures	PA	III	>2
TENS	PI	II/III	>20

vii. Monitoring Progress of Studies

1. Work diary/ Log books

- Log books shall be maintained regularly and should be checked and assessed periodically by the faculty members imparting the training. This will in turn be evaluated/assessed by an external reviewer appointed by the university biannually during the months of July and January.

2. Periodic tests
3. Dissertation
4. CBME/ WPBA/Mini CEX/DOPS/Quarterly assessment
5. Evaluation of teaching programs
6. Teaching Skills

viii. Dissertation

1. Synopsis should be presented
2. Dissertation should be written under the Supervision of Guide.

ix. *Schedule of Examination*
x. *Eligibility criteria*
xi. *Scheme of Examination*

1. Dissertation
2. Written Examination (Theory)

- Consists of four papers of 3 hours each having 10 short structured questions with 10 marks each:

Paper I: Basic Sciences as applied to Anaesthesiology
Paper II: Practice of Anaesthesia: Anaesthesia in relation to associated systemic and medical diseases.
Paper III: Anaesthesia in relation to subspecialties/superspecialties Paper IV: Intensive Care Medicine, Pain Medicine and Recent advances.

3. Practical / Clinical Examination:

- consists of 3 clinical cases,

Long case: One, duration 30 min (history, examination, Diagnosis and Management, Discussion)

Short cases: Two, 15 minutes each for short case. In short cases only relevant history important to anaesthesia to be taken (history, clinical examination and diagnosis, discussion).

4. Viva Voce:

- should be conducted preferably on four tables with one examiner on Each

Table:

Table one: ECG, X-rays, ABG Cards, Pulmonary function tests, Capnographs, clinical exercises card.

Table two: Anaesthetic Drugs, Emergency Drugs, IV Fluids, Nerve Bocks (skeleton).

Table three: Anaesthesia machine including circuits and Vaporizers, ETT, Supraglottic Airway devices, ICU Ventilator and oxygen therapy equipment.

Table four: Resuscitation equipment's, resuscitation demonstration, Difficult Airway

Equipment, monitoring equipment's.

Alternatively,

1. One long case, viva voce at one station with all examiners, and: 150 marks

2. 28 OSCE station covering two stations of short cases, drugs ECG, X-rays, PFT, ABG, Respiratory loops, Resuscitation etc.: 150 marks

5. Examiners:

xii. Criteria for declaring as pass in University Examination
xiii. Declaration of distinction
xiv. Statement of the competencies

- The student during the training programme, should acquire the following competencies:

A. Cognitive domain

- Demonstrate knowledge of Anatomy related to;
  - ✓ Diaphragm, upper and lower airway, heart and coronary circulation ,
  - ✓ Regional anaesthesia - field block, central neuraxial, blockade, block for acute pain states
  - ✓ Procedures like -Intramuscular injections, arterial and venous cannulations and
  - ✓ Patient Positioning under anaesthesia
- Demonstrate knowledge of Physiology of various systems (respiratory, cardiovascular, hepatobiliary, renal, endocrine, pregnancy, hematological, neuromuscular, regulation of temperature and metabolism, stress response, cerebral blood flow and ICP, central, autonomic and peripheral nervous systems, metabolic response to stress and trauma) in detail and translate its application in a problem solving manner.
- Demonstrate knowledge of Biochemistry relevant to fluid balance and blood transfusion, perioperative fluid therapy, acid base homeostasis in health and diseases.
- Demonstrate knowledge of commonly used drugs in anaesthesia practice (premedication, induction agents - intra-venous and inhalational, neuromuscular blocking agents and reversal of muscle relaxants) - general principles, concepts of pharmacokinetics and pharmacodynamics, drug

interactions with the other drugs taken concomitantly by the patient and anaphylactoid reactions.

- Demonstrate knowledge of gas laws, medical gas supply system, and fluidics, electricity, and diathermy and oxygen therapy.
- Demonstrate knowledge of 'principles of physics' that govern functions of basic anaesthesia delivery equipment, airway devices – (laryngoscopes, airways etc.), breathing systems and monitors, fiber optics, Lasers, Pacemakers and defibrillators, monitoring equipment's (used for assessment of cardiac functions, temperature, respiratory functions, blood gases, intracranial pressure, depth of anaesthesia and neuromuscular block), Sterilization of equipment's, manufacture, filling and transport of gases and liquid oxygen. etc.
- Demonstrate knowledge of importance of pre-anaesthetic assessment and optimization of a patient; consisting of evaluation, interpretation of laboratory investigation as applied to the care of the patients in planning and conduct of general anaesthesia.
- Demonstrate knowledge of basic life support, advanced cardiac, trauma life support, and neonatal resuscitation according to latest guidelines.
- Demonstrate knowledge of principles of sterilization and universal precautions, selection, maintenance and sterilization of anaesthesia and related equipment, Infection control, cross contamination in OT and ICU. Immune response and anaesthesia.
- Describe the development and history of anaesthesia as a specialty with knowledge of important personalities who have contributed towards it.
- Demonstrate knowledge of principles of artificial ventilation, management of unconscious patients, oxygen therapy, shock- (pathophysiology and management) and various protocols related to Intensive Care Unit.
- Demonstrate knowledge of post-operative care in the post-anaesthesia recovery room, in terms of management of
    - ✓ Post-operative pain: various modalities
    - ✓ Nausea and vomiting
    - ✓ Identified emergencies and postoperative complications.
    - ✓ Special precautions to be taken in specific surgical patients.

- Demonstrate knowledge of acute pain management, chronic pain therapy & therapeutic nerve blocks, acupuncture, acupressure and other non- conventional methods of treatment.

- Describe documentation, medico-legal aspects of anaesthesia and concept of informed consent.

- Demonstrate knowledge of research methodology and basics of biostatistics relevant to data collection, analysis, and record keeping in anaesthesia, comparison and estimation of significance.

- Demonstrate ability to interpret blood gas analysis and other relevant biochemical values, various function tests and basics of measurement techniques, ECG.

- Explain blood coagulation mechanism, and their disturbances, rational use of blood and blood components.

- Demonstrate knowledge pertaining to special anaesthetic techniques as relevant to:

    - ✓ Outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormal environments including rural area and calamitous situations

    - ✓ Associated medical disorders in surgical patients

    - ✓ Geriatric and pediatric anaesthesia, Emergency, ENT, orthopedic, ophthalmology, obstetrics, dental, radio-diagnosis and radiotherapy.

    - ✓ Induced hypothermia, incidental, and environmental safety of patient.

    - ✓ Malignant hyperthermia, myasthenia gravis, GB syndrome and other neuromuscular diseases, obesity, COPD, Diabetes mellitus, bronchial asthma and hypertensive crises.

    - ✓ Principles of anaesthetic management of neuro/cardiac/thoracic/vascular/ transplantation/burns and plastic surgery.

    - ✓ Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorder posted for unrelated surgery

    - ✓ Shock, types, pathogenesis and management of patients in shock, renal failure, critically ill and/or on ventilator, Multiple organ failure

- Demonstrate knowledge pertaining to care of terminally ill, Hospices management, do not resuscitate orders.
- Demonstrate knowledge of general principles of medical audit and Critical incident reporting.
- Demonstrate knowledge of Ethics and clinical trial.
- Demonstrate knowledge of Hospital, ICU and OT design and planning.
- Demonstrate knowledge of Medical education including evidence based medical education.
- Demonstrate knowledge of principles of human resources and material management.

B. Affective Domain:

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.

C. Psychomotor domain

At the end of the course, the student should acquire skills in the following broad areas and be able to:

- Demonstrate ability as a perioperative physician, in terms of
    - ✓ Acquiring mastery in careful and relevant history taking, physical examination in clinical evaluation of the patient preoperatively.
    - ✓ Collecting and synthesizing preoperative data from parent hospital and other sources and to develop a rational strategy for the peri- operative care of the patient.

- ✓ Thorough and systematic approach to preoperative evaluation of patients with and without systemic diseases, undergoing different types of operations.
- ✓ Prioritizing problems, present cases clearly and systematically to attending consultants.
- ✓ Developing working relationships with consultants in other specialties to assist in preoperative evaluation and get a good consultation.
- ✓ Interacting with preoperative patients and developing effective counseling techniques for different anaesthetic techniques and peri- operative procedures.
- ✓ Assessing and explaining risk of procedure and taking informed consent.
- ✓ Managing information in preoperative evaluation and outcome enhancement and communication skill to patients and relatives.
- ✓ Ability to choose and order the required investigations to be done in a particular patient peri operatively

- Demonstrate ability in performing
  - ✓ Pre-operative equipment check
  - ✓ selection of drugs
  - ✓ Preparation of work table etc.

- Identify conditions like difficult airway by following difficult airway algorithms.
- Demonstrate ability to establish topical airway anaesthesia for awake intubation
- Demonstrate management of a Failed intubation drill on a Mannequin according to latest guidelines
- Demonstrate ability to monitor and assess depth of anaesthesia
- Demonstrate abilities to manage body fluid composition; volume status; replacement of fluid and blood loss; use of whole blood and blood components.
- Demonstrate abilities to manage Electrolyte and acid base derangements; osmolarity and osmolality.

- Demonstrate acquisition of skills to initiate mechanical ventilation; select appropriate type and mode of ventilator; and monitor proper functioning of ventilator.
- Identify the need to perform intra-operative laboratory tests, blood gases, coagulation profile and interpret the results with clinical co relation
- Demonstrate ability to manage co-morbid conditions and anaesthesia
- Demonstrate ability to perform cannulation of arteries, central and peripheral veins.
- Demonstrate ability in using and interpreting the following routine non- invasive and invasive monitors intra-operatively:
    a. Electrocardiogram with ST-segment analysis
    b. Noninvasive blood pressure
    c. Capnograph: values and changes in values and waveform.
    d. Pulse oximetry: values and changes in values
    e. Neuromuscular blockade monitor
    f. Invasive arterial pressure: waveform and changes in the waveform
    g. Central venous pressure: values and waveform
    h. Pulmonary artery pressure: Values and waveforms, pulmonary capillary wedge tracing.
        i. Cardiac output
        ii. Mixed venous oxygen saturation
        iii. Evoked potential
        iv. Trans esophageal echocardiography: basic understanding
- Demonstrate skills in providing basic life support, advanced cardiac life support, trauma life support and Paediatric-neonatal life support, train medical and paramedical staff in BLS and ALS.

- Demonstrate mastery in common procedures like vascular access, use of latest invasive and non-invasive monitoring equipment, lumber puncture, management of appropriate mechanical ventilation and total care of Intensive Care Patient.

- Demonstrate ability to administer general anaesthesia and regional anaesthesia for ASA I to V, under supervision.

- Demonstrate ability to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks under supervision.

- Demonstrate ability to use ultrasound machine for giving blocks and venous cannulation.

- Demonstrate ability to plan and administer anaesthesia to all emergency patients under supervision including patients for Cardiac, Neurosurgery, Pediatric surgery, and for all major surgeries, able to manage critically ill patients and treat intractable pain.

- Demonstrate following abilities in Emergency Anaesthesia, Trauma and Resuscitation:

    - ✓ Organize resources in case of mass casualty.
    - ✓ Perform triage.
    - ✓ Assess, transport and manage mass casualties / disaster management and camp anaesthesia.
    - ✓ Manage massive hemorrhage and massive blood transfusion.
    - ✓ Transport critically ill patient.
    - ✓ Perform anaesthetic management of geriatric patients with fracture neck of femur
    - ✓ Manage severe burns patients, rapidly progressing spinal compression, massive hemoptysis and lobectomy, peritonitis from various suspected causes, preparation and management of bowel obstruction, septicemic shock, acute upper airway obstruction such as foreign body, epiglottitis, infections, cardiac tamponade from examples post cardiac surgery, malignant pericardial effusion, peri-operative management of rupture aneurysm of abdominal aorta
    - ✓ Basic Cardiac Life Support and Advanced Cardiac Life Support, Basic Trauma Life Support, Advanced Trauma Life Support, and Cerebral preservation.
    - ✓ Management of intra-operative cardiac arrest
    - ✓ Management of intra-operative bronchospasm
- Demonstrate ability to document a Medico-legal aspect.

- Demonstrate ability to provide special sedation /anaesthesia requirements outside operating Room, e.g. Radiology: for CT, MRI (especially in relation to dye allergy and embolization, Oncho radiotherapy, Electroconvulsive shock therapy (modified ECT. Non-invasive cardio-radiologic procedures including balloon angioplasty and cardiac catheterization, Non-invasive neuro- radiologic procedures, lithotripsy etc.

- Demonstrate ability to analyze data and write a thesis, present scientific data, participate in anaesthesia audit.

- Demonstrate ability to critically review and acquire relevant knowledge from the journals about the new development in the specialty

- Demonstrate following abilities in the Post Anaesthesia Care Unit (PACU)

    - ✓ Assess the patient's recovery and condition for a safe discharge or transfer.

    - ✓ Observe, recognize and treat the commonly occurring problems likely to arise in the Post-anaesthesia Care Unit (PACU) especially those in relation to cardio-respiratory systems:

        1. Airway integrity and compromise.
        2. Arrhythmia
        3. Hypertension
        4. Hypotension
        5. Pain prevention and pain relief
        6. Nausea and vomiting
        7. Decreased urine output
        8. Emergence delirium
        9. Delayed emergence from anaesthesia
        10. Shivering
        11. Post-obstructive pulmonary edema.

    - ✓ Assess patient recovery and the parameters for transfer from the PACU to the ward, ICU, home.
    - ✓ Score the patient's condition according to the Aldrete system, including fast tracking after out-patient surgery.
- Demonstration of following abilities in Intensive Care Unit

    - ✓ Understanding the spectrum of critical illnesses requiring admission to ICU.
    - ✓ Recognizing the critically ill patient who needs intensive care -Trauma, burns, all types of shock, Sepsis, SIRS and ARDS, Poisoning, infectious patient (HIV, Hepatitis) and patients with metabolic disturbances.
    - ✓ Monitoring progress of patients by physiological scoring systems
    - ✓ Practicing infection control practices and control of nosocomial infections.
    - ✓ Inserting central venous lines, arterial lines using ultrasound and interpreting the data.
    - ✓ Managing cardiovascular instability, respiratory failure and postoperative pulmonary complications

- ✓ Understanding of the operation of mechanical ventilators including different ventilatory modalities non-invasive ventilation, complications and modes of weaning.
- ✓ Principles and application of Oxygen Therapy
- ✓ Glycemic control in the critically ill patient
- ✓ Practice of Hypothermia and prevention of cerebral injury after cardiac arrest
- ✓ Delivering appropriate nutritional support - enteral and parenteral.
- ✓ Proper use of sedative/hypnotic drugs in the ICU.
- ✓ Practicing ethical and legal aspects of critical care
- ✓ Good communication skills with patient and relatives.
- ✓ Proper Sterilization of ICU equipment.

- Demonstration of following abilities in Acute and Chronic Pain Management

  - ✓ Assessment of patients with pain including: history taking, physical examination, and interpretation of investigations.
  - ✓ Classify types of pain - acute chronic, traumatic, cancer pain, etc. with the knowledge of Pain pathways in detail.
  - ✓ Practice the different modalities of physical therapy that may relieve both acute and chronic pain
  - ✓ Practice the acute pain, cancer pain guidelines and WHO treatment ladder.
  - ✓ Practice routes of administration and risk/benefits of drugs used for acute and chronic pain relief, patient controlled analgesia and treat the common pain syndromes.
  - ✓ Demonstrate practice of pain management in patients with problem drug use, drug dependency and addiction and identify the parameters for referral to a pain medicine specialist.
- Demonstrate Organization of acute pain service and role of acute pain nurse for pain assessment in various groups of patients, Physiological changes secondary to Pain, practice different modalities of pain control. Pharmacology and side effects of opioid analgesia and non-opioid analgesia, principle of patient-controlled analgesia and assessment of its efficacy, Pharmacology and side effects of epidural/intra-thecal opioid. Neurological assessment of epidural blockade and management of failed block. Management of regional blockade – brachial plexus, para-vertebral and intra-pleural block. Management of epidural abscess. Substance abuse and acute pain control. Pain control in concurrent medical diseases – COAD, IHD, bleeding tendency,

geriatric. Pain control in burns patients. Pain control in trauma patients included multiple rib fracture

- Demonstration of abilities to manage Chronic Pain

    - ✓ Practice different modalities of chronic pain management - physical therapy, psychotherapy, (including cognitive behavioral approaches), neuroablation,

Neuro-augmentation, spinal, opioid, interventional neuro-blockade, non-opioid analgesia

    - ✓ Anatomy, indication, technique and complication of chemical sympathectomy (lumbar sympathectomy, stellate ganglion block, celiac plexus block).
    - ✓ Practice principles of management of cancer pain, principle of management of non-cancer neuropathic pain - phantom limb pain, post-herpetic neuralgia, complex regional pain syndrome, trigeminal neuralgia. Principle of management of non-cancer nociceptive pain - myofascial pain, lower back pain, intractable angina, burns, chronic pancreatitis, PVD.
    - ✓ Practice Epidural steroid injection (all levels) and long-term epidural catheterization.
    - ✓ Observe and practice following blocks: Infra-orbital nerve, Intercostal nerve
    - ✓ Recognize complications associated with each blocks and know appropriate treatment of each
    - ✓ Know the indications for stimulation techniques such as transcutaneous electrical nerve stimulation (TENS), dorsal column stimulation, and deep brain stimulation.
    - ✓ Mechanisms and side effects of other therapies used for treating pain.
    - ✓ The principles of pain management in special patient groups including the elderly, children, disabled, intellectually handicapped and those unable to communicate.
    - ✓ Awareness of the principles for insertion and management of implantable drug delivery pumps.
    - ✓ Awareness of the basic principles of palliative care.

- Demonstrate practice of Regional Anaesthesia

    - ✓ Applying general principles of pharmacology of local anaesthetics and various adjuvants.
    - ✓ Familiarizing with the relevant anatomy for regional techniques.
    - ✓ Application of indications and contraindications to regional anesthetic technique including central neuraxial blocks, peripheral nerve blocks and sympathetic nerve blocks.
    - ✓ Assessing adequacy of regional anaesthesia, and learn techniques of supplementation of inadequate blocks.
    - ✓ Providing effective anxiolytics and sedation of patients by both pharmacologic and interpersonal technique.
    - ✓ Performing the following regional anaesthesia techniques:

        - o Brachial plexus, cervical plexus, stellate ganglion block, lumbar plexus, lumbar sympathetic, Sciatic nerve block, Femoral nerve block, 3 in 1 block, Wrist block, Popliteal Nerve block, Trigeminal nerve block, Retro bulbar blocks, Paravertebral blocks, Intercostal blocks, Caudal block – adult and pediatric, Ankle block, Epidural block/Catheter, Subarachnoid block, Bier's block, All peripheral nerves of the upper and lower limbs.

- Demonstrate practice of Thoracic Anaesthesia

    - ✓ Pre-operative assessment of patients undergoing Thoracotomy (lung resection), thoracoscopy, video assisted thoracoscopy and mediastinoscopy
    - ✓ Various approaches and their relevant equipment's for lung isolation.
    - ✓ Various double lumen tubes and their placement.
    - ✓ Application of Principle of chest drain.
    - ✓ Respiratory Physiology and management of one lung ventilation (OLV). Indications, contraindications and hazards of OLV.
    - ✓ Application of the knowledge of Anatomy of lung and Broncho- pulmonary segments.
    - ✓ Anatomy and techniques for intercostal nerve block and thoracic epidural. Management of thoracic epidural anaesthesia and analgesia
    - ✓ Anatomy, techniques and placement of paravertebral block/catheter.
    - ✓ Post-operative care of patients after lung surgery.
    - ✓ Peri-operative management of patients with myasthenia gravis.
    - ✓ Peri-operative management of patients with mediastinal mass.

- ✓ Anaesthetic management of mediastinoscopy, major airway stenting.
- ✓ Lung volume reduction surgery and problems.

- Demonstrate practice of Cardiovascular Anaesthesia:

  - ✓ Application of the knowledge of Anatomy and physiology of valvular disease, coronary arteries and their territories. Pulmonary circulation, coronary circulation, cerebral circulation, visceral circulation.
  - ✓ Application of the knowledge of Distribution of blood volume to different organs and systems and their control. Microcirculation. Venous system, venous pressure, its influence on various functions.
  - ✓ Regulation of blood pressure, hypotensive anaesthesia.
  - ✓ Anatomy and physiology of all operable congenital heart disease like ASD, VSD, PDA, TOF, transposition of great vessels.
  - ✓ Application of the knowledge of anatomy and physiology of vascular heart disease like co-arcation of aorta.
  - ✓ Assessment of cardiac patient with ischemic heart, valvular heart disease and other diseases listed above. Understanding of cardiac catheterization, echocardiography, stress testing, and radio-nucleotide imaging.
  - ✓ Application of Principle and complication of cardiopulmonary bypass
  - ✓ Application of Principle of trans-esophageal echocardiography
  - ✓ Application of Principle of circulatory support: inotropes, IABP, pacing
  - ✓ Coagulation and management of coagulopathy.
  - ✓ Off pump bypass
  - ✓ Intra-operative management of aortic surgery and major peripheral vascular surgery, aneurysm grafts, recanalization procedures.
  - ✓ Understanding of the adult patient with congenital heart disease and their management during anaesthesia.
  - ✓ Postoperative cardiac critical care, including cardiovascular problems, analgesia.
  - ✓ Insertion of invasive monitoring for arterial monitoring, central venous pressure monitoring, pulmonary artery catheter insertion and interpretation.
  - ✓ Robotic cardiac surgery.
- Demonstrate practice of Paediatric Anaesthesia

  - ✓ Application of knowledge of Anatomical changes in Paediatric patient and neonates.
  - ✓ Application of knowledge of Physiology and pharmacology in Paediatric patient.

- ✓ Guideline for pre-operative fasting in children and pre-medication.
- ✓ Anaesthetic equipment: laryngoscopes, airways, endotracheal tubes, LMAs, PLMA and breathing circuit for children.
- ✓ Anaesthesia management for premature and newborn.
- ✓ Emotional problems for parent and child and principles of premedication. Consent by parents and their presence during induction. To become skilled in communicating with children, parents and other relatives.
- ✓ Problems of transporting a sick pediatric patient from the ward to the operating room and back with regard to temperature maintenance, cardiovascular stability, ventilation and oxygenation.
- ✓ Estimate preoperatively blood volume, hourly fluid requirements, fluid deficit, third space loss, acceptable blood loss and apply principles of fluid and blood replacement in the perioperative period.
- ✓ Induce and maintain anaesthesia by inhalation, intravenous, intramuscular and rectal routes and monitor pediatric patients.
- ✓ Understand the benefits, risks and techniques of regional anaesthesia in children. Anatomy and techniques of caudal, dorsal penile and inguinal regional block, spinal and epidural block
- ✓ Learn to recognize and treat post anaesthesia complications like apnea, laryngospasm, acid-base and electrolyte disturbances, febrile and convulsing child and bleeding child.
- ✓ Common problems related to common congenital syndromes presenting for surgery. Anaesthetic management of a child with concurrent disease – Down's, Pierre Robin syndrome, von Willebrand's disease, Goldenhar's, Sturge-Weber, Tracher-Colin, Prune-Belly, and cyanotic and non-cyanotic congenital heart disease.
- ✓ Paediatric resuscitation: drugs, doses and defibrillation of children of all ages, from the very premature neonates to those children with complex coexisting disease.
- ✓ Management of patients requiring Paediatric intensive care, ventilator management, and support of circulation.
- ✓ Resuscitation of neonates and children of all ages. A period of one to two months in a PICU is recommended for all post graduate students undergoing advanced training in Paediatric anaesthesia.
- ✓ Paediatric pain management
- ✓ Assessment of a child with URTI, with a heart murmur.
- ✓ Management of fluid and electrolytes in children.
- ✓ Anaesthetic management of a malignant hyperthermia susceptible child.

- ✓ Anaesthetic management of FB bronchus, oesophagus, Wilm's tumour, congenital diaphragmatic hernia, tracheo-oesophagus fistula, thoracotomy.
- ✓ Anaesthesia for Fetal Surgery.
- ✓ Sedation techniques including the selection, management and monitoring of
- ✓ Children for diagnostic and therapeutic procedures, with particular attention to working in areas outside the theatre suite.

- Demonstrate practice of Transplant anaesthesia

  - ✓ Application of knowledge of basic pathophysiology of renal and liver failure. Principles of anesthetizing an immuno-compromised patient.
  - ✓ Principles of anesthetizing patient with end stage renal/liver disease and patient with organ transplantation. Perioperative management.

- Demonstrate practice of Neuro anaesthesia

  - ✓ Application of basic knowledge of cerebral circulation and intra cranial pressure and its implications
  - ✓ Anaesthesia to patients with neurologic disease, head injury undergoing neurologic or non-neurologic surgery and for diagnostic procedures requiring anaesthesia.
  - ✓ Anesthetic implications of the most common neurosurgical procedures, Tran's nasal, trans-sphenoidal pituitary surgery. Posterior fossa surgery. Surgery for supratentorial pathology.
  - ✓ Application of basic concepts behind electrophysiologic monitoring of the brain and spinal cord.
  - ✓ Application of knowledge of general principles of positioning the patient for surgery and the advantages and disadvantages of each position.
  - ✓ Effects of anaesthesia on the electroencephalogram (EEG) and evoked potentials.
  - ✓ Differential diagnoses and treatment alternatives of intraoperative intracranial hypertension ("tight brain")
  - ✓ Management of Head Trauma, and its anesthetic management and various protocols regarding their management and associated trauma.
  - ✓ Intracranial surgery and spinal surgery, both routine and emergency.
  - ✓ Monitoring: techniques for detection and management of air embolism.
  - ✓ Lumbar puncture and CSF drainage.
  - ✓ Non-surgical management of the head trauma patient, Systemic complications of severe brain injury.
  - ✓ Management of subarachnoid hemorrhage and vasospasm.

- ✓ Diagnosis and management of patients with brainstem death; and dealing with patient's relatives

- The following are special procedures which the post graduate student must be able to perform

Sr. No. Name of procedure

1. Blind Nasal intubation
2. Failed intubation drill (includes Fiber optic Laryngo/ Bronchoscope)
3. Double Lumen Tube
4. Bronchial Blocker placement
5. 5 Jet Ventilation
6. Suctioning and physiotherapy of wet lung
7. Intubation in Neonates
8. Initiation and management of ventilation
9. Combined Spinal Epidural
10. Brachial Plexus Block
11. Intravenous Regional Anaesthesia
12. Elbow, Wrist, Digital, Sciatic, Femoral, Lateral Cutaneous Nerve of thigh, Ankle - each
13. Cervical-Superficial and Deep, Stellate, Splanchnic – each
14. Central Venous Line by Brachial, Jugular and Subclavian veins
15. Radial and Femoral Artery cannulation
16. CVP monitoring
17. Pulmonary Capillary Wedge Pressure
18. Neuro-muscular transmission Monitoring
19. Anesthetic Depth eg. BIS monitoring
20. Use of Ultrasound in Anaesthesia and Intensive Care

- Demonstration of anesthetic abilities in the intraoperative period keeping into consideration the specific requirement of the surgical procedure – ENT, Orthopedic, Gynecology – Obstetrics, General surgery, Onchosurgery, replacement surgeries, urosurgery, vascular, plastic, Thoracic, Dental etc.

xv. Components of the PG curriculum

1. Theoretical knowledge
2. Practical/clinical Skills
3. Training in Thesis.
4. Attitudes, including communication.
5. Training in research methodology.

- Study material

A. Recommended books

Recent edition of the following books may be bought and used

1. Practice of Anesthesiology - Wylie - Churchill – Davidson, 7 edition.
2. General Anaesthesia - Gray, Nunn, Utting, 4 edition.
3. Anaesthesia - Two volumes, Ronald D, Miller, 7 edition.
4. Anatomy for Anaesthesist - Harold Willis,
5. Understanding Anesthetist Equipment's - Dorsh&Dorsh, 5 edition.
6. Emergency Anaesthesia – Thronton ,2 edition
7. Principles of Obstetric - Anaesthesia - J. S. Crawford, 5 edition.
8. Physics for Anesthetist - Muscnin&Mactintosh, 4 edition.
9. Neuro Surgical Anaesthesia – Hunter, 2 edition.
10. PaediatricAnaesthesia – Gregory, 5 edition.
11. Cardiac Anaesthesiology - 2 volumes - Jonathan B.
12. Anaesthesia and co existing diseases – Stoelting, 6 edition.
13. Anaesthesia Equipment - Ehrenwerth and James. B. Eiscnkraft, 2 edition.
14. Text Book of Anaesthesia - A. R. Aitken Head & G. Smith, 5 edition.
15. Anaesthesia for infants and children – Smith, 8 edition.
16. Obstetrics Anaesthesia and Andgest – Bonica, 4 edition.
17. Regional Anaesthesia - Macintosh series,
18. Epidural Analgesia – Bromage,
19. Medical problems of Anaesthesia – Kaufman.
20. Principles of Anaesthesiology – Collins, 2 edition.
21. Anaesthesia for Orthopedic Surgery – Zauder & others.
22. Neural Blockade – Cousins, 4 edition.
23. Cardiac Anaesthesia – Kaplan, 6 edition.
24. Thoracic Anaesthesia - Kaplan and Muschin, 3 edition.
25. Drugs Interactions & other basic Medical science and Anaesthesia specialty books as available.

B. Recommended Journals

1. Anaesthesiology and Analgesia Journal (States)
2. Anaesthesiology Journal
3. Anaesthesia Journal
4. ActaAnaesthesia Scandinavia
5. Canadian Journal of Anaesthesia
6. Indian Journal of Anaesthesia
7. British Journal of Anaesthesia
8. Expert Anaesthesia

9. Recent advances in Anaesthesiology
10. Year Book of Anaesthesia
11. Anaesthesia Clinics
12. Clinics in North America in Anaesthesiology

ANNEXURES

Format of Model Check Lists

32. Model Check-List For Evaluation Of Journal
33. Model Check-List For Evaluation Of Seminar Presentations
34. Model Check List For Evaluation Of Clinical Work In Ward /OPD
35. Evaluation Form For Clinical Presentation
36. Model Check List For Evaluation Of Teaching Skill Practice
37. Model Check List For Dissertation Presentation
38. Continuous Evaluation Of Dissertation Work By Guide / Co-Guide
39. Model Check List For Evaluation Of Log Book
    a. Academic Activities Attended
    b. Academic Presentations Made By The Student
    c. Diagnostic And Operative Procedures Performed
    d. DOPS
40. Model Overall Assessment Sheet

41. Quarterly Assessment

Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines

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.	Thesis / 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**

ANAESTHESIOLOGY

ACADEMY OF HIGHER EDUCATION AND RESEARCH

PH NO :+919480849814

EMAIL ID: anaesthesia@sdumc.ac.in

Direct Observation of Procedural Skills (DOPS):

Date of Assessment (DD/MM/YY) **PG's Name**

☐☐ / ☐☐ / ☐☐

PG Year ☐

Assessor's Name

Assessor's Email

Assessor's Position

Professor ☐ **Associate Prof.** ☐ **Assistant Prof.** ☐

Senior Resident ☐

Clinical Setting (Major OT / ICU):

Procedure:

Please score the PG on the scale shown. Please note that your scoring should reflect the performance of the PG against that which you would reasonably expect at their stage/year of training and level of experience. Please mark 'Unable to Comment' if you feel you have not observed the behavior.

Well below expectation for stage of training	*Below expectation for stage of training*	*Borderline for stage of training*	*Meets expectation for stage of training*	*Above expectation for stage of training*	*Well above expectation for stage of training*	*Unable to Comment*
Demonstrates understanding of indications, relevant anatomy, technique of procedure:						
☐	☐	☐	☐	☐	☐	☐
Obtains informed consent:						
☐	☐	☐	☐	☐	☐	☐
Demonstrates appropriate preparation pre-procedure						
☐	☐	☐	☐	☐	☐	☐
Appropriate analgesia or self-sedation:						
☐	☐	☐	☐	☐	☐	☐
Technical ability:						
☐	☐	☐	☐	☐	☐	☐
Aseptic technique						
☐	☐	☐	☐	☐	☐	☐
Seeks help where appropriate:						
☐	☐	☐	☐	☐	☐	☐
Post procedure management:						
☐	☐	☐	☐	☐	☐	☐

Communication skills: ☐ ☐ ☐ ☐ ☐ ☐ ☐
Consideration of patient/professionalism: ☐ ☐ ☐ ☐ ☐ ☐ ☐
Overall ability to perform procedure: ☐ ☐ ☐ ☐ ☐ ☐ ☐

Based on this observation please now rate the level of independent practice the PG has shown for this

Procedure:

Level of Independent Practice	
Rating	
Unable to perform the procedure	☐
Able to perform the procedure under direct supervision/assistance	☐
Able to perform the procedure with limited supervision/assistance	☐
Competent to perform the procedure unsupervised and deal with complications	☐

Which aspects of the encounter were done well?

Any suggested areas for improvement?

Agreed Action:

PG's Signature ..... Assessor's Signature…...……..…

DEPARTMENT OF ANAESTHESIOLOGY

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Mini Clinical Evaluation Exercise (Mini-CEX) Assessment Form

Case Details	Procedure									
	Age			ASA						
Medical status of the patient										
Other issues										
Overall complexity (circle)	Low			Moderate			High			
	1	2	3	4	5	6	7	8	9	
Focus for learning The PG considers what they would like to learn from this experience.										
PG Self-Assessment	I need the assessor in the theatre			I need the assessor in the hospital			I could manage this procedure independently and do not require direct supervision			
	1	2	3	4	5	6	7	8	9	
Assessor Feedback Please note: The aim of this assessment is to provide meaningful feedback to a PG so they can make specific plans to improve and progressively develop toward a consultant level of practice.										
Overall Performance for THIS Case Based on this observation of their performance, in hindsight,	PG needs assessor in the theatre suite			PG needs assessor in the hospital			PG could manage this procedure independently and does not require			

what level of supervision did the PG require for THIS case overall							direct supervision		
	1	2	3	4	5	6	7	8	9

Key:

1. Not comfortable leaving PG unsupervised in theatre for any period of time
2. Comfortable to leave PG to go on brief coffee break in theatre tearoom. Not happy for PG to instigate changes in management in your absence
3. As in 2, but comfortable staying out of theatre for a bit longer, e.g. while eating your lunch. PG may instigate some new actions that you have previously discussed
4. Happy to leave the theatre block, but remain immediately available in the hospital. Feels the need to check in on the PG at regular intervals
5. Happy to leave the theatre block but remain immediately available in the hospital e.g. not take on another case themselves. Expect PG to notify supervisor of any significant problem or event, e.g. persistent abnormal physiological parameter, major blood loss
6. As in 5 but expect PG to manage most problems initially, and call you if their initial management doesn't work
7. Could potentially be off-site but would want to review the PG's management plan before they started the case
8. Supervisor Off-site. Confident that PG can make a good assessment and plan, but want to be notified that they are doing the case
9. PG could manage this case as a consultant. Appropriate if they don't contact supervisor. May have collegial discussion on case

Observations	
Knowledge	Demonstrates relevant basic science / clinical knowledge and understanding pertaining to the case
Patient assessment	Performs a complete and appropriate assessment of the patient and presents well documented findings
Planning	Formulates an appropriate clinical plan demonstrating an understanding of relevant

	issues related to the patient, procedure, pathology, positioning and place etc
Preparation	Prepares appropriately for any intervention, checks equipment, organizes theatre and monitoring, prepares drugs and ensures appropriate personnel are present
Organization / efficiency	Creates a well-organized workspace, uses time effectively and efficiently
Vigilance	Demonstrates situational awareness through constant monitoring of the patient (clinically and electronically), the procedure and other personnel
Problem solving / decision making	Demonstrates sound judgment and clinical decision making
Insight	Recognizes limits of their expertise and experience. Takes on responsibility appropriately
Technical proficiency	Demonstrates proficiency (including appropriate informed consent and infection control)
Documentation	Comprehensively, concisely and legibly documents relevant matters
Patient interaction	Develops rapport and trust; accurately elicits, synthesizes and conveys relevant information; develops a common understanding of issues, problems and plans
Team interaction	Participates effectively and appropriately in an inter professional healthcare team
Risk minimization	Practices to reduce medical error; complies with hospital and college protocols and guidelines
Please note the focus of any discussion during this assessment	

Overall Feedback			
Examples of what was done well Example: In-depth knowledge of perioperative management relevant to co-morbidities of heart failure/disease Focused pre-operative assessment, well-presented. Anaesthetic plan tailored to specific case			
Areas that need improvement and action Example: Ensure drugs and equipment relevant to plan are prepared prior to commencement; Documentation must be legible and complete; Increased vigilance at appropriate time, e.g. to match depth of anaesthesia and surgical stimulation.			
PG reflection and comments			
PG reflection and comments			
PG action plan Example: Over the next week, I will show my notes to my assistant to check whether they are clear and contain all relevant information, and amend if needed.	Based on my reflection and the feedback I have received I intend to:		
Date of assessment			
PG Name		PG email	
Assessor Name		Assessor email	

Assessment toward completion of SSU?	□ Yes □ No	If yes, SSU Name	
Competency			

MODEL CHECK-LIST FOR EVALUATION OF JOURNAL

REVIEW PRESENTATIONS

Name of the Student: Name of the Faculty/Observer:

Date:

SI. No.	Items for observation during presentation	Poor 0	Below Average	Average 2	Good 3	Very Good
1.	Article chosen was					
2.	Extent of understanding of scope & objectives of the paper by the candidate					
3.	Whether cross references have been consulted					
4.	Whether other relevant publications consulted					
5.	Ability to respond to questions on the paper / subject					
6.	Audio- Visual aids used					
7.	Ability to defend the paper					
8.	Clarity of presentation					
9.	Any other observation					
	Total Score:-					

MODEL CHECK-LIST FOR EVALUATION OF SEMINAR PRESENTATIONS

Name of the Student: Name of the Faculty/Observer:
Date:

SI. No.	Items for observation during presentation	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Whether other relevant publications consulted					
2.	Whether cross references have been consulted					
3,	Completeness of Preparation					
4.	Clarity of Presentation					
5.	Understanding of subject					
6.	Ability to answer questions					
7.	Time scheduling					
8.	Appropriate use of Audio-Visual Aids					
9.	Overall Performance					
10.	Any other observation					
	Total Score:-					

MODEL CHECK LIST FOR EVALUATION OF CLINICAL WORK IN WARD / OPD

(To be completed once a month by respective Unit Heads including posting in other departments)

Name of the Student: Name of the Unit Head: Date:

SI. No.	Points to be considered:	Poor 0	Below Average	Average 2	Good 3	Very Good
1.	Regularity of attendance					
2.	Punctuality					
3.	Interaction with colleagues and supportive staff					

4.	Maintenance of case records					
5.	Presentation of cases during rounds					
6.	Investigations work up					
7.	Beside manners					
8.	Rapport with patients					
9.	Counseling patient's relatives for blood donation or Postmortem and Case follow up.					
10.	Overall quality of Ward work					
	Total Score:-					

EVALUATION FORM FOR CLINICAL PRESENTATION

Name of the Student: Name of the Faculty: Date:

SI. No.	Points to be considered	Poor 0	Below Average 1	Average 2	Above Average 3	Very Good 4
1.	Completeness of history					
2.	Whether all relevant ' points elicited					
3.	Clarity of Presentation					
4.	Logical order					
5.	Mentioned all positive and negative points of importance					
6.	Accuracy of general physical examination					
7.	Whether all physical signs elicited correctly					
8.	Whether any major signs missed or misinterpreted					
9.	Diagnosis: Whether it follows logically from history and					

10	Investigations required • Complete list				-	
	• Relevant order					
	• Interpretation of investigations					
11.	Ability to react to questioning Whether it follows logically from history and findings					
12.	Ability to defend diagnosis					
13.	Ability to justify differential diagnosis					
14.	Others					
	Grand Total :-					

MODEL CHECK LIST FOR EVALUATION OF TEACHING SKILL PRACTICE

SI. No.		Strong Point	Weak Point
1	Communication of the purpose of the talk		
2.	Evokes audience interest in the subject		
3.	The introduction		
4.	The sequence of ideas		
5.	The use of practical examples and/or		
6.	Speaking style (enjoyable, monotonous, etc., specify)		
7.	Attempts audience participation		
8.	Summary of the main points at the end		
9.	Asks questions		
10.	Answers questions asked by the audience		
11.	Rapport of speaker with his audience		
12.	Effectiveness of the talk		
13.	Uses AV aids appropriately		

MODEL CHECK LIST FOR DISSERTATION PRESENTATION

Name of the Student: Name of the Faculty:

Date:

SI. No.	Points to be considered divine	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Interest shown in selecting a topic					
2.	Appropriate review of literature					
3.	Discussion with guide & other faculty					
4.	Quality of Protocol					
5.	Preparation of proforma					
	Total Score:-					

CONTINUOUS EVALUATION OF DISSERTATION WORK BY GUIDE / CO-GUIDE

SI. No.	Items for observation during presentations	Poor 0	Below Average 1	Average 2	Good 3	Very Good 4
1.	Periodic consultation with guide/co-guide					
2.	Regular collection of case material					
3.	Depth of analysis / discussion					
4,	Departmental presentation of findings					
5.	Quality of final output					
6.	Others					
	Total Score:-					

LOG BOOK

Table 1: Academic activities attended Name: Admission Year: College:		
Date	Type of Activity Specify: Seminar, Journal Club,	Particulars

LOG BOOK

Table 2: Academic presentations made by the student Name: Admission Year: College:		
Date	Topic	Type of Presentation Specify: Seminar, Journal Club, Case Presentation, UG teaching, etc.

Table 3: Diagnostic and Operative procedures performed Name:

Admission Year:

Date	Name	IP No.	Procedure	Category O, A, PA, PI*

Key: O - Washed up and observed
A - Assisted a more senior Surgeon
PA - Performed procedure under the direct supervision of a senior Surgeon
PI - performed independently

Model Overall Assessment Sheet

Name of the College: Academic Year:

SI. No	Faculty Member & Others	Name of Student and Mean Score									
		A	B	C	I)	E	F	G	H	I	J
1											
2											
3											
4											
5											
Total Score											

Note: Use separate sheet for each year.