CURRICULUM

POSTGRADUATE

MD Physiology

From July 2026 session

JAWAHARLAL INSTITUTE OF POSTGRADUATE MEDICAL EDUCATION AND RESEARCH (JIPMER),
PUDUCHERRY – 605 006.

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This curriculum was approved at the 19th meeting of the Standing Academic Committee held on 28th January 2026 and ratified at the 22nd meeting of the Governing Body and will be applicable for students joining MD Physiology from the July 2026 session.

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GOAL OF THE COURSE

The aim of teaching postgraduate students in Physiology is to provide comprehensive knowledge of the functions of various systems of the body, facilitate the understanding of the physiological basis of health and disease, and carry out the basic responsibilities as a teacher in Physiology and to possess skills to carry out quality research work which has translational value.

TERMINOLOGY

Key-capabilities

They refer to the practices carried out by the specialists as part of their professional services.

They represent the services required from them by students, other medical/paramedical staff, patients, or society in general.

Thus, they refer to the specific tasks that the postgraduate will be expected to do after he completes the course.

For the purpose of training, the tasks are broken down into units that have distinct cognitive concepts unless they are predominantly procedural or attitude-based.

Core ideas in the practice of Key Capabilities

They refer to the ideas that underlie specialists' practice. They include ideas and concepts about the structure and functioning of organs and organ systems in health and disease, lab investigations, reporting of lab results, equipment, etc.

COURSE CONTENT

1. Key capabilities in the practice of Physiology (outline below, details in Annexure 1 (Part A))
2. Details of the course content (outline below, details in Annexure 1 (Part B))
3. Peripheral postings, details in Annexure 1(Part C) and under 'Educational strategy'

(Please refer to Annexure 1 for details)

OUTLINE

KEY CAPABILITIES	
A. Professional in teaching	
1	Teac undergraduate medical, paramedical, allied health sciences, and postgraduate students the principles of general, systemic, molecular, and applied physiology
2	Teach practical aspects of Physiology to undergraduates and postgraduates
3	Apply physiological knowledge to understand the etiopathogenesis of various diseases
4	Perform lab investigations to assess the physiological functions of various systems in the body, both in diseased and normal individuals
5	Possess adequate skills to interpret lab reports.
6	Devise newer accurate tests/methods for evaluating physiological functions.
B. Preceptor in integrating general principles of medical education	
1	Integrate the general principles of medical education using appropriate teaching-learning techniques and resources.
2	Adopt the appropriate teaching-learning and assessment tools.
3	Create content-based teaching-learning lesson plans and assessment plans for undergraduate and postgraduate teaching.
4	Devise need-based novel teaching-learning and assessment tools.
5	Incorporate advances in technology for teaching and assessment.
6	Possess skills in e-learning technologies.

C. High-quality research	
1	Possess skills to carry out high-quality research work (Identify and define the Research Problem, Review the Literature, Formulate a Hypothesis, Research Design, Carry out the Research Process, Analyse Research Results, Report Research Findings, Publish study results in high-impact journals)
2	Present the research work in various scientific forums
3	Lead and guide a research project
4	Coordinate with clinical departments for collaborative research work
5	Know and follow ethical principles while performing research on humans and animals ● Learn to do basic data analysis using standard statistical tools ● Learn to write a scientific manuscript
6	Write a proposal for extramural funding
7	Evaluate research publications critically
8	Actively participate in seminars and journal clubs
D. Communication and collaboration	
1	Communicate with students, colleagues, seniors, faculty in the institute, administrators, and patients in different settings while overcoming communication barriers
2	Collaborate with clinicians across various disciplines and allied departments for academic, research-related activities and patient care services
3	Work with others to establish a conducive working environment.
4	Handle and resolve interpersonal conflicts and disagreements
5	Communicate effectively with patients during recruitment and obtain informed consent for research activities.
E. Handling of lab equipment	
1	Possess knowledge to handle & proper maintenance of laboratory equipment, operating systems, databases, and software
2	Possess basic knowledge of the calibration and standardization of laboratory equipment
3	Possess basic skills to handle technical issues relating to malfunctioning laboratory devices

4	Be aware of the various chemicals/reagents/kits, used and their Material Safety Data Sheets (MSDS) and storage specifications for laboratory safety
5	Effectively dispose of the laboratory waste following the guidelines of biomedical waste management to ensure minimal risk of infections and accidents in laboratories
F. Providing clinical diagnostic services	
1	Apply the theoretical knowledge in relevant clinical settings to aid in diagnosis and therapeutic management
2	Possess skills to render patient care services through various diagnostic lab investigations (Autonomic function tests, Pulmonary Function tests, EP/EMG investigations, Body composition analysis) available in the department
3	Possess adequate skills to interpret patients' lab reports accurately
G. Functioning and contributing as a team member and or team leader	
1	Possess skills to set up special laboratories for assessing the physiological functions of various systems
2	Participate in and contribute to departmental and institutional quality improvement activities
3	Effectively lead a team for academic, research, or patient care services
4	Possess AETCOM skills
H. Life-long learner	
1	Possess an ongoing quest to remain updated on recent advances in Physiology
2	Integrate new shreds of evidence into clinical practice

LEARNING RESOURCES

Theory Books:

1. Review of Medical Physiology: by W. F. Ganong
2. Textbook of Medical Physiology: by Dr. G. K. Pal
3. Understanding Medical Physiology: by Dr. R. L. Bijlani
4. Medical Physiology: by A. Rhodes and G. A. Tanner
5. Medical Physiology: by W. F. Boron and E. L. Boulpep
6. Textbook of Medical Physiology: Arthur C. Guyton
7. Textbook of Medical Physiology: by Dr. A. K. Jain
8. Physiological basis of Medical Practice: by Best and Taylor
9. Physiology: by R. M. Berne and M. N. Levy
10. Textbook of Physiology: by H. D. Patton, A. F. Fuchs, B. Hille, A. M. Scher and R. Steiner
11. Principles of Neural Science. Eric R. Kandel, John D. Koester, Sarah H. Mack, Steven A. Siegelbaum.

Practical Books:

1. Textbook of Practical Physiology: by Dr. G. K. Pal and Dr. Pravati Pal
2. Textbook of Practical Physiology: by Dr. A. K. Jain
3. Textbook of Practical Physiology: by Dr. C. L. Ghai
4. Textbook of Practical Physiology: by Dr. Ranade

EDUCATIONAL STRATEGY

Academic Activity	Day	Timing
PG Seminars or PG practical presentation	Friday	2.30 pm - 4.30 PM
UG practical presentation or Journal Club	Saturday	11.00 am -1.00 PM

Seminar, Practical presentation and Journal club (Refer to Annexure 2)

- Minimum number of seminar presentations by each student: 5/year
- Minimum number of PG practical presentations by each student: 5/year
- Minimum number of Journal club presentations by each student: 2/year
- Minimum number of seminar and/or practical and/or journal club participations: 50/year/student
- Minimum 75% attendance for the presentations.

Posting within Department

The postgraduate residents will be posted in different workplaces of the department on rotation at frequent intervals throughout the course. He/she will achieve the objectives of the posting in all these workplaces.

- Semester–wise split
- Rotation: 3 months/lab
- To maintain a log book – Number of cases, case details, and findings.
- Assessed by SR I/C and Faculty I/C (Minimum 3 cases to be entered in logbook)
- End posting test – Assessment will be done.

All post-graduate residents will be posted in the following departmental laboratories on a rotation basis as a part of academic training:

1. Hematology and Human Practical Lab
2. Pulmonary Function Testing Lab
3. Obesity Research Lab
4. Cardiovascular Research Lab
5. Electrophysiology Lab
6. Autonomic Function Testing Lab
7. Neurophysiology Lab
8. Molecular Physiology Lab
9. Central Animal Facility
10. Intra-operative Neuromonitoring
11. ACYTER and Lifestyle Medicine

Peripheral Posting

The postgraduate residents will be posted in different departments/divisions of the hospital/institute during the first two and a half years of their course. The residents will be assessed for their knowledge, skills, and performance in the department of peripheral posting. Attendance and feedback from these postings will be sent by the respective departments to Physiology.

- Semester–wise split
- Total duration – 6 weeks

Year	Semester	Peripheral departments
1st year	1st semester	-
	2nd semester	Biostatistics
2nd year	3rd semester	Pulmonology
	4th semester	Neurology
	End of 4th semester	Cardiology
3rd year	5th semester	Endocrinology, Biochemistry

Dissertation

- A research project should be undertaken and dissertation must be submitted as per Postgraduate Research Monitoring Committee (PGRMC) guidelines of JIPMER.
- Two hard copies of the dissertation, prepared from the research project, should be submitted to the Dean (Academics) JIPMER, at two and half years of the course to become eligible to appear for the final examination at the end of the course, as per the guidelines of JIPMER.
- Six monthly interim presentations of the dissertations will be done to monitor the progress of the research work and take corrective measures when faced with difficulties.
- **Please refer to Postgraduate Dissertation Regulations and Postgraduate Examination Regulations document for further details**

WORKPLACE OBSERVATION

Logbook

(Please refer to Annexure 3 for sample forms)

1. A consolidated record of the number of cases, done independently and with assistance, of each procedure type is entered as per the format in **Annexure 3.** Each entry is made with the date and is to be certified by faculty.
2. Detailed work-up of cases selected every month from posting in different workplaces (2 cases with different clinical diagnoses) will be maintained by the resident and entered in the logbook.

3. Record of academic activities (at the department, institute, or outside institute level) to be entered in the logbook are as follows

i. Presentation in departmental seminars
ii. Presentations in journal clubs presented (with Title, Journal & Article reference)
iii. Conferences attended – National/International
iv. Papers presented at conferences with title, name of the conference, date of presentation (with abstract book)
v. Papers published in the journal (with article reference)
vi. Peripheral postings: Feedback forms/score sheets filled by faculties in other departments during the peripheral posting

4. Record of co-scholastic activities, if any

Workplace observation scheme
(Recorded 4 monthly – submitted along with internal assessment marks)

(Please refer to Annexure 3 for sample forms)

The day-to-day activities in practice and learning by the resident will be observed and recorded in the "workplace observation form" at pre-decided time instances.

Assessment of the logbook is to be done at the same time instances, and entry is made in the 'workplace observation form' by the faculty.

Feedback, as part of formative assessment, is given to residents, by faculty, during these time instances

ASSESSMENT

Marks

Exam	Marks	Description
Theory exit examination	400 marks	This is the written exam at the end of the course. Four theory examination papers as given in the curriculum document of the course.
Practical exit exam	400 marks	This is the practical examination at the end of the course. The detailed scheme is given in the curriculum document of the course.
Internal Assessment	Internal assessment Theory: 50 marks	Two exams should be conducted - one at the end of first year and the other at the end of second year. Portions for the examination and pattern of the examination must be notified to the students at least one month in advance. The pattern of the internal assessment test will be similar to one paper of the theory exit examination. Two faculty members will evaluate the paper of each candidate in a blinded manner and the average of the 2 scores will be taken as the final score for the internal assessment. If a resident misses one of the tests due to medical reasons (medical certificate from a faculty member of the treating department and duly forwarded by the HoD to the Dean (Academic)), he/she can be permitted to appear in the test that is held for the next batch 6 months later. This can be permitted only once in the course period. If a resident does not attend an internal assessment test, or if he/she fails to attend the rescheduled test due to medical reasons, the score will be considered as 0 for the test. No retests or re-evaluation will be permitted under any circumstances. The internal assessment marks should be communicated to the students within two months of conducting the exams. Internal assessment test marks will be added to the final aggregate to the tune of 100 marks (theory and practical). There is no cut off of internal assessment test scores for determining eligibility to appear in the exit examination or to decide pass/fail solely based on the internal assessment test scores. However, when a student secures less than 50%

		marks in the internal assessment or when any concern is formally raised by the student with the Dean office, a review board with at least 3 faculty members should be constituted to review the student's performance with the student, recommend appropriate remedial measures, document the remedial plan, and submit a signed copy of the document to the Dean's Office. Additional periodic assessments can be held as part of formative assessment. Scores of these tests will not be considered for internal assessment and will not be considered for replacing scores of any of the internal assessment tests. Information to be provided to the Dean Office, before the final examination. 1. Dates of internal assessment examinations conducted 2. Names of faculty members involved in assessment against each date 3. Marks obtained by students in theory, practical and workplace-based observation in each exam session 4. Internal assessment marks for each student for Theory, Practical and Workplace based assessment. An average of the two theory and practical tests will be used to calculate scores for 50 and 25 marks respectively. Cumulative workplace-based assessment scores will be determined for 25 marks. 5. Copy of review documentations for periods of low performance of a student, if any, with remedial measures suggested by the departmental committee.
Internal Assessment (Practical and Workplace-based assessment)	Internal assessment Practical: 25 marks Internal assessment Workplace-based assessment: 25	For practical examinations, all members of the faculty of the department, from Assistant Professor to the senior-most faculty, shall participate in internal assessment on a rotating basis. The assessment shall be planned such that multiple faculty members are engaged for each student and different faculty members are engaged for the two assessments, wherever feasible. The pattern prescribed in the curriculum document shall be followed for practical assessments and the score shall be adjusted for 25 marks. Workplace-based assessment marks are given based on practice of the profession and affective domain attributes in the workplace and in the learning environment. Workplace observation proforma should be

	marks	provided to students at the time of joining the department. The method of workplace observation should be explained to the students at the beginning of the course.
Dissertation	100 marks	Dissertation marks will be calculated by the average of the scores provided by 2 external examiners. Approval of the dissertation with more than 50% scores awarded by the external examiners will be one of the eligibility criteria for appearing for the exit examination of the discipline.
Total	1000 marks	**Criteria for PASS:** 1. (a) A candidate will need to pass the final Theory Exit Exam and Practical Exit Exam independently. (b) A minimum of 50% marks in 'Theory Exit exam' (a minimum of 40% in each of the four papers) and 50% in 'Practical Exit exam' separately shall be mandatory 2. A candidate should also score 50% or above in the final aggregate marks (500 out of 1000) to pass in the degree course. If a student secures a pass score in theory and practical examination but fails in the aggregate score, he/she can re-appear in the exit examination of the subsequent session. There is no provision to improve internal assessment or dissertation scores.
Please refer to Postgraduate Examination Regulations document for further details		

Syllabus for Exams

Theory Exit Exam

Paper I: General Physiology, Body fluids, Blood, Physiological basis of immunity, Renal physiology, Basics of biostatistics, and History of Medicine.

Paper II: Endocrine physiology, Physiology of reproduction, ANS and Gastrointestinal system.

Paper III: Cardiovascular system, Respiratory system, Integrative physiology (environmental physiology, exercise physiology, nutrition, and yoga).

Paper IV: Central nervous system, Special senses, Nerve and muscle, and Recent advances.

Practical Exit Exam

Duration: Two days

Maximum Marks: 400 (Practical: 290 marks; Viva: 80 marks, Microteaching: 15 marks, Thesis viva: 15 marks)

First day:

1. Hematology practical: 60 marks
2. Lab Investigation Practical: 60 marks
3. Human practical: 50 marks
4. Clinical practical: 60 marks

Second day:

5. Mammalian practical: 60 marks
6. Microteaching: 15 marks
7. Viva: 80 marks
8. Thesis Viva: 15 marks

MODEL THEORY QUESTION PAPERS

Department of Physiology, JIPMER, Puducherry

M.D. Physiology model paper

Paper I – General Physiology, Body fluids, Blood, Physiological basis of Immunity, Renal Physiology, Basics of Biostatistics & History of Medicine

Time: 3 Hours **Maximum Marks:** 10x10=100

Answer all questions

Draw diagrams wherever necessary

1. Explain the experimental techniques to study the movement of ions across the cell membrane. (10)
2. Discuss the mechanism of transcription and translation in brief. Add a note on the human genome project. (3+3+4)
3. Discuss cellular immunity. Add a note on the role of cellular & humoral immunity in combating COVID-19. (6+4)
4. Briefly describe the features and treatment of anaemia due to precursor cell failure. Add a note on the regulation of erythropoiesis (3+3+4)
5. Discuss the structure & functions of platelets. Add a note on platelet function tests. (6+4)
6. Explain the role of the kidney in acid-base homeostasis. Add a note on limiting pH in urine. (8+2)
7. Explain the role of different hormones on the transport of solutes and ions across kidney tubules (10)
8. Explain sample size calculation in brief. (10)
9. Describe the body composition in brief. Explain the principle & method of measurement of intracellular fluid volume. (4+6)
10. Discuss the contribution of following scientists in Physiology (5+5)
    a) William Bowman
    b) E.H. Starling

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M.D. Physiology model paper

Paper II – Endocrine Physiology, Physiology of Reproduction, ANS & GIT

Time: 3 Hours **Maximum Marks:** 10x10=100

Answer all questions

Draw diagrams wherever necessary

1. Classify hormones and receptors. Differentiate between genomic and non-genomic effects of hormones. (2+8)
2. Name the adrenocortical hormones. Explain the mechanism of action & functions of any one of them. Add a note on Cushing syndrome. (1+6+3)
3. Briefly describe the functions of hormones of the ovary. (10)
4. List the sex chromosomal anomalies. Describe any two sex chromosomal anomalies in humans and the physiological basis of features in them. (2+8)
5. Briefly describe the cause, clinical features & pathophysiology of Type-I diabetes mellitus. Add a note on its diagnosis & management. (6+4)
6. Discuss the synthesis, functions, regulation & applied aspects of hormones secreted by the pineal gland. (2+3+3+2)
7. Define BRS & give its normal value. Discuss the principle, technique & physiological basis of its measurement. Add a note on the applied aspect of BRS. (2+6+2)
8. Briefly describe the digestion and absorption of proteins in GIT. (10)
9. List the liver function tests and briefly discuss the interpretation of any two. (3+7)
10. Discuss the nerve supply of GIT. Add a note on the megacolon. (7+3)

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M.D. Physiology model paper

Paper III – CVS, RS, Integrated Physiology (Space Physiology, Ageing, Environmental Physiology, Sports and Exercise Physiology, Nutrition & Yoga)

Time: 3 Hours **Maximum Marks:** 10x10=100

Answer all questions

Draw diagrams wherever necessary

1. Discuss the special properties of cardiac muscle. (10)
2. Discuss the neural regulation of respiration. Add a note on the measurement of FRC. (7+3)
3. Discuss the ECG changes in acute MI & the physiological basis of it. A short note on HIS bundle electrocardiogram. (6+4)
4. Explain the long-term regulation of BP (10)
5. Draw a labelled Wiggers diagram. Add a note on Special features & factors affecting pulmonary blood flow. (3+3+4)
6. Short notes on (i) Mechanism of refractory shock

   (ii) Flow volume loop of the lung (5+5)
7. Discuss briefly (i) Carbon dioxide dissociation curve

   (ii) Methods of Oxygen administration (6+4)
8. Explain the (i) Cardiovascular changes in isometric exercise.

   (ii) Exercises recommended for hypertensive patients and their basis (5+5)
9. Discuss briefly (i) Measurement & classification of obesity

   (ii) Mechanism of the genesis of fever (5+5)
10. Short notes on (i) Role of micronutrients. (ii) Role of pranayama in COVID 19 (5+5)

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MD Physiology model paper

Paper IV - Central Nervous System, Special Senses, Nerve and Muscle Physiology & Recent Advances

Time: 3 Hours **Maximum Marks:** 10x10=100

Answer all questions

Draw diagrams wherever necessary

1. Name the ascending pathways and describe the dorsal column pathways. Write a note on ataxia. (2+5+3)
2. Describe the molecular basis of smooth muscle contraction and relaxation. (10)
3. Define memory and learning. Discuss the various types of memory with suitable examples. (2+8)
4. Discuss the pathophysiological basis of obstructive sleep apnoea. Briefly describe the treatment modalities. (6+4)
5. Explain the mechanism of regulation of posture. (10)
6. Describe the theories of colour vision. Explain the physiological basis of colour perception. (4+6)
7. Draw the pain pathways. Explain the endogenous analgesia system (2+8)
8. Describe the functions of the limbic system. What is Kluver-Bucy syndrome? (7+3)
9. Explain the mechanism of action of any four types of neuromuscular blockers. (10)
10. Discuss the perception of the sensation of smell with a suitable example. Add a note on the loss of smell due to viral infection. (7+3)

Annexure 1 (Part A)

Key Capabilities

Key capabilities have been listed under the following categories

A. Professional in teaching
B. Preceptor in integrating the general principles of medical education
C. High-quality research
D. Communication and collaboration
E. Handling of lab equipment
F. Providing clinical diagnostic services
G. Functioning and contributing as a team member and or team leader
H. Lifelong learner

Mapping of Key Capabilities in the Practice of Physiology

S.no	Key capabilities	**Minimum expected performance at months**					
		6	**12**	**18**	**24**	**30**	**36**
1.	A. Professional in teaching						
1a.	Teach undergraduate medical, paramedical, allied health sciences, and postgraduate students the principles of general, systemic, molecular, and applied physiology.	1	2	3	4	5	5
1b.	General physiology, body fluids, blood and immunity	1	2	3	4	5	5
1c.	Renal system, Gastrointestinal system and Autonomic Nervous system	1	1	2	3	4	5
1d.	Endocrine, reproduction and Respiratory system	1	1	1	2	4	5
1e.	Cardiovascular system, Exercise and Integrative physiology	1	1	1	2	4	5
1f.	Nerve Muscle, Motor and Sensory system	1	1	1	2	4	5
1g.	CNS and special senses	1	1	1	1	2	4
1h.	Statistics	1	1	1	2	3	4

2.	Teach practical aspects of Physiology to undergraduates and postgraduates.	2	2	3	4	5	5
2. a	All UG practical Hematology practical 1. Collection of blood samples 2. Estimation of haemoglobin 3. Estimation of RBC count 4. Estimation of Haematocrit and calculation of blood indices 5. Estimation of WBC count 6. Making a peripheral smear and performing the differential leucocyte count 7. Estimation of AEC 8. Estimation of Arneth count 9. Estimation of ESR 10. Determination of blood group 11. Estimation of bleeding time and clotting time 12. Demonstrate Osmotic fragility, platelet count, reticulocyte count	2	4	4	5	5	5
2 b.	Human practical 1. Demonstration of muscle fatigue by Mosso's ergography 2. Recording of respiratory movements by Stethography 3. Charting the field of vision - Perimetry 4. Determination of vital capacity -Vitalometry 5. Recording of blood pressure and heart rate at rest 6. Determination of heart rate and blood pressure response to standing and exercise	2	2	4	4	5	5
2 c.	Clinical examination 1. Clinical examination of the Cardiovascular system 2. Clinical examination of the Respiratory system 3. Clinical examination of the Motor system and reflexes 4. Clinical examination of the Sensory system 5. Clinical examination of I-XII Cranial nerves	2	2	4	4	5	5

	6. Clinical examination of Gastrointestinal system 7. Demonstration of Autonomic function tests and Pulmonary function tests						
2 d.	Animal experiments Demonstration of the effect of various drugs on rat uterine and intestinal contraction (Animal/Simulator).	1	1	2	3	4	5
3.	Apply physiological knowledge to understand the etiopathogenesis of various diseases.	1	2	3	4	5	5
4.	Perform lab investigations to assess the physiological functions of various systems in the body, both in diseased and normal individuals. Perform the following lab investigations: 1. Heart rate variability 2. Cardiac autonomic function tests 3. Baroreflex sensitivity 4. Nerve conduction studies 5. Pulmonary function tests 6. Body composition analysis 7. Visual evoked potential 8. Auditory evoked potential 9. Cognitive evoked potential - P300 10. Somatosensory evoked potential	2	2	3	4	5	5
	Learn the following the lab experiments: 1. Electromyography 2. Electroencephalogram 3. ELISA for various biochemical parameters	1	1	1	2	3	4
5.	Possess adequate skills to interpret the lab reports.	1	2	3	4	5	5
6.	Devise newer accurate tests/methods for evaluating physiological functions.	1	1	1	1	2	2
	B. Preceptor in integrating general principles of medical education						

1.	Integrate the general principles of medical education using appropriate teaching-learning techniques and resources.	2	2	3	3	4	5
2.	Adopt the appropriate teaching-learning and assessment tools.	2	2	3	3	4	5
3.	Create content-based teaching-learning lesson plans and assessment plans for undergraduate and postgraduate teaching.	2	2	3	3	4	5
4.	Devise need-based novel teaching-learning and assessment tools.	1	2	3	3	4	5
5.	Incorporate advances in technology for teaching and assessment.	2	2	3	3	4	5
6.	Possess skills in e-learning technologies.	2	2	3	3	4	5
	C. High-quality research						
1.	Possess skills to carry out high-quality research work (Identify and define the Research Problem, Review the Literature, Formulate a Hypothesis, Research Design, Carry out the Research Process, Analyse Research Results, Report Research Findings, Publish study results in high-impact journals)	1	2	3	4	4	5
2.	Present the research work in various scientific forums.	1	1	2	3	4	5
3.	Lead and guide a research project.	1	1	1	2	3	4
4.	Coordinate with clinical departments for collaborative research work.	1	2	2	3	3	4
5.	Know and follow ethical principles while performing research on humans and animals.	1	1	2	3	4	5
6.	Write a proposal for extramural funding.					1	2
7.	Evaluate research publications critically.	1	1	1	2	3	4

8.	Actively participate in seminars and journal clubs.	1	2	3	4	4	5
	D. Communication and collaboration						
1.	Communicate with students, colleagues, seniors, faculty in the institute, administrators, and patients in different settings while overcoming communication barriers.	2	3	4	4	5	5
2.	Collaborate with clinicians across various disciplines and allied departments for academic, research-related activities and patient care services.	2	3	4	4	5	5
3.	Work with others to establish a conducive working environment.	2	3	4	4	5	5
4.	Handle and resolve interpersonal conflicts and disagreements.	2	3	4	4	5	5
5.	Communicate effectively with patients during recruitment and obtain informed consent for research activities.	2	3	4	4	5	5
	E. Handling of lab equipment						
1.	Handle laboratory equipment, operating systems, databases, and software.	1	2	3	3	4	5
2.	Possess basic knowledge of the calibration and standardization of laboratory equipment.		1	2	3	4	5
3.	Possess basic skills to handle technical issues relating to malfunctioning laboratory devices.		1	2	3	4	5
4.	Be aware of the various chemicals/reagents/kits used and their storage specifications for laboratory safety.		1	2	2	3	4
5.	Effectively dispose of laboratory waste to ensure minimal risk of infections and accidents in laboratories.	1	2	2	3	4	5
	F. Providing clinical diagnostic services						

1.	Apply the theoretical knowledge in relevant clinical settings to aid in diagnosis and therapeutic management.	1	2	2	3	4	5
2.	Possess skills to render patient care services through various diagnostic lab investigations (Autonomic function tests, Pulmonary Function tests, EP/EMG investigations, Body composition analysis) available in the department.		1	2	3	4	5
3.	Possess adequate skills to interpret patients' lab reports accurately.		1	2	3	4	5
4.	Proficiency in BCLS and ACLS		1	2	3	4	
	G. Functioning and contributing as a team member and or team leader						
1.	Possess skills to set up special laboratories for assessing the physiological functions of various systems.			1	1	2	3
2.	Participate in and contribute to departmental and institutional quality improvement activities.				1	2	3
3.	Effectively lead a team for academic, research, or patient care services.				1	2	3
	H. Life-long learner						
1.	Possess an ongoing quest to remain updated on recent advances in Physiology.		1	2	3	4	5
2.	Integrate new shreds of evidence into clinical practice.				1	2	3

LEARNING OBJECTIVES

Generic objectives for 'Professional in teaching'

- Able to teach undergraduate medical, paramedical, allied health science, and postgraduate students the principles of general, systemic, molecular, and applied physiology.
- Able to teach practical aspects of Physiology to undergraduates and postgraduates.
- Able to apply physiological knowledge to understand the etiopathogenesis of various diseases.
- Able to perform lab investigations to assess the physiological functions of various systems in the body, both in diseased and normal individuals.
- Should possess adequate skills to interpret lab reports.
- Able to devise newer accurate tests/methods for evaluating physiological functions.

Generic objectives for 'Preceptor in integrating general principles of medical education'

- Able to integrate the general principles of medical education using appropriate teaching-learning techniques and resources.
- Able to adopt the appropriate teaching-learning and assessment tools.
- Able to create content-based teaching-learning lesson plans and assessment plans for undergraduate and postgraduate teaching.
- Able to devise need-based novel teaching-learning and assessment tools.
- Able to incorporate advances in technology for teaching and assessment.
- Should possess skills in e-learning technologies.

Generic objectives for 'Perform High-quality research'

- Should possess the skills to carry out high-quality research work (Identify and define the Research Problem, Review the Literature, Formulating a Hypothesis, Research Design, Carry out the Research Process, Analyse Research Results, Report Research Findings, Publish study results in high impact journals)
- Able to present the research work in various scientific forums.
- Ability to lead and guide a research project.
- Able to coordinate with clinical departments for collaborative research work.
- Should follow ethical principles while performing research on humans and animals.
- Able to write a proposal for extramural funding
- Able to evaluate research publications critically.
- Should actively participate in seminars and journal clubs.

Generic objectives for 'Communication and collaboration'

- Able to communicate with students, colleagues, seniors, faculty in the institute , administrators, and patients in different settings while overcoming communication barriers.
- Able to collaborate with clinicians across various disciplines and allied departments for academic and research-related activities.
- Able to work with others to establish a conducive working environment.

- Able to handle and resolve interpersonal conflicts and disagreements.
- Communicates effectively with patients during recruitment and obtaining informed consent for research activities.

Generic objectives for 'Handling of lab equipment'

- Able to handle laboratory equipment, operating systems, databases, and software.
- Should possess basic knowledge of the calibration and standardization of laboratory equipment.
- Should possess basic skills to handle technical issues relating to malfunctioning of laboratory devices.
- Should be aware of the various chemicals/ reagents/kits used and their storage specifications for laboratory safety.
- Able to effectively dispose of laboratory waste to ensure minimal risk of infections and accidents in laboratories.

Generic objectives for 'Providing clinical diagnostic services'

- Able to apply the theoretical knowledge in relevant clinical settings to aid in the diagnosis and therapeutic management
- Should possess skills to render patient care services through various diagnostic lab investigations (Autonomic function tests, Pulmonary Function tests, EP/EMG investigations, Body composition analysis) available in the department.
- Should possess adequate skills to interpret patients' lab reports accurately.

Generic objectives for 'Functioning and contributing as a team member and or team leader'

- Should possess skills to set up special laboratories for assessing the physiological functions of various systems.
- Should participate in and contribute to departmental and institutional quality improvement activities.
- Should effectively lead a team for academic, research, or patient care services.

Generic objectives for 'Life-long learner'

- Should possess an ongoing quest to remain updated in recent advances in Physiology.
- Able to integrate new shreds of evidence into clinical practice.

Annexure 1 (Part B)

Details of course content

Details of Course Content

I. General physiology, Body fluids, Blood, Physiological basis of immunity, Renal physiology and Basics of biostatistics.

General Physiology:

1. Principles of homeostasis and feedback control mechanisms
2. Functional organization of cells, intercellular connections, cell death (apoptosis)
3. Physiology of genetics
4. Transport across the cell membrane
5. Membrane potential

Body Fluids:

1. Body fluid compartments
2. Measurement of body fluids
3. Regulation of volume and composition of body fluids

Blood Physiology:

1. Composition and functions of blood
2. Bone marrow and hemopoiesis
3. Erythropoiesis and physiology of red cells
4. Blood groups and blood transfusion
5. Pathophysiology of anaemia and polycythaemia
6. Leucopoiesis and leucocytes
7. Haemostasis, platelets, and blood coagulation

Physiological basis of Immunity:

1. Development of immunity
2. Cellular immunity
3. Humoral immunity
4. Physiological basis of immunotherapy, and prevention of transplant rejection

Renal Physiology

1. Functional Anatomy of Kidney
2. Renal Blood Flow and Glomerular Filtration
3. Tubular Functions
4. Mechanisms of Urine Concentration and Dilution
5. Water Excretion; Diuresis and Diuretics
6. Acidification of Urine
7. Kidney Function Tests
8. Physiology of Micturition and Bladder Dysfunctions

Basics of Biostatistics:

1. Student t test
2. ANOVA
3. Post-hoc tests
4. Tests for statistical comparison
5. Other biostatistical tests

II. Endocrine physiology, Physiology of reproduction, ANS and Gastrointestinal system

Endocrine Physiology:

1. Mechanisms of hormone actions, G proteins

2. Endocrine functions of the hypothalamus and hypothalamopituitary axis
3. Anterior and posterior pituitary glands
4. Thyroid gland
5. Adrenal cortex and medulla
6. Endocrine pancreas
7. Parathyroid gland and calcium homeostasis, bone physiology
8. Pineal gland
9. Local hormones

Physiology of Reproduction:

1. Sex differentiation and development
2. Physiology of puberty and menopause
3. Male reproductive system
4. Female reproductive system
5. Physiology of pregnancy and parturition
6. Physiology of breast development and lactation
7. Physiology of contraception

ANS:

1. Functional Organization of ANS
2. The Sympathetic System
3. The Parasympathetic System
4. Control of Autonomic Functions; Autonomic Dysfunction; Autonomic Function Tests

Gastro-intestinal System:

1. Functional Organization of GI tract
2. Gastrointestinal Hormones
3. GI Secretions
- Salivary secretion
- Gastric Secretion; Gastric Function Tests and Pathophysiology of Peptic Ulcer
- Pancreatic Secretion and Pancreatic Function Tests
- Functions of Liver and Pathophysiology of Jaundice
- Biliary Secretion
- Intestinal Secretion
4. GI Motility
- Chewing, Deglutition and Oesophageal Motility
- Gastric Motility
- Small Intestinal Motility
- Motility of Large Intestine; Colonic Functions and Defecation
5. Principles of Digestion and Absorption

III: Cardiovascular system, Respiratory system, and Integrative physiology (Environmental physiology, exercise physiology, nutrition, and yoga)

Cardiovascular System:

1. Functional organization of CVS, Functional anatomy, and innervation of the heart
2. Properties of Cardiac Muscle
3. Electrophysiology of Heart and Electrocardiogram
4. Cardiac Cycle
5. Cardiac Output

6. Heart Rate and Arterial Pulse
7. Principles of Hemodynamics
8. The Arterial System
9. The Venous System
10. Capillary and Lymphatic Circulations Blood Pressure and its Regulation
11. Integrated Regulation of Cardiovascular System
12. The Regional Circulations
13. Foetal Circulation
14. Pathophysiology of Hypertension and Hypotension
15. Pathophysiology of Shock
16. Pathophysiology of Heart Failure

Respiratory System:

1. Functional Organization of Respiratory System
2. Mechanics of Breathing
3. Alveolar Ventilation and Gas Exchange in the Lungs
4. Pulmonary Circulation and Ventilation-Perfusion Ratio
5. Transport of Gases in Blood
6. Regulation of Respiration
7. Physiological Changes at High Altitude
8. Hypoxia and Oxygen Therapy
9. Hazards of Deep-Sea Diving and Effects of Increased Barometric Pressure
10. Respiration in Abnormal Conditions and Abnormal Respirations
11. Artificial Respiration and Cardiopulmonary Resuscitation
12. Pulmonary Function Tests

Integrative Physiology:

1. Environmental physiology
2. Exercise physiology
3. Nutrition
4. Physiology of Yoga

IV: Central nervous system, Special senses, Nerve and muscle, and Recent advances

Central nervous system Physiology:

1. Functional Organization of Nervous System; Functions of glial cells
2. Synaptic Transmission in CNS
3. The Sensory System

- Physiology of Receptors
- Ascending Pathways
- Physiology of Pain
- Trigeminal System
- Thalamus and Sensory Cortex

4. The Motor System

- Segmental Organization of Motor System
- Muscle Spindle and Golgi Tendon Organ
- Spinal Reflexes
- Descending Pathways
- Control of Posture and Movement

- Basal Ganglia
- Cerebellum
- Vestibular Apparatus

5. Functions of the Hypothalamus, EEG, and Sleep
6. Limbic System and Higher Functions
7. Cerebrospinal Fluid

Special senses:

1. Physiology of vision
2. Physiology of hearing
3. Physiology of taste and smell

Nerve and muscle Physiology:

1. Physiology of nerve (nerve action potential, propagation, and conduction of action potential, classification of nerve fibres, responses of nerve to injury)
2. Physiology of muscle (structure of skeletal, cardiac, and smooth muscles; molecular basis of muscle contraction)
3. Neuromuscular transmission

Recent advances:

1. Advances in all branches of physiology like neurophysiology, cell physiology, etc.
2. Advances in techniques like recombinant DNA technology, voltage clamping, patch clamping, echocardiography, MRI, computerized investigations, etc.
3. Advances in applied physiology
4. Advances in research methodologies

Annexure 1 (Part C)

Peripheral postings

Department	Basic Objectives	Duration	Cases/Practical/ Demonstrations	Attended/ Presented/ Participated	Faculty signature
Pulmonology	To study PFT, PSG interpretation in disease conditions	1 week (FN)			
Biochemistry and Endocrinology	To study ELISA techniques & interpretation, endocrinological principles of management	1week (FN)			
Cardiology	To study ECG, ECHO, and TMT (technique & interpretation of report)	1 week (FN)			
Biostatistics	Hands-on training in sample size calculation, inferential statistics, descriptive statistics, correlation, and regression analysis	2 weeks (AN)			
Neurology	To study EEG, NCS, EMG, TMS, and DBS and evoked potential interpretation	1 week (FN)			

(May include more departments as needed/available)

Annexure 2

Seminar topics (Theory & Practical)

TOPIC	Date Attended/ Presented	Faculty Signature
List of theory topics		
General Physiology		
1. Physiology of genomics		
2. Type of ion channels		
3. Patch and volume clamp		
4. Membrane potential		
5. Mechanism of oxidative stress		
Blood and Immunity		
6. Stem cells and their application		
7. Blood transfusion and blood substitutes		
8. Phagocytosis (Neutrophil, eosinophil, and macrophage)		
9. Anticlotting mechanism and regulation		
10. Bleeding disorder		
11. Coagulation disorder		
12. T cell – development, mechanism of action		
13. B cell – development, mechanism of action		
14. Complement system		
15. Type of antigen & Antigen Presenting cell		
16. Monoclonal antibody		
17. Immunological tolerance		
Nerve and Muscle physiology		
18. Graded potential and its property		
19. Propagation of action potential		
20. Neuromuscular junction and its disorder		
21. Postsynaptic potential and neuromuscular blocker		
22. Property of skeletal muscle		
23. EC of smooth muscle		
24. Property of smooth muscle		
GIT Physiology		
25. Electrophysiology of GI smooth muscle		
26. Gastric secretion – experimental evidence and its regulation		
27. GI immune system		
28. Enterohepatic circulation and intestinal flora		
29. Diabetic gastropathy and malabsorption syndrome		
Renal Physiology		
30. Regulation and measurement of Renal blood flow		
31. Regulation and measurement of GFR		
32. Tubular function PCT and its disorder		
33. Tubular function DCT and LH and its disorder		
34. Counter current mechanism		
35. Mechanism of acidification of urine		
36. Micturition reflex and its disorder		

Endocrine Physiology		
37. G protein receptor and its disorder		
38. Second messengers – CAMP and IP3		
39. TK and JAK stat		
40. Direct and indirect action of GH		
41. Synthesis, Metabolism, regulation and MOA – Thyroid hormone		
42. Physiological action and disorder of Thyroid hormone		
43. Adrenal medullary hormone		
44. Adrenomedullin and chromogranin		
45. Function of glucocorticoids		
46. Function of mineralocorticoids		
47. Structure, Synthesis, Metabolism, regulation – Insulin		
48. MOA and Physiological action – Insulin		
49. Diabetes mellitus		
50. Physiological action and disorder – PTH		
51. Calcium homeostasis		
52. Synthesis, Metabolism, regulation and MOA – ADH		
53. Physiological action and disorder of ADH		
Reproductive Physiology		
54. Sex differentiation		
55. Male infertility and semen analysis		
56. Testicular hormone		
57. Ovarian hormone		
58. Female infertility treatment		
59. Placental hormone		
Cardiovascular Physiology		
60. Property of cardiac muscle		
61. Pacemaker potential and Cardiac action potential		
62. Pressure volume relationship		
63. Regulation and measurement of cardiac output		
64. Principle of haemodynamics		
65. Neural Regulation of BP		
66. Vascular, hormonal and long-term regulation of blood pressure		
67. Cardiac function curve		
68. Starling force and its application		
69. Heart lung preparation		
70. HIS bundle ECG		
71. Genomics of Hypertension		
72. Shock and Heart failure		
73. Endothelin		
Respiratory Physiology		
74. Pulmonary surfactant		
75. Dead space and its measurements		
76. Diffusing capacity		

77. VP ratio		
78. CO_2 transport		
79. Regulation of respiration		
80. Pre – Botzinger complex and J receptor		
81. Central pattern generator in respiration and breathing control in sleep		
82. Abnormal respiration and method of artificial respiration		
83. Oxygen debt – phases and note on oxygen toxicity		
84. Hypoxia and Hypoxia-inducible factors		
Integrative Physiology		
85. High altitude Physiology		
86. Deep sea diving Physiology		
87. Microgravity effect		
88. Regulation of body temperature and genesis of fever		
89. Type and degree of exercise		
90. Respiratory changes in exercise		
91. Cardiovascular changes in exercise		
92. Energy source, fatigue, and heat production in exercise		
93. Aerobic training		
94. Etiopathogenesis of obesity		
95. Acid base homeostasis		
Central nervous system Physiology		
96. Property of synapse		
97. Receptor potential and its property		
98. Pain pathway and theories of referred pain		
99. Mechanism of pain recognition and perception		
100. Analgesia system		
101. Motor neuron		
102. Muscle spindle		
103. Spinal reflex		
104. Medial system pathway		
105. Spinal integration of postural reflex		
106. Medullary integration of postural reflex		
107. Midbrain integration of postural reflex		
108. Cortical integration of postural reflex		
109. Basal ganglia pathway and disorder		
110. Function of cerebellum and disorder		
111. Vestibular apparatus		
112. Vestibular reflex and function test		
113. Circadian rhythm		
114. Regulation of food intake – hypothalamus		
115. Reticular activating system		
116. Physiology of sleep		
117. Theory of sleep and its disorder		
118. Major aminergic and cholinergic system		
119. Motivation and addiction		

120. Physiology of emotion and its disorder		
121. Learning and memory		
122. Disorder of Learning and memory		
123. Language and speech and its disorder		
124. Neocortex		
125. Cerebral asymmetry		
126. Cortical plasticity		
Special senses		
127. Phototransduction		
128. Visual pathway – disorder		
129. Visual adaptation		
130. Visual reflex		
131. Theories of colour vision		
132. Type of ocular movements – disorder		
133. Mechanism of hearing		
134. Cochlear potential		
135. Olfactory pathway		
136. Mechanism of smell perception		
137. Gustatory transduction		
List of Practical presentations		
Hematology practical		
1. Collection of blood samples		
2. Estimation of haemoglobin		
3. Estimation of RBC count		
4. Estimation of Haematocrit and calculation of blood indices		
5. Estimation of WBC count		
6. Making a peripheral smear and performing the differential leucocyte count		
7. Estimation of AEC		
8. Estimation of Arneth count		
9. Estimation of ESR		
10. Determination of blood group		
11. Estimation of bleeding time and clotting time		
12 .Demonstrate Osmotic fragility, platelet count, reticulocyte count		
13. Study of Haemopoietic Cells Present in the Bone Marrow		
Human practical		
1. Demonstration of muscle fatigue by Mosso's ergography		
2. Recording of normal and modified movements of respiration – Stethography		
3. Demonstration of ECG		
4. Charting the field of vision - Perimetry		
5. Determination of vital capacity -Vitalometry		
6. Determination of heart rate and blood pressure response to standing and exercise		

Clinical examination		
1. Clinical examination of the Cardiovascular system		
2. Clinical examination of the Respiratory system		
3. Clinical examination of GIT		
4. Clinical examination of Motor system and Sensory system		
5. Clinical examination of I-XII Cranial nerves		
Animal Lab practical		
1. Rat uterus & Effect of drugs		
2. Rat intestine & Effect of drugs		
3. Effect of drugs on mammalian heart		
Clinical Investigations		
1. Pulmonary function testing (PFT)		
2. Heart rate variability (HRV)		
3. Conventional Autonomic function tests(CAFTs) – Sympathetic & Parasympathetic tests		
4. Baroreceptor reflex sensitivity (BRS)		
5. Evoked potentials - P300, Somatosensory evoked potentials (SSEP)		
6. Motor nerve conduction study (MNCS)		
7. Sensory nerve conduction study (SNCS)		
8. Brainstem Evoked Response Audiometry(BERA)		
9. Tilt table test (TTT)		
10. Treadmill test (TMT)		
11. Surface Electromyography (EMG)		
12. Electroencephalography (EEG)		
13. Body composition analysis by Bioelectrical impedance analysis (BIA)		
14. Kinanthropometry		

Annexure 3

Workplace assessment form

Reporting time: on time/late

Number of leaves taken: authorized: **Unauthorised absenteeism, if any**

Duration of posting: From ……. To …….

Place of posting:

Hematology lab /Pulmonary function tests lab /Autonomic function tests lab/

Electrophysiology lab/Obesity lab /Cardiovascular research lab /Neurophysiology lab/

Animal lab / Molecular research lab

	Scores	0	1	2	3	NA
	Score 0- Not attempting to meet expectations **Score 1-** Attempting to, but yet to meet expectations **Score 2-** meets expectations **Score 3-** Proficient, independently exhibits responsibility and standards beyond minimum expectations NA- Not applicable to that lab					
1	**Maintaining proper conduct during the posted period (Regularity & Punctuality)**					
2	**Clinical Work up in labs** a. Takes History b. Interprets the reports and does proper documentation Consults with allied departments for doubts regarding the patient's history and the need for the investigation					
3	**Knowledge of proper handling of instruments during the test procedures**					
4	**During the test procedures** a. Monitors patients during the test procedure b. Coordinates with seniors, colleagues for executing the whole procedure c. Documents, informs and manages procedure related complications if any Gives instructions and appointment to patient for if follow up is needed					

5	**Displays adequacy of literature search and justifies rationale for interpretation of test results**					
6	**Maintains Meticulousness and Comprehensiveness of Records- in** ➢ File and Digital data management					
7	**Communication with patient and caretaker**					
8	**Team-based work and Leadership** ➢ Coordinates with Seniors and Colleagues ➢ Shows interest in teaching juniors ➢ AETCOM					
9	**Accepts feedback, self reflects and demonstrates willingness to change**					
	Total marks **(Maximum possible marks-30)**					
	Log Book Scoring (20 marks)					
	Signature of Faculty					

- **End posting assessment will be conducted at the end of each posted lab period**

1. MBBS LECTURES ATTENDED

S. No	Date	Topic	Hours	Signature of faculty

2. MBBS PRACTICAL DEMONSTRATION GIVEN

S. No	Date	Topic	Hours	Signature of faculty

3. OTHER UG COURSES LECTURES TAKEN

S. No	Date	Topic	Hours	Signature of faculty

4. PRACTICAL DEMONSTRATION GIVEN FOR OTHER UG COURSES

S. No	Date	Topic	Hours	Signature of faculty

5. PG TOPICS PRESENTED

S. No	Date	Moderator	Topic	Hours	Signature of the Faculty in charge

6. PG PRESENTATIONS/ SEMINARS ATTENDED

S. No	Date	Topic	Presenter	Signature of faculty in-charge

7. ACTIVITIES IN HAEMOTOLOGY LAB

S. no	Date	Activities done	Signature of SR I/C	Signature of Faculty I/C

8. ACTIVITIES IN THE AUTONOMIC FUNCTION TESTING LAB

S. no	Date	Subject detail	Diagnosis	Test Assisted/done	Signature of SR I/C	Signature of Faculty I/C

9. ACTIVITIES IN THE CARDIOVASCULAR RESEARCH LAB

S. no	Date	Subject detail	Diagnosis	Assisted/done	Signature of SR I/C	Signature of Faculty I/C

10. ACTIVITIES IN THE ELECTROPHYSIOLOGY LAB

S. no	Date	Subject detail	Diagnosis	Test Assisted/done	Signature of SR I/C	Signature of Faculty I/C

11. ACTIVITIES IN THE PULMONARY FUNCTION TESTING LAB

S. no	Date	Subject detail	Diagnosis	Test Assisted/done	Signature of SR I/C	Signature of Faculty I/C

12. ACTIVITIES IN THE NEUROPHYSIOLOGY LAB

S. no	Date	Activities done	Signature of Tech. Supervisor / Lab tech.	Signature of Faculty I/C

13. ACTIVITIES IN THE OBESITY RESEARCH LAB

S. no	Date	Activities done	Signature of Tech. Supervisor / Lab tech.	Signature of Faculty I/C

14. ACTIVITIES IN THE MOLECULAR RESEARCH LAB

S. no	Date:	Activities done	Signature of Tech. Supervisor / Lab tech.	Signature of Faculty I/C

15. JOURNALS PRESENTED

S. No	Date	Presenter	Journal reference

16. JOURNAL PRESENTATIONS ATTENDED

S. No	Date	Moderator	Journal reference