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UNIVERSITY OF MYSORE
Estd. 1916

VishwavidyanilayaKaryasoudha
Crawford Hall, Mysuru- 570 005.

No: AC10/759/2019-20

Dated: 06.07.2019.

NOTIFICATION

Sub: Change of Nomenclature from the academic year 2019-20-Reg.

Ref: 1.Decision of the Faculty of Science and Technology Meeting held on 01.04.2019.
2. Decision of the Academic Council meeting held on 07.06.2019.

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The Board of Studies in **Assisted Reproductive Technology and Embryology (PG)** which met on **27.02.2019** has resolved and recommended to change the nomenclature of M.Sc in Assisted Reproductive Technology and Embryology to M.Sc in Assisted Reproduction and Embryology from the academic year 2019-20.

The Faculty of Science & Technology and the Academic Council at their Meetings held on 01.04.2019 and 07.06.2019 respectively have also approved the above proposals.

DRAFT APPROVED BY THE REGISTRAR.

Lingaraju 08/7/19
DEPUTY REGISTRAR (ACADEMIC),
UNIVERSITY OF MYSORE,
MYSORE.

To:

1. Registrar (Evaluation), University of Mysore, Mysuru.
2. The Dean, Faculty of Science Department of Studies in Zoology, Manasagangotri, Mysuru.
3. The Director, International Institute for Assisted Reproductive Technology and Research Center, 3rd Floor, Gopala Gowda Shanthaveri Memorial Hospital, Premises, T.N.Pura Road, Nazarbad, Mysuru-570010.
4. The Director, PMEB, Pareeksha Bhavan, University of Mysore, Mysuru.
5. The Director, College Development Council, MoulyaBhavan, Manasagangotri, Mysuru.
6. The Deputy Registrar/ Assistant Registrar/ Superintendent, AB and EB, University of Mysore, Mysuru.
7. The PA to Vice-Chancellor/ Registrar/ Registrar (Evaluation), University of Mysore, Mysuru.
8. Office Copy.

SP(S-5)/Approved.

Annexure -1

International Institute for Assisted Reproductive Technology and Research Centre (IIARTRC)

Specialized programme by University of Mysore
Credit Pattern (2019-2020)

M.Sc., in Assisted Reproduction and Embryology

Regulation and Syllabus

Regulations

The credit pattern for Assisted Reproduction and Embryology is similar to the University's choice based credit system. However, the syllabus does not have soft core and open elective papers. All subjects are mandatory. The total credit for course is same as that of PG programme of the University.

Following shall be the minimum and maximum credits per semester.

The credit pattern is lecture (L); Tutorial (T); Practical (P); (L:T:P) Pattern.

Lecture: One hour session of theory class per week in a semester is 1 credit.

Tutorial and practical: Two hour session of tutorial or practical per week in a semester is 1 credit .

One semester period : 16 weeks of teaching and learning.

Duration of semester: 20 weeks that includes semester end examinations.

- A Candidate can enroll for a minimum of 16 credits per semester and maximum of 20 credits per semester.
- A Candidate has to earn a minimum of 76 credits for successful completion of a master Degree.

C1 - Multiple Choice test 10 marks, Assignment 5 Marks

C2 - Test descriptive 10 marks, Topic presentation 5 Marks

Continuous assessment pattern:

Continuous assessment	Time duration	Marks		Minimum 30% and an aggregate of 40% to declare pass
		Max	Min	
C1	1 week to 8 weeks	15	4.5	
C2	9 weeks to 16 weeks	15	4.5	
C3	Complete 16 weeks	70	21	

Eligibility for Admission: Students of Bachelor of Science Degree (B Sc) from any UGC recognized Universities with life Science subjects or any equivalent bachelor degree/MBBS/BDS/BAMS/BHMS/B.Pharma/BSc Nursing/Engineering with sciences (Biotechnology and life science related) and Students from foreign nationals are also eligible, subjected to eligibility from University of Mysore. Admissions will be done as per University of Mysore norms.

SEMESTER I **(20)CREDITS**

SL NO	**TITLE OF THE PAPER**	CREDIT PATTERN			TOTAL CREDITS
		L	T	P	
1.1	**Cellular biology & biophysical techniques**	2	0	0	2
1.2	**Human Reproductive biology**	4	0	0	4
1.3	**Andrology Laboratory Techniques-1**	0	0	6	6
1.4	**Andrology laboratory Techniques-2**	0	0	8	8
		6	**0**	**14**	**20**

SEMESTER II **(20)CREDITS**

SL NO	**TITLE OF THE PAPER**	CREDIT PATTERN			TOTAL CREDITS
		L	T	P	
2.1	**Genetics & Reproductive Endocrinology**	2	0	0	2
2.2	**Assisted Reproduction**	2	0	0	2
2.3	**In-Vitro Fertilization techniques**	0	0	8	8
2.4	**Clinical Embryology**	0	0	8	8
		4	**0**	**16**	**20**

SEMISTER III **(20) CREDITS**

SL NO	TITLE OF THE PAPER	CREDIT PATTERN			TOTAL CREDITS
		L	T	P	
3.1	**Infertility Counseling**	2	0	0	2
3.2	**Human Gametes and Embryo culture System**	2	0	0	2
3.3	**Micromanipulation in ART**	0	0	8	8
3.4	**Cryobiology and Techniques**	0	0	8	8
		4	**0**	**16**	**20**

SEMISTER IV **(20)CREDITS**

SL NO	TITLE OF THE PAPER	CREDIT PATTERN			TOTAL CREDITS
		L	T	P	
4.1	**Preimplantation Genetic Screening (PGS)**	2	0	0	2
4.2	**Quality control and risk management in ART**	2	0	0	2
4.3	**Writing and presentation skill**	0	2	0	2
4.4	**Project Work**	0	0	10	10
		4	2	**10**	**16**

Semester 1 **(20 Credits)**

Paper 1.1 Cellular Biology and Biophysical Techniques

(2 credits - 2 hours/Week)- 32 Hours

Unit I. Cell Biology

Basic Characteristics of the Cell: Diversity of cell size and shape, Cell theory, Structure, organization and composition of prokaryotic and eukaryotic cell. Structure and functions of cell organelles, Cell division-mitosis and meiosis. Plasma membrane -structure and functions, **chromosomes-** Types of Chromosomes and molecular anatomy of eukaryotic chromosomes – nucleosomes, organization and significance of polytene and lamp brush chromosomes, Numerical changes in chromosomes. Molecular events of cell division and cell cycle, regulation of cell cycle. **8 Hours**

Unit II. Biochemistry

Structures of atoms, molecules and bonds, chemical foundations of biology, pH, pK, acids, bases and buffers, Covalent and non-covalent interactions, Vander –Wall forces, electrostatic and Hydrogen bonding and hydrophobic interactions, Laws of thermodynamics,
Classification, structure and Properties of carbohydrates, amino acids and proteins, and lipids. Nucleic acids- Structure and properties- Bases, Nucleosides, Nucleotides, Polynucleotides. Structure of double stranded DNA (B, A, and Z-DNA. Types of RNAs and their biological significance. **8 Hours**

Unit III. Biophysical Techniques

Introduction to Biophysics: Scope of Biophysics, Interaction of living and non-living matters, chemical foundations of Biophysics.

Microscopic techniques: Principle and application of light, Phase contrast, Dark field, Fluorescence microscopy, Scanning and Transmission Electron Microscopy.
Chromatography techniques: Principle and application of paper chromatography, TLC, Gel filtration, chromatography, Ion –Exchange chromatography, Affinity chromatography, Gas-liquid chromatography, HPLC. **8 Hours**

Centrifugation: Principle, techniques of preparative, analytical and ultracentrifuges
Electrophoresis and Blotting Techniques, Principle and application of PAGE, SDS-PAGE, Southern, Northern and Western blotting techniques.
Spectroscopic techniques: Electromagnetic spectrum of light, Beer-Lambert's law, Principle and application of UV, Visible and IR spectroscopy, Fluorescence spectroscopy ,NMR, Atomic absorption spectroscopy, Mass spectroscopy, Flow cytometry.

Radio isotope techniques: Nature of radioactivity, detection and measurement. Auto

radiography and its applications, Biological importance of Lasers, Microwaves and Radiations.

8hours

SEMESTER I

Paper 1.2 Human Reproductive Biology (2 credits - 2 hours/Week) - 32 Hours

UNIT 1 16 Hours

- Biomedical background of Bourn Hall Clinic
- The Bourn Hall story
- Gonadal changes from birth to puberty, Puberty and its timing, Environmental factors and puberty, Puberty and Psychological adjustment
- Anatomy of male and female reproductive systems
- Gamete biology: Spermatogenesis and oogenesis
- Andrology : Detailed Composition of seminal plasma,
- Semen Examination; Introduction, sample collection methods, sample collection for diagnostic or research purposes
- Sterile collection of semen for assisted reproduction and microbiological analysis
- Sample collection at home, collection of semen by condom
- Safe handling of specimens
- Initial examination: Liquefaction, semen viscosity, semen appearance, semen volume and PH
- Initial microscopic examination: Thorough mixing of the sample, making wet preparation,
- Cellular elements other than spermatozoa
- Sperm motility: categories of sperm movements, preparation and assessment of sperm motility
- Sperm vitality test: Using eosin-nigrosin, eosin alone and hypo-osmotic swelling test.
- Sperm Concentration estimation: Types of counting chambers
- Sperm Morphology assessment: Preparation of sperm smear, assessment of sperm morphology, staining procedures for sperm morphology
- Assessment of specific sperm defects
- Assessment of sperm leukocytes in semen
- Assessment of immature germ cells in semen

- Biomedical assay for accessory sex organ function: measurement of fructose and zinc in seminal plasma
- Ultra structure of spermatozoa,

UNIT 2 **16 Hours**

- Male and female reproductive system: congenital or developmental disorders associated with primary testicular disorder,
- Klinefelter Syndrome, chryptorchism.
- Varicocele, infection, Drug and radiation
- Sperm transport disorders
- Poor semen parameters
- Causes of female infertility: Failure to ovulate, Problem in menstrual cycle, infection, failure to mature egg properly, endometriosis,
- Primary ovary insufficiency,
- Uterine anomaly and fibroid.
- Infertility trends worldwide, infertility in India
- Various Environmental factor effect on male and female infertility
- Clinical examination of male and female
- Female infertility: Disorders of female reproductive system, Fallopian tubal block, hydrosalpinx
- Polycystic ovary syndrome (PCOS)
- Ovulation and an ovulation
- Ovarian stimulation protocol

SEMESTER I

Practical paper-1.3 (6 Credits - 12 hours / week x 16 weeks)

Paper title: Andrology laboratory techniques - 1

1. Setting up of an IUI Laboratory,
2. Equipment and safety: Basic supplies needed in and Andrology laboratory,
3. Potential biohazards in Andrology laboratory, safety procedure,
4. Safety Procedure of laboratory Equipments, precautions when handling liquid nitrogen.
5. Brief Account of equipments: laminar air flow, various types of microscope, stereo zoom microscope, inverted microscope, Incubator used for IUI/dry bath, Centrifuge unit, Refrigerator, Makler chamber, Neuber chamber, sperm concentration
6. Use of CASA to sperm morphology assessment
7. Use of CASA to assess sperm motility,
8. Sperm preparation: Introduction, Choice of method, efficiency of sperm separation from seminal plasma and infectious organism, simple washing procedure, Direct swim-up, Discontinuous density gradient,
9. Preparation of HIV infected semen sample
10. Preparation of testicular and epididymal spermatozoa
11. Preparation of retrograde ejaculation sample
12. Antisperm antibody test
13. Biomedical waste Management

SEMESTER I

Practical paper- 1.4 (8 Credits - 16 hours / week x 16 weeks)

Paper title : Andrology laboratory techniques-II

1. Semen examination with Kruger's criteria
2. Semen cryopreservation protocol: standard procedure, modified freezing protocols for poor semen samples, labelling of straws and record
3. Assessment of sperm chromatin: aniline blue test, acridine orange test, sperm chromatin structure assay (SCSA), Comet assay and TUNEL assay.
4. Quality Control in the Andrology laboratory
5. Assessment of the Acrosome reaction
6. Assessment of nuclear decondensation of sperm and other functional test
7. Measurement of reactive oxygen species generated by leukocytes and sperm suspension
8. Sperm survival test
9. Advanced types of sperm preparation for ART
10. Mouse reproductive Anatomy
11. Mouse reproductive physiology
12. Extraction of the oocytes from the ovary(Slaughter house)

Semester II **(20 Credits)**

Paper 2.1: Genetics and Reproductive Endocrinology

(2 Credits - 2 hours/week) - 32 Hours

UNIT 1 **16 Hours**

- Reproductive endocrinology: Hormones and their function, principles of hormone assay, various equipment to do hormone assay,
- Immuno assay, Hypothalamic pituitary function, thyroid hormones,
- Hirsutism primary and secondary amenorrhea.
- Male and female Endocrinology
- Hormonal regulation of spermatogenesis and ovarian cycle
- Luteal phase defect, Physiology of implantation.

UNIT 2 **16 Hours**

- Basic genetics of the cell,
- Chromosomal variations, Chromosomal syndromes, Genetic basis of evolution.
- Gene regulation: Translation, transcription, Expression, imprinting
- Basic Genetics: Genotype Phenotype, Mendelian inheritance pattern,
- Human karyotyping,
- DNA chromatin and Chromosomes,

- Gene Mutation and its effect,
- Epigenetics,
- Monogenic diseases, Chromosomal abnormalities numerical and structural.
- Human genome Project

SEMESTER II

Paper 2.2: Assisted reproduction (2 Credits - 2 hours/week) - 32 Hours

UNIT 1 16 Hours

- History of assisted reproduction
- Gonado tropins in ART; Follicle stimulation Hormone(FSH), Estradiol, progesterone and luteal hormone
- Removal of hydrosalpinges to improve IVF outcome,
- Ovarian reserve test, by AMH
- Antral follicle count

UNIT 2 16 Hours

- Ovarian endo metriomas and IVF outcome.
- Uterine cavity abnormality and IVF outcome,
- Various kind of sperm retrieval technique for ART
- Ultrasound In ovarian stimulation and follicle monitoring
- Ovarian hyper stimulation syndrome
- Oocyte markers of competence:
    - Nuclear maturity
    - Cytoplasmic maturity
    - Polar bodies
    - Zona Pellucida
    - Cumulus cells

SEMESTER II

Paper 2.3: In-Vitro fertilisation techniques (IVF techniques)

Practical paper-1 **(8 credits- 16 hours/week x 16 weeks)**

1. Preparation for IVF procedure: Going through patient file to know about kind of stimulation protocol, Gonadotrophins used.
2. previous history IVF if patient underwent IVF else where
3. Culture Medium in ART: Media preparation for ART, detailed account of culture medium, sperm survival test, media preparation for intra uterine insemination(IUI) and IVF-ET
4. Method of fertilization, number of good quality oocytes, fertilization and number of embryos, and quality of embryos available.
5. Preparation for the IVF procedure: Medium aliquoting into sterile tube, Dish preparation for IVF and ICSI,
6. IVF witnessing
7. Dish preparation for IVF: close and open culture system
8. Sperm concentration calculation for IVF
9. Insemination of IVF droplet with sperm and co-incubation
10. Follicular fluid screening
11. Identification of oocytes, washing and pre-incubation
12. Assessment of Oocyte quality, IVF and fertilization check
13. Pronucleus grading
14. Fragmentation and grading the embryo

SEMESTER II

Paper 2.4: Clinical Embryology

Practical paper-2 (8 Credits - 16 hours/week x 16 weeks)

1. Setting up of ART Unit with various facilities and detail Account on embryology laboratory and equipments.
2. Quality control, quality assurance and trouble shooting in IVF lab
3. Equipments to control air quality in Embryology laboratory
4. Sterilization methods
5. Good laboratory practice (GLP)
6. Tissue culture techniques
7. Preparation of standard operation protocol for all procedures in the IVF laboratory.
8. Culture system: Open and close culture advantages and disadvantages
9. Preparation for follicular fluid aspiration, culture medium disposables
10. Insemination of processed sample, Conventional IVF,
11. short term insemination and long term insemination, fertilization check, observation of fertilized Oocyte till Blastocyst development.
12. Cleavage stage embryo grading
13. Blastocyst grading
14. Blastocyst culture advantages and disadvantages

Semester III **(20 Credits)**

Paper 3.1: Infertility counseling **(2 Credits - 2 hours/week) - 32 Hours**

UNIT 1 **16 Hours**

- Basics of counseling
- Infertility counseling
- Psychology of infertility
- Medical aspects of the infertility for the counselor
- Cross cultural issues in infertility counseling
- Psychological evaluation of the infertility couple
- Evidence based approach to infertility counseling
- Individual counseling and psycho therapy
- Counseling the infertile couple

UNIT 2 **16 Hours**

- Group approach to infertility Counseling
- Sexual counseling and infertility
- Genetic counseling and the infertile patient
- Recipient counseling for Donor insemination
- Recipient counseling for EGG donation
- Embryo donation counseling
- Ethical aspects of infertility counseling
- Legal issues in infertility Counseling
- Assisted reproductive technology and the impact on Children

Paper 3. 2: Human gamete and Embryo culture system

(2 Credits - 2 hours/week) - 32 Hours

UNIT 1 **16 Hours**

- Historical background of gametes and embryo culture
- Utility of animal models for Human embryo cultureMedia composition
- Salts and osmolarity, energy source and metabolism,
- amino acids and cellular homeostasis,
- Macromolecules and embryo growth,
- antioxidant chelater and cellular function,
- PH and buffers, Growth factors.

UNIT 2 **16 Hours**

- Culture system: Single step and sequential
- Embryo co-culture
- Low-Oxygen Cculture
- Culture system: Embryo density
- Culture system: air quality
- Culture system miner oil overlay
- Human embryo Culture media comparison
- Embryo Culture and epigenetic

Semester III

Paper 3.3: Micromanipulation In ART (8 credits - 16 hours/week x 16 weeks)

Practical-1

1. History of micromanipulation,
2. various kinds of micromanipulation unit,
3. detail Account of all micro manipulation unit,
4. Micro tool preparation equipments,
5. Hands on practice of various micro manipulation unit,
6. Micro tool alignment,
7. ICSI dish preparation
8. Brief Account on PVP and hyaluronidase
9. Oocyte denudation
10. Oocyte assessment
11. Sperm immobilisation with various technique
12. Intra Cytoplasmic sperm injection
13. Assisted hatching: Zona drilling, Zona thinning, Chemical and laser assisted hatching
14. Intra-Cytoplasmic morphologically selected sperm injection (IMSI)
15. Physiological selection of sperm and intra Cytoplasmic sperm injection (PICSI)
16. Spindle view (Polo-scope)
17. Time lapse video monitoring of developing embryo

Semester III

Paper 3.4 : Cryobiology and Techniques (8 credits - 16 hours/week x 16 weeks)

Practical- 2

1. History of gamete cryopreservation
2. Psychological and psychosocial issues surrounding sperm and eg banking
3. Legal and ethical aspects of gamete banking
4. Method of sperm retrieval and banking in cancer patient
5. Detailed Account of cryoprotectant for slow freezing and vitrification method
6. Dish preparation for freezing/vitrification
7. Dish preparation for thawing/warming
8. Advantage and disadvantage between slow freezing and vitrification method
9. Oocyte/sperm vitrification
10. Cleavage stage embryo vitrification
11. Blastocyst collapse and vitrification
12. Trouble shooting in vitrification
13. Ovarian tissue cryopreservation: Harvesting ovary
14. Preparation and processing of ovarian cortex
15. Vitrification of ovarian cortex
16. Storage of vitrified ovarian cortex
17. Warming of ovarian cortex
18. Various equipment used for slow freezing

Semester IV **(20 Credits)**

Paper 4.1: Preimplantation Genetic Screening (PGS)

(2 Credits- 2 hours/week) - 32 hours

UNIT 1 **16 Hours**

- History of PGS: Animal studies and preclinical work, development of human embryo biopsy
- Genetic basis of inherited technologies
- Prenatal screening and diagnosis
- Preimplantation embryo development
- Preimplantation genetics
- Clinical aspects of Preimplantation genetics

UNIT 2 **16 Hours**

- Polar body biopsy
- Cleavage stage embryo biopsy
- Blastocyst biopsy
- Preimplantation genetic diagnosis for infertility (PGS)
- Preimplantation genetic diagnosis for sex-linked disease and sex selection for non-medical reasons
- Genetic counseling.

Paper 4.2: Quality control and risk Management in ART

(2Credits - 2 hours/week) - 32 Hours

UNIT 1 **16 Hours**

- Quality and quality management in ART laboratory
- Regulation, licensing and accreditation
- Risk and Risk management in ART laboratory
- Quality and risk management tool
- Risk education/risk minimization
- How do we manage risk, the benefit of risk management
- Developing Risk management programme
- How are we doing bench marking
- Human resources

UNIT 2 **16 Hours**

- Parameters to run successful laboratory
- Mitochondrial replacement therapy in ART
- Proteomics and Metabolomics
- ICMR guideline for ART unit, and regulation in assisted reproduction
- Surrogacy Bill
- PCPND Act
- Regulation and ethics in clinical practice
- Gamete and embryo donation
- Regulation of ART Bank

Paper 4.3 : Writing and presentation skill (2 credits)

Students will select the appropriate topics related to ART under the guidance of teacher and prepare the power point presentation. Prepared PPT will be presented during monthly seminar.

Paper 4.4: PROJECT WORK (10 credits)

Students pursuing M.Sc in Assisted Reproduction and Embryology Degree course is required to carry out work on a selected research project under the guidance of post graduate teacher. This is to train a post graduate student in research methods and techniques. Project work includes identification of a problem, formulation of a hypothesis, search and review of literature, getting acquainted with recent advances, designing research study, collection of data, data analysis and comparison of results and finally drawing conclusions.

The project should be written under the following headings

- Introduction
- Aims of objective of the study
- Review of literature
- Material and Methods
- Results
- Discussion
- Conclusion
- Summary
- Tables
- Annexure

Four copies of the project prepared. shall be submitted to the department/university before the final examination date notified.

Scheme of examination

C3 Total marks **70 marks**

Part-1 Simple answer questions (**1 to 12 numbers**)

2x10 Questions (12 questions) **20 marks**

Answer any ten of the following

Part-2 Descriptive questions. (**13 to 20**)

5X6 Questions **30 Marks**

Answer any six of the following

Part-3

10x 2 Questions **20 Marks**

Write Long answer questions (21 to 24)

Answer any two of the following

RECOMMENDED READING BOOKS

Sl.No.	Name Of The Book	Authors	Edition And Year
1	Andrology Laboratory Manual	Ashok Agarwal, Kamini A Rao, M S Srinivas.	2010
2	A Practical Guide To Selecting Gametes And Embryos	Markus Montag.	2014
3	A Practical Guide To Basic Laboratory Andrology	Christopher L R Barratt ,David Mortimer , Jose Antonio Castilla ,Juan G.Alvarez,Lars Bjorndahl.	2010
4	A Workbook On Human Spermatozoa And Assisted Conception	Ashok Agarwal , Sonia Malik.	2012
5	Biennial Review Of Infertility	Bart C Fauser, Catherine Racowsky , Douglas T Carell, Peter N Schegel.	2013
6	Biochemistry	David Rawn, J.	1989
7	Biochemistry	Voet, D. And Voet, J.G.	1999
8	Biochemistry-The Chemical Reactions Of Living Cells- Vol-2.	David E. Metzle	1977
9	Biophysical Chemistry Part-2	Cantor And Schmmel.	1980
10	Biophysical Chemistry-Principles And Techniques.	Upadyaya And Upadyaya.	2003
11	Chemistry – An Introduction To General, Organic And Biological Chemistry.	Karen C. Timberlake	1999
12	Embryo Culture: Methods And Protocols,	Gary D Smith, Jason E. Swain, Thomas B.Pool.	2013
13	Embryo Transfer	Gautam N Allahbadia	2008

14	Handbook Of Human Oocyte Cryopreservation	Eleonora Porcu , Patrizia Maria Ciotti, Stefano Venturoli	2013
15	Harrisons Endocrinology	J Larry Jameson	2010
16	Harper's Review Of Biochemistry, , (1997)	Murray Et. Al.	1997
17	Human Assisted Reproductive Technology: Future Trends In Laboratory And Clinical Practice.	Botros R. M.B. Rizk ,David K Gardner , , Tommaso Flcone .	2011
18	Infertility Counseling-A Comprehensive Handbook For Clinicians.	Linda Hammer Burns, Sharon N Covington	2006
19	Lehninger : Principles Of Biochemistry	David L Nelson, Michael M Cox	2015
20	Male Infertility , 2nd Edition ,	T B Hargreave .	1997
21	Medical Laboratory Technology Part-	S K. Mizanur Rahman.	2009
22	Molecular Biology Of The Cell.	Bruce Alberts	2002
23	Netters Atlas Of Human Embryology	Larry R Cochard	2002
24	Quality And Risk Management In The IVF Laboratory	David Mortimer And T. Mortimer	2008
25	Oocyte Biology In Fertility Preservation	S. Samuel Kim	2013
26	Sperm Banking –Theory And Practice	Allan A Pacey , Mathew J Tomlinson	2009
27	Textbook Of IUI And ART	Hrishikesh Pai,Kinjal R Shah, Nanditha Palshetkar ,Rishma Dhillon Pai.	2016
28	Text Book Of Biochemistry With Clinical Correlations.	Thomas Devlin	1999
29	Textbook Of In Vitro Fertilization And Assisted Reproduction :The Bourn Hall Guide To Clinical And Laboratory Practice.3rd Edition	Peter R Brinsden	2005
30	The Sub fertility Handbook-A Clinicians	Gab Kovacs .	2011

	Guide, 2ND Edition ,		
31	Textbook Of Assisted Reproductive Technologies: Laboratory And Clinical Perspectives. 3rd Edition	Ariel Weissman , Colin M Howeles , David K Gardner ,Zeev Shoham.	2009
32	Practical Manual Of In Vitro Fertilization.	Alex C. Varghese, Ashok Agarwal , Zsolt Peter Nagy	2013
33	Practical Biochemistry; Principles And Techniques;	K.Wilson And J. Walker (1995) 4 Th Edn.	1995
34	Preimplantation Genetic Diagnosis 2nd Edition	Joyce Harper	2009