Mahatma Gandhi University

Of

Medical Sciences & Technology, Jaipur

Syllabus

M.Sc. Clinical Embryology

(2 Years Degree Course +

1 Year Internship)

Notice

1. Amendments made by the University in Rules / Regulations of the Courses shall automatically apply.
2. The University reserves the right to make changes in the syllabus/books/ guidelines, fee structure or any other information at any time without prior notice. The decision of the University shall be binding on all.
3. The Jurisdiction of all court cases shall be Jaipur Bench of Hon'ble Rajasthan High Court only.

M.Sc. Clinical Embryology (Code)

(2 Years Degree Course + 1 Year Internship)

Rules & Regulations

1. **TITLE OF THE COURSE**
   The title of the course shall be **"**M.Sc. Clinical Embryology".

2. **DURATION OF COURSE/TRAINING**

   The course shall be of two years duration and one year internship from the date of commencement of academic session.

3. **MEDIUM OF INSTRUCTION**
   English shall be the medium of instruction

4. **ELIGIBILITY FOR ADMISSION**:
   The candidate must have passed B. Sc with at least one subject of biological Sciences or B. Sc Biotechnology or MBBS from a recognized university.

5. **CRITERIA FOR ADMISSION**

   Selection shall be done by an Admission Board of the University strictly on merit. It will consist of two-step process –Written Entrance Examination followed by Counseling/Personal Interview (PI).

6. **RESERVATION POLICY**

   Reservation shall be applicable as per policy of the State Government.

7. **ENROLMENT**

   Every candidate who is admitted to M.Sc. Course in Mahatma Gandhi Medical College & Hospital shall be required to get himself/herself enrolled with the Mahatma Gandhi University of Medical Sciences & Technology after paying the prescribed eligibility and enrolment fees.

   A candidate shall deposit enrolment fees along with tuition fees at the time of his/her admission to the course. Such a candidate who fails to submit, through the college Principal, duly filled enrolment form along with original documents including migration certificate required for enrolment within two months of his/her admission or up to November 30 of the year of admission whichever is later, he/she will have to pay late fee prescribed by the University

8. **MIGRATION RULES**

   No student, once admitted to the course and enrolled by the University, will be permitted to migrate to any other Course/ University.
   No student will be admitted to the Course on migration from any other Course/ University.

9. ATTENDANCE

Minimum 75% attendance in each year, both for theory and practical classes separately. Student with deficient attendance will not be permitted to appear in University examination.

10. TRAINING:

1. The period of training for M.Sc. shall be of two years from the date of admission.
2. Part – I and Part – II of the course shall be of one-year duration each.
3. The candidate will undertake the post graduate training as a full time post graduate in the department concerned.
4. The students will be required to complete the prescribed period of study and fulfill the requirement of attendance before they are allowed to appear in the University examination.

11. EXAMINATION AND ASSESSMENT

1. The examination of Part I shall consists of three theory papers and internal assessment and practical & viva-voce examination.
2. The examination of Part II shall consist of three theory papers & internal assessment and practical in the opted specialization.
3. A candidate shall be permitted a maximum of 4 years from the year of admission to complete the course and pass the examination failing which, the candidate will have to leave the course.
4. Only those candidates will be allowed to appear at Part II examination, who have passed Part –I examination completely.
5. Degree of M.Sc. Clinical Embryology will be awarded to a candidate only after his successful completion of one year compulsory internship.

12. CONDUCTION OF THE UNIVERSITY EXAMINATION:

University examination shall be conducted twice in a year; that is Main and Supplementary Examination. Supplementary examination shall be conducted after 2-4 months of the main examination.

13. SCHEME OF EXAMINATION

The Examination in Part I shall consist of:

Paper	**Marks**
Theory	
Paper I – Introduction To Embryology	100 Marks
Paper II – Infertility and its Clinical Management, Andrology	100 Marks
Paper III – IVF Procedure: Fertilisation, Embryo Production & Cryopreservation Techniques	100 Marks
Internal Assessment	100 Marks
Practical & Viva Voce Examination	100 Marks
Total Marks	**500 Marks**

Notes:

1. Each theory paper shall be of 3 hours duration.
2. Each paper will be set by the External Examiner of the subject concerned and will be assessed by the internal examiner of the subject concerned.
   Pattern of questions to be set and answered shall be as follows:

Paper	**No. of questions to be set**	**No. of questions to be answered**
Paper I	4	4
Paper II	4	4
Paper III	4	4

3. In order to pass the University Examination, the candidate must secure a minimum of 50% marks in each theory paper including internal assessment and 50% marks in practical and viva-voce examination separately.
4. A candidate who has failed in one or more theory paper of Part-I Examination must appear in that theory paper in supplementary examination which will be conducted by university within 2 – 4 months.

The Examination in of Part II shall consist of:

Paper	**Marks**
Theory	
Paper I – Intacytoplasmic Sperm Injection	100 Marks
Paper II – Ethics and Regulation in ART	100 Marks
Paper III – Cytogenetics	100 Marks
Internal Assessment	100 Marks
Practical & Viva Voce Examination	100 Marks
Total Marks	500 Marks

Notes:

1. Each theory paper shall be of 3 hours duration.
2. All papers shall be set by the External Examiners.
3. Paper I will be assessed by the External Examiner and Paper II will be assessed by the Internal Examiner viz. Head of the Department of subject concerned. Paper III will be assessed by Professor / Associate professor / Assistant professor

   Pattern of questions to be set and answered shall be as follows:

Paper	No. of questions to be set	No. of questions to be answered
Paper I	4	4
Paper II	4	4
Paper III	4	4

4. Practical examination shall be conducted by one Internal, one External Examiner which will be appointed by the university.
5. In order to pass the examination the candidate must secure a minimum of 50% marks in Theory papers including internal assessment and 50% marks in practical and viva-voce examination separately.
6. In case a student passes either in Theory or in Practical only, the student shall be considered to fail in the whole examination and he will have to appear in both the Theory and Practical in the subsequent examination.

14. APPOINTMENT OF EXAMINER AND PAPER SETTERS

a. All the examiners, paper setters, theory examination answer books evaluators, Internal and External Examiners for Practical examinations shall be appointed by the President of the University.

b. Qualification of the Paper setter / Examiner: Assistant Professor and above.

c. Paper setter can be an examiner

15. GRACE MARKS

No grace marks will be provided in M.Sc. Examination

16. REVALUATION / SCRUTINY

No Revaluation of answer books shall be permitted in M.Sc. Examination. However, the candidate can apply for scrutiny of marks as per University Rules.

Curriculum Outline

Distribution of Teaching hours

1st Year Master of Clinical Embryology

Course Title	Hours
Basic Human Embryology	80
Gametogenesis, Meiosis, Implantation and placentation	70
Preimplantation embryo development, Development of various organs	70
Anatomy of Male Reproductive System, Anatomy of Female Reproductive System	100
Anatomy of Brain, Anatomy of Sperms	80
Physiology of Ovulation, Folliculogenesis, Physiology of Menses	100
Hormonal control of human, Natural Cycle, Various stimulation protocols, Ovarian Hyper stimulation syndrome (OHSS), Complication of stimulation	100
Monitoring of patients, Reproductive function and causes of sub fertility	60
Investigating male and female patients, Infertility and its management, Ultrasound, Elderly Patients Reproduction	80
Andrology, Physiology of Sperm, Spermatogenesis, Male Factor	60
Total Theory Hours	**800**
Practical	400
Total Hours :	**1200**

2nd Year Master of Clinical Embryology

Course Title	Hours
Miscarriage, Ectopic Pregnancies, Multiple Gestation, Heterotrophic, Pregnancies	100
Oocyte Donation Programme, Surrogacy	80
Lab Set-up for andrology, Sperm Separation, Sperm Survival Test, Sperm preparation for IUI & IVF, Grading of Sperms, Semen cryopreservation-both neat and processed sample, Sperm freezing, Donor Sperm Programme	120
IVF Procedure: Fertilization, Embryo Production & Cryopreservation Techniques (Theory)	150
IVF Procedure: Fertilization, Embryo Production & Cryopreservation Techniques (Practical)	80
Embryo Reduction, Complication of IVF, Anesthesia, Patient Counseling, History of cryobiology	80
Intacytoplasmic Sperm Injection (ICSI), Historical aspect, Indication for ICSI , Philosophy of ICSI, Introduction to micromanipulator , Physics of micromanipulation	80
PESA, TESA, TESE and ICSI, Patient Counseling	60
Introduction to lab, Lab ethics, Aseptic precaution, Introduction to instruments, Handling of instruments, Insemination technique	50
Total Theory Hours	**800**
Practical	400
Total Hours :	**1200**

SYLLABUS

M.Sc. Clinical Embryology ( )

(2 Years Degree Course + 1 Year Internship)

Learning Objectives: At the end of the course, a Postgraduate in Clinical Embryology shall be able to:

1) Demonstrate comprehensive knowledge and understanding of gross and microscopic structure of the human cell and its organelles.

2) Comprehend normal anatomy and physiology of the male and female reproductive system.

3) Demonstrate knowledge of basic and systemic embryology including human genetics, genetic inheritance, gene regulation, immunology and stem cell therapy.

4) Develop a basic understanding of biochemistry, endocrinology, and pharmacology.

5) Independently handle semen and its processing for both techniques – Intrauterine Insemination (IUI) and in – vitro fertilization (IVF).

6) Be acquainted with mouse anatomy and physiology 7) Should be also to identify and handle human oocyte in embryology laboratory

8) Competently handle human gametes in the scenario of IVF and ICSI.

9) Assess viability of embryos and their developmental competence with fair accuracy.

10) Cryopreserve human gametes and embryos, thaw them and subsequently develop them to transfer into the uterus.

11) Understand the basic concepts of embryology.

12) Should be well versed setting up an IVF laboratory according to standards available and well versed in quality control measures.

Assessment:

The examination to the first/second year shall be open to a student who:

Has remained on the rolls of the course concerned for full on academic year preceding the examination and having attended not less than 75% of the full course of lectures and 75% practical separately held for the purpose in each year.

FIRST YEAR

PART- I:

MODULE 1: **INTRODUCTION TO EMBRYOLOGY** –

- Basic Human Embryology
- Gametogenesis
- Meiosis
- Implantation and placentation
- Preimplantation embryo development
- Development of various organs
- Anatomy of Male Reproductive System
- Anatomy of Female Reproductive System
- Anatomy of Brain
- Anatomy of Sperms

MODULE 2: INFERTILITY AND ITS CLINICAL MANAGEMENT–

- Physiology of Ovulation
- Folliculogenesis
- Physiology of Menses
- Hormonal control of human
- Natural Cycle
- Various stimulation protocols
- Ovarian Hyperstimulation syndrome (OHSS)
- Complication of stimulation
- Monitoring of patients
- Reproductive function and causes of subfertility
- Investigating male and female patients
- Infertility and its management
- Ultrasound
- Elderly Patients reproduction
- Miscarriage
- Ectopic Pregnancies
- Multiple Gestation
- Heterotrophic Pregnancies
- Oocyte Donation Programme
- Surrogacy

MODULE 3: ANDROLOGY–

- Physiology of Sperm
- Spermatogenesis
- Male Factor
- Lab Set-up for andrology
- Sperm separation
- Semen analysis
- Semen analysis as per WHO criteria
- Sperm morphology assessment according to Strict (Kruger) criteria.
- Sperm survival test.
- Grading of Sperms
- Sperm preparation for IUI
- Sperm preparation for IVF
- Semen preparation for IUI-Classical method, Standard method and Density gradient method.
- Semen cryopreservation-both neat and processed sample.
- Sperm freezing
- Donor Sperm Programme

SECOND YEAR

PART- II:

MODULE 4: IVF PROCEDURE: FERTILISATION, EMBRYO PRODUCTION & CRYOPRESERVATION TECHNIQUES (THEORY) –

- Lab Set-up for IVF
- Requirements and Protocols
- Quality Control and Quality Assurance
- Health and safety in the laboratory
- Introduction to culture media
- Handling and culture techniques
- Preparation of media and buffer
- Sequential culture media
- Co-culture
- Normal embryo development
- Abnormal embryo development
- Metabolism of embryo
- Grading of oocyte
- Selection of embryo
- Grading of embryo
- Blastocyst culture –technique
- Embryo transfer technique
- USG guided embryo transfer
- Embryo Reduction
- Complication of IVF
- Anesthesia
- Patient Counseling
- History of cryobiology
- Physiology of cryobiology
- Cryoprotectant and its role
- Lab Set-up for cryopreservation
- Embryo freezing
- Slow freezing technique
- Vitrification of gamete of embryo
- Recent development in cryobiology

MODULE 5: IVF PROCEDURE: FERTILISATION, EMBRYO PRODUCTION & CRYOPRESERVATION TECHNIQUES (PRACTICAL) –

- Introduction to lab
- Lab ethics
- Aseptic precaution
- Introduction to instruments
- Handling of instruments
- Insemination technique
- Identification of oocyte
- Grading of oocyte
- Insemination of oocyte
- Denuding
- Ferti-check on day 1
- Classification of 2PN
- Growth of embryo on day 2
- Shifting of embryos
- Quality of embryo on day 3
- Grading of blastocyst
- Selection of blastocyst for embryo transfer
- Vitrification of blastocyst
- Vitrification of cleaving embryos
- Retrieval of vitrified embryos

MODULE 6: INTACYTOPLASMIC SPERM INJECTION (ICSI) –

- Historical aspect
- Indication for ICSI
- Philosophy of ICSI
- Introduction to micromanipulator
- Physics of micromanipulation
- Various equipment required to perform ICSI
- Sperm immobilization
- Selection of sperm
- Preparation of sperm for ICSI from ejaculates and testicular biopsies
- Various medias required to perform ICSI
- Denuding of oocyte
- Micropipette handling
- ICSI procedure
- Indication and contraindication of ICSI procedure
- Obstructive azoospermia and ICSI
- PESA, TESA, TESE and ICSI
- Risk of anomalies in ICSI
- Intracytoplasmic morphologically selected sperm injection (IMSI)
- Identification of abnormal sperm
- Identification of immature sperm
- Sperm separation from testicular biopsy
- Identification of spermatids, spermtocytes and other cells
- Assessment of fertilization (ferti-check)
- Patient Counseling

MODULE 7: QC, QA AND RECORD KEEPING IN ART –

- Set up of IVF lab
- How to establish and equip an IVF lab
- QA and AC for IVF lab
- QA and QC practices
- Precision of IVF procedure
- Designing of IVF lab and its location in the clinic
- Record keeping
- Lab maintenance protocol
- Roster of work
- Introduction and maintenance of all instruments in IVF lab
- Calibration of all instruments
- Quality improvement techniques
- Review national and international guidelines
- Trouble shooting and its solution

MODULE 8: ETHICS AND REGULATION IN ART –

- Current legislation and regulation in ART, India ,
- Requirement for licensing, accrediting and approving ART clinics ,
- National guidelines for accreditation of ART clinics in India ,
- Ethics consideration and legal issues ,
- Ethical policies ,
- Indian Society for Assisted Reproduction (ISAR) ,
- Surrogacy- Ethical and legal issues
- Ethical frameworks and principles
- Relevant regulatory bodies
- Role of ethics in health care
- Social and ethical responsibilities with regards to patient care
- Patient Consent

MODULE 9: CYTOGENETICS –

- Role of genetics in infertility ,
- Molecular and cellular biology ,
- Chromosomal and genetic analysis in IVF ,
- Genetic techniques ,
- FISH ,
- Embryo biopsies
- Preparation of blastomeres for FISH
- Karyotyping
- Role of genetics in OATS
- Genes and RPL (Recurrent pregnancy losses)

PRACTICAL:

- Hands on experience in Andrology & Biochemistry Laboratory
- Hands on experience in Animal Laboratory
- Introduction into the IVF laboratory
- Laboratory procedures – practicals from Ovum pick up to transfer
- The sperm sample – preparation methods
- In – Vitro Fertilization & ICSI
- Embryo Scoring
- Culture Conditions
- Equipments
- Microscopes
- Embryo transfer
- Cell Biopsy
- Cryopreservation programme & quality assurance
- Sperm freezing/thawing
- Oocyte freezing/thawing or vitrfication/warming
- Embryo freezing/thawing or vitrification/warming
- Ovarian freezing/thawing or vitrificaion/warming
- Testicular freezing/thawing
- Frozen Embryo Transfer
- Equipments
- Innovative techniques in human embryo viability assessment
- Risks in the IVF Laboratory

Method of Training:
The candidates shall attend all the undergraduate Theory and Practical Classes regularly.

Seminars & Journal Review Meetings:
The postgraduate students should actively participate in departmental seminars and journal reviews.

Periodical Assessment and Progress Report:
The postgraduate students have to be assessed periodically by conducting written, practical and viva voce examination. The assessment should be based also on participation in seminars, journal review, and performance in the teaching and use of teaching aids and progress in dissertation work.

The assessment will be done by all the recognized P.G teachers of department and the progress records be maintained by the head of the department.

Project work:
During the course of study every candidate has to prepare a project individually, on a selected topic under the direct guidance and supervision of a recognized postgraduate teacher.

The suggested time schedule for dissertation work is:

1. Preparation work for dissertation synopsis including pilot study and submission of the synopsis to the University within 6 months from the commencement of course or as per the dates notified by the University from time to time.
2. Data collection for project and writing the project.
3. The candidates shall report the progress of the project work to the concerned guide periodically and obtain clearance for the continuation of the project work.
4. Submission of the project six months prior to the final examination or as dates notified by the University from time to time.

Books for Study

1. A – Z Encyclopedia on Infertility Sulochana Ganasheela 2005.
2. A Practical Guide to Setting Up an IVF Lab, Embryo Culture Systems and Running the Unit Alex C Varghese, Peter Sjoblom, K. Jayaprakasan, April 2013.
3. Oogenesis Giovanni Coticchio, David Albertini, Lucia De Santis December 2012.
4. Sperm Chromatin Biological & Clinical Applications in Male Infertility & Assisted Reproduction Nini, Armand; Agarwal, Ashok (Eds.) September2011.
5. Practical Manual of In Vitro Fertilization: Advanced Methods and Novel Devices Nagy, Zsolt Peter; Varghese, Alex C; Agarwal, Ashok (Eds) September2011.
6. Preservation of Human Oocytes Dr. Andrea Borini & Dr. Giovanni Coticchio December 2009.
7. Human Preimplantation Embryo Selection Kay Elder, Jacques Cohen February2008.
8. In Vitro Fertilization: A Practical Approach David K. Gardner February2008.
9. Textbook of Assisted Reproductive Techniques David K. Gardner, Ariel Weissman, Colin M. Howles, Zeev Shoham, 4th Edition.
10. A Textbook of in Vitro Fertilization and Assisted Reproduction: the Bourn Hall Guide to Clinical and Laboratory Practice Peter Brindsen 3rd Edition 2004.
11. Quality & Risk Management in the IVF Laboratory David Mortimer February 2008.
12. A Color Atlas for Human Assisted Reproduction: Laboratory & Clinical Insights (Hardcover) Pasquale Patrizio, Michael J Tucker, Vanessa Guelman August 2006.
13. The Developing Human: Clinically Oriented Embryology Keith L. Moore, 7th edition January 2003.
14. Principles and Practice of Assisted Reproductive Technology, Vol. 2, Lab. Aspects of IVF & Andrology, 2nd Edition - Kamini Rao.
15. Infertility Diagnosis, Management & IVF – Dr. Anil Dubey.

MODEL PAPER

M.Sc. Clinical Embryology – I **Short Name**

M.Sc. Clinical Embryology

Part-I (Main) Examination month year

Paper I
Introduction To Embryology

Time: Three Hours
Maximum Marks: 100

Students shall be allowed to take only one supplementary copy long with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answer at different places in the answer book

Attempt all Questions.

Q.1 Write down development of male genital tract, its anatomy. Explain obstructive azoospermia and its management. 25

Q.2 Write down prerequisites to setup an IVF lab and methods of prevention in infection in Lab. 25

Q.3 Long answers Type

a) Quality control and quality assurance 12½

b) Different methods of semen preparation. 12½

Q.4 Short Notes 5x5=25

a) Components of culture medias.

b) Advantages and disadvantages blastocyst transfer

c) Micromanipulators in IVF lab

d) LAH

e) Three methods to differentiate between immotile and dead sperm.

MODEL PAPER

M.Sc. Clinical Embryology – I **Short Name**

M.Sc. Clinical Embryology

Part-I (Main) Examination month year

Paper-II
Infertility and its Clinical Management, Andrology

Time: Three Hours
Maximum Marks: 100

Students shall be allowed to take only one supplementary copy long with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answer at different places in the answer book

Attempt all Questions.

Q.1 Write down tubal factors for infertility, their evaluation and management. 25

Q.2 Enlist WHO classification of anovulation. Write down pathophysiology of PCOS and drugs used for ovulation induction in PCOS. 25

Q.3 Long answers Type

a) Explain antagonist protocol, its advantages and disadvantages 12½

b) Risk & prevention of OHSS in ART 12½

Q.4 Short Notes 5x5=25

a) WHO criteria of semen analysis

b) Retrograde ejaculation

c) Role of varicocele in male infertility

d) Three technique of surgical sperm retrieval

e) OATS

MODEL PAPER

M.Sc. Clinical Embryology – I **Short Name**

M.Sc. Clinical Embryology

Part-I (Main) Examination month year

Paper-III

IVF Procedure: Fertilisation, Embryo Production & Cryopreservation Techniques

Time: Three Hours
Maximum Marks: 100

Students shall be allowed to take only one supplementary copy long with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answer at different places in the answer book

Attempt all Questions.

Q.1 Write down the steps and markers of implantation. What are the different causes of RIF and their management 25

Q.2 Write down the steps vitrification and thawing of Day 3 embryos, its advantages and disadvantages. 25

Q.3 Long answers Type

a) Grading of oocyte and embryos 12½

b) Different culture medias used in IVF lab. 12½

Q.4 Short Notes 5x5=25

a) Indications for cryopreservation

b) Endometrial preparation before FET

c) Advantages of sono guided ET

d) Failed fertilization in IVF lab causes and management

e) LAH

MODEL PAPER

M.Sc. Clinical Embryology

Part-II (Main) Examination month year

Paper I
Intacytoplasmic Sperm Injection

Time: Three Hours
Maximum Marks: 100

Students shall be allowed to take only one supplementary copy long with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answer at different places in the answer book

Attempt all Questions.

Q.1 Enlist the indications of ICSI. Explain micromanipulator used for ICSI and steps of procedure. 25

Q.2 Define OATS. Enlist the causes of severe oligo astheno spermic, its endocrine evaluation and management. 25

Q.3 Long answers Type

a) Advantages and disadvantages of ICSI 12½

b) Surgical methods of sperm retrieval 12½

Q.4 Short Notes **5x5=25**

a) IMSI

b) Techniques to select best sperm in sever OATS

c) Sperm freezing before chemotherapy

d) Indications and methods of assisted hatching

e) OCCC's

MODEL PAPER

M.Sc. Clinical Embryology

Part-II (Main) Examination month year

Paper-II
Ethics and Regulation in ART

Time: Three Hours
Maximum Marks: 100

Students shall be allowed to take only one supplementary copy long with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answer at different places in the answer book

Attempt all Questions.

Q.1 Write down indications for oocyte donation. Write in detail in ICMR guidelines and counselling of donor. 25

Q.2 What is National Registry System (NARI) for IVF labs. How does it work at national and state level. 25

Q.3 Long answers Type

a) Ethical issues in third party reproduction 12½

b) New surrogacy bill, 2019 12½

Q.4 Short Notes 5x5=25

a) Role of ART in premature menopause

b) Indications of donor sperm cycles

c) Role of GnRH analogues.

d) Sperm bank

e) Fertility preservation in female before cancer therapy.

MODEL PAPER

M.Sc. Clinical Embryology

Part-II (Main) Examination month year

Paper-III
Cytogenetics

Time: Three Hours
Maximum Marks: 100

Students shall be allowed to take only one supplementary copy long with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answer at different places in the answer book

Attempt all Questions.

Q.1 Write down indications of PGs. Different methods and steps of embryo biopsy. 25

Q.2 Give in detail, what is the recommended schedule for antenatal screening? 25

Q.3 Long answers Type

a) Factors responsible for aneuploidy in embryos 12½

b) Grading of embryos and interpretation of fragmentation 12½

Q.4 Short Notes 5x5=25

a) What is epigenetics

b) Risks of day 3 embryo biopsy

c) Indications of PGD

d) Risk associated with advanced maternal or paternal age

e) Consent before donor insemination