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EXPERT COMMITTEE: PROGRAMME DESIGN AND COURSE PLANNING

Prof. Himadri Roy Director, SOGDS, IGNOU New Delhi	Prof. Anu Aneja, SOGDS, IGNOU New Delhi	Prof. Nilima Srivastava SOGDS, IGNOU New Delhi
Prof. P. T. Manoharan Chennai	Prof. Annu J. Thomas SOGDS, IGNOU, New Delhi	Prof. Savita Singh SOGDS, IGNOU, New Delhi
Prof. Bimla Kapoor, IGNOU, New Delhi	Prof. Neelam Kumar, NISTAD, New Delhi	Dr. Smita M. Patil SOGDS, IGNOU, New Delhi
Dr. Sumi Krishna Independent Scholar, Bangalore	Dr. Gita Chadha, University of Bombay, Mumbai	Dr. Sunita Dhal SOGDS, IGNOU, New Delhi
		Dr. G. Uma SOGDS, IGNOU, New Delhi

PROGRAMME COORDINATORS:

Dr. Sunita Dhal & Prof. Savita Singh

COURSE COORDINATOR: Dr. Sunita Dhal

COURSE DEVELOPMENT TEAM

Block 1:

Unit 1: Dr. Sumi Krishna, Independent Scholar, Bangalore

Unit 2: Dr. Sumi Krishna, Independent Scholar, Bangalore

Unit 3: Dr. Madhumita Biswal, Sambalpur University, Odisha

Block 2:

Unit 4: Prof. Savita Singh, IGNOU, New Delhi

Unit 5: Prof. Nilima Srivastava, IGNOU, New Delhi

Unit 6: Dr. Sunita Dhal, IGNOU, New Delhi

Block 3:

Unit 7: Dr. Meenu Anand, University of Delhi, New Delhi

Unit 8: Dr. Sunita Dhal, IGNOU, New Delhi

Unit 9: Dr. Deeksha Dave, IGNOU, New Delhi

Block 4:

Unit 10: Dr. G. Uma, IGNOU, New Delhi and

Prof. Rohitashw Kumar, SKUAST, Kashmir

Unit 11: Dr. Archana Patnaik, IIT, Kanpur

Unit 12: Dr. Sunita Dhal & Dr. Jyoti Sharma, DST, New Delhi

Block 5:

Unit 13: Prof. Rennu Addalakha, CWDS, New Delhi

Unit 14: Dr. Khirod Maharana, University of Allahabad, Allahabad

Unit 15: Dr. Sumi Krishna, Independent Scholar, Bangalore

COURSE EDITORS

Block 1: Prof. Savita Singh (Content & Language)

Block 2, 3 & 4: Prof. Nilima Srivastava (Content & Language)

Block 5: Prof. Savita Singh (Content & language)

In House Editing: Dr. Sunita Dhal (Content & language)

Proof Reading: Dr. Sunita Dhal

Unit Transformation: Dr. G. Uma

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PRODUCTION TEAM

Mrs. Promila Soni

Assistant Registrar, MPDD, IGNOU, New Delhi

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PROGRAMME INTRODUCTION

The Certificate Programme in Gender and Science is an interdisciplinary programme. This programme is having three courses encompassing gendered view of science and society; gender inclusive policies and programmes and having specific focus on health and wellbeing. These three courses have been developed by holding expert committee meetings for designing the programme and course structure. These three courses include BGS 002: Gender, Science, Technology and Society; BGS 003: Socio-Political Dimensions of Gender and Science; and BGS 004: Gendered Dimensions of Health.

In this programme, you are expected to gain basic understanding about the dynamics and interrelation of gender and science to be able to contextualize the discourse of science with a gender lens. All the courses would investigate the relevance of gender concepts in order to demystify scientific rationality. The programme aims at engaging and understanding the basic principles, dynamics, processes, problems, and issues of gender and science as an area of study.

Programme Learning Outcomes

- To impart theoretical concepts of science from a feminist perspective;
- To enrich capacities of learners with regard to policies, programmes and schemes related to women and science.
- To enable learners to critically engage with societal-science approach in the area of science with special focus on climate change, renewable energy, industry, health, agriculture and ecology;

COURSE INTRODUCTION

The course **BGS-002: Gender, Science, Technology and Society** is the introductory course of this programme. In this course, you will be able to understand the basic concepts of gender, science and society. This course will help you to develop conceptual base in the area of gender and science. This course combines both theoretical and applied concepts covering the fields of feminist science studies, scientific knowledge construction, women in STEMM, and climate change and energy issues. It also offers a feminist critique of science and technology and argues for developing a deep understanding on feminist alternatives as an approach to do science.

Block 1: Introduction to Gender and Science

The first Unit of this course is intended to familiarise you with basic terms and concepts of gender studies and explain why gender-power relations exist across social institutions like caste and class. The second Unit discusses the complexity of gender and offers it reflection on the gendered nature of the scientific knowledge and scientific institutions. The last Unit of this Block explains how technologies have become the predominant medium through which gender attributes and stereotypes are expressed.

Block 2: Historical and Theoretical Contexts

The Unit 4: Historical Perspective maps out the history of science in its evolutionary trajectories. The unit begins with a discussion about the modern science in the 17th century with the period divided between Renaissance and the Enlightenment. Unit 5 discusses positivism, an approach that sought to apply the scientific methodological principles of empirical observation, deductive reasoning, and formulation of laws or universal generalizations in the social sciences. Unit 6 provides a brief overview of women scientist's access to science education and profession. It offers a historical perspective of women's exclusion from modern science.

Block 3: Women and Local Knowledge

The Unit 7 attempts to bring about an understanding of the inter-related concepts of health and well-being and their types and meaning. It aims to bring about a holistic understanding of these terms which are beyond the notions of health and well-being as physical constructs. The Unit 8: Farming and Food Production intends to define local knowledge and discusses farming practices from the perspective of women as bearers of local knowledge system. The last Unit of this block discusses the critical environmental issues of climate change and energy conservation obtained through a gender lens. This unit also throws light on the impact of environmental degradation of women in rural as well as urban areas.

Block 4: Women and Science & Technology Workplaces

In the Unit: **Agriculture and Its Allied Areas**, you are going to learn about feminist theorization of women's work at home as a form of care work. It also aims to understand the nature of care economy within the household with specific focus on agriculture and work as defined in the economic context. The Unit 11: Information and Communication Technology (ICT) explains how technology also becomes a source of division including inaccessibility people and regions, between people and regions in the form of unequal availability and access. One such kind of a divide created by ICT is expansion of the gender divide. The last Unit of this Block is structured to provide an overview and perspectives of women's inclusion in the STEM disciplines. It highlights concerns and issues related to under-representation of women in the diverse fields encompassing science, technology, engineering and mathematics.

Block 5: Feminism And Science

In the Unit 13, you will learn about what is understood as scientific method, including a critique which will enable you to differentiate between common sense knowledge and the construction of scientific knowledge. Unit 14 attempts to analyse feminist position on the nature of technology as patriarchal, and fractures myth that only the males are the innovators. It also discusses debates around technology as liberating or enslaving for women. The last Unit of this course focuses on feminist alternatives which encompass gendered approaches with an aim to transform the disciplines of science and technology. It draws examples from different feminist scholars who have provided an alternative understanding of reality with the help of women's experiences and knowledge.

The image features a large, light gray watermark of the IGNOU logo and text. The logo consists of a stylized 'U' with a circular emblem inside, and the text 'ignou' is written in a lowercase, sans-serif font. Below the logo, the text 'THE PEOPLE'S UNIVERSITY' is written in a smaller, uppercase, sans-serif font. The main text of the document is centered over this watermark.

BLOCK 1
INTRODUCTION TO GENDER AND SCIENCE

THE PEOPLE'S
UNIVERSITY

UNIT 1 GENDER AND SOCIETY

Structure

- 1.0 Introduction
- 1.1 Learning Outcomes
- 1.2 Femininity, Masculinity and Gender Identities
- 1.3 Systemic Male Domination and Patriarchies
- 1.4 Unequal and Gendered Division of Labour
- 1.5 Gender-Power Relations
- 1.6 Let us Sum Up
- 1.7 Unit End Question
- 1.8 References
- 1.9 Suggested Readings

1.0 INTRODUCTION

In the mid-1970s, the historical invisibility of women in productive work began to be documented by researchers and highlighted by the modern women's movement in India. It was clear that socio-cultural ideas about the capacities and abilities of women and men, and institutional structures, rather than their physique and biology were determining women's roles in the domestic and public spheres. Two decades later in the mid-1990s, this understanding was deepened by the feminist concept of gender and the significance of gender identities and gender relations in shaping people's lives. It has now become evident that multiple inequities, such as of gender, class, caste, ethnicity, religion and language, are interwoven and embedded in the organisation of society and in the institutions and processes of knowledge creation, including science. This impacts the bodies, lives and work of all persons. This introductory Unit is intended to familiarise you with basic terms and concepts. (Some of these will be developed in greater detail in later Units.)

Terms of discourse

Every discipline uses specialised 'terms of discourse' to improve communication. Such terms may be derived from normal usage, acquire a specialised meaning, and sometimes seep back into everyday language. Where the specialised usage has evolved recently, as with the word gender, the difference between the everyday word and the term can be confusing. Even a word like 'society' can be understood in different ways. Throughout this Unit, relevant terms will be explained and discussed.

1.1 LEARNING OUTCOMES

After studying this Unit, you will be able to

- Explain how typical ideas of femininity and masculinity shape gender

identities;

- Examine how systemic male domination is varied in different patriarchies;
- Analyse the division of labour in caste societies which is unequal and gendered; and
- Examine why gender-power relations persist across class and caste.

1.2 FEMININITY, MASCULINITY AND GENDER IDENTITIES

The people who live in a particular geographic area, with a common history and features like languages, customs, belief systems and institutions, constitute a ‘society’. Historically, societies have developed ideas and norms about the traits, behaviours, roles, responsibilities and positions of individuals. These ideas typify what it means to be a woman, a man, or a person of the third gender (TG) – that is, a person with an intersex identity (born with reproductive or sexual anatomy that does not fit definitions of female or male); or a transgender person (not identifying with the sex to which they were assigned at birth).

These social norms are encompassed in concepts of femininity and masculinity, which shape the way in which individuals perceive themselves and live their lives. Women and men experience these ideas differently. As V. Geetha¹ points out, these ideas affect our food, our clothes, even our sexual relations and thoughts, shaping how we perceive ourselves and others. For instance, boys are taught to be bold and daring, while girls are taught to be modest and retiring. Boys are not supposed to cry, and girls are not supposed to climb trees. Anyone who seems like a misfit is ridiculed.

Ideas of femininity and masculinity vary across society, class, community and caste. Traits and behaviours that are considered feminine or masculine are specific to particular contexts. Having a muscular body is widely considered to be ‘manly’, but this is not so in parts of Southeast Asia, where many men have delicate bodies. So too, in all societies, some men are caring and gentle (not considered typically male) just as some women are assertive and bold (not considered typically female). Traits such as gentleness and toughness are human characteristics of both women and men.

People do not accept these ideas passively into their everyday practice, but struggle with them, re-working some, subverting or discarding others. Such negotiation involves both cooperation and conflict. For instance, it has been noted that high caste women accept their subordinated position in the family as a kind of ‘bargain’ with men because it enables the women to maintain their superior caste status in society. Typical ideas also change over time. Today, many girls wear jeans and boys wear brightly coloured shirts that would not have been acceptable in their grandparents’ times.

Femininity and masculinity are not the natural result of sexual differences or even of socio-economic relations but arise from systemic norms enforced by society. As the French writer Simone de Beauvoir² famously said, ‘One is not

born but rather becomes a woman.’ This insight laid the ground for the feminist understanding of ‘gender’ as being socially constructed. Feminism is the modern socio-political movement for the rights of women, for women’s voice and their resistance to invisibility and silencing. It encompasses many different threads. But broadly feminists view gender as the way in which people think about themselves and organise their societies, their belief systems and institutions. Gender is, thus, fluid and dynamic and a critical ‘analytical category’ to understand society.³

It is also useful to be clear about what gender is *not*. As **Sumi Krishna**⁴ has written:

- a) Gender is not a binary grammatical category to differentiate between the forms of words in a language (like *stree-ling/pu-ling* in Hindi).
- b) Gender does not mean women although the term gender has been widely and wrongly re-assimilated into common usage as an alternative word for women.
- c) Gender is not the same as biological sex, i.e. female/male anatomical, physiological and reproductive features and functions. (The gender-sex interaction will be discussed in Unit 2.)
- d) Gender is not fixed but is a process by which a person acquires certain traits, needs and interests and assumes particular roles and responsibilities.

The English language term ‘gender’ does not have a single-word translation in many languages. So, it is necessary to develop new meanings for existing words. Some Chinese feminists combine two words, ‘social + sex’, to denote gender. Women’s groups in Karnataka have used the Kannada word *lingatva* (derived from the word for sexuality in Sanskrit) to express the concept of gender.

Gender shapes every person’s identity, traits and behaviour, their roles, positions and responsibilities in society, and the meaning they find in their lives. One’s gender identification depends on one’s perception of oneself as a woman or a man, or as being in between or neither. Gender is not something we are born with but is shaped from birth throughout our lives by how we are brought up, by our relationships with family and relatives, and by interactions with the caste and community.

1.3 SYSTEMIC MALE DOMINATION AND PATRIARCHIES

Indian society and the social groups that constitute it are characterised by many diversities, and also by disparities of materials, social resources and knowledge. Both diversity (such as ethnic, social and gender differences) and disparity (such as economic levels) are related to the ways in which a particular society is organised. Social structures such as family and community occur across society; other structures such as economic class, social status or position create a hierarchy in society. Families too may be

internally organised as a hierarchy with the father or other adult male usually having the most authority.

Systemic male domination varies across communities, religious and ethnic/tribal groups. Among plains-dwelling peasant and caste societies, the control of productive resources, labour and knowledge is organised in a decidedly hierarchical manner. Ritual status among caste groups is based on concepts of purity and impurity – ranging from high status Brahmans to low status *Dalits* (ritually excluded as ‘untouchables’).

This is very different from the many hill-dwelling and tribal groups where the sharing of productive resources and the division of labour within the family, kin group or village is relatively more egalitarian. Until a few decades ago, women had a greater role in taking decisions and managing resources among certain Adivasi/tribal groups in central and north-eastern India who foraged for food and practised shifting (slash and burn) cultivation. When Adivasi/tribal groups adopt settled agriculture, the process of social stratification and women’s subordination begins.

Male dominated societies are marked by taboos against women using the plough, denying them rights to own land, the phenomenon of witch hunting and exclusion from social rituals and the political system. Commenting on the social transition (from tribe to caste) among tribal groups in Jharkhand in central India, **Govind Kelkar** and **Dev Nathan**⁵ have noted: ‘The absence of any seclusion of women in the tribal situation, the free mixing of adolescents of both sexes, the choice of women and men as regards to their marriage partners, the ease of divorce, the practice of widow remarriage – all come under severe attack in the period of formation of caste society.’

Similar transitions have taken place among the tribal societies of north-eastern India, where the transition from foraging to settled agriculture; communal to individual land ownership; and tribal belief systems to Hinduism or Christianity has affected the women’s roles and status. Although women have relatively more personal and economic autonomy, retaining some control over the income from foraged forest produce, they are subordinate to men in the religious and political spheres.⁶

There are different views about the emergence of patriarchy, which is the systemic privileging of male values and beliefs, and male domination of the family, household, and other institutions. Patriarchal societies are generally (though not always) patrilineal, that is, descent, inheritance and succession are traced through the male line. Such societies are often also patrilocal, as in much of northern India, where a married woman moves to the home of the husband or to his paternal home, and where authority vests with the patrilineal kin.

Patriarchy is manifested in ways that are specific to a social group, tribe or caste, although some patriarchal elements may be common across social groups. So, it is more accurate to talk of patriarchies, in the plural. Uma Chakravarty⁷ says: ‘As we explore different regions and different time periods, we can see that an evolved caste-based patriarchy is very different from tribal patriarchies.’ The most widespread form of present-day, caste-

linked male dominance in India is ‘Brahmanical patriarchy’, which has also influenced various tribal patriarchies.

Patriarchy is sometimes wrongly seen as a mirror-image of ‘matriarchy’, societies where female values and interests are supposedly valued and where institutions are dominated by women. There is, however, no evidence of functioning matriarchies in the past or in the present. There are a few communities that are matrilineal, tracing descent through the female line. The matrilineal communities in India include the tribal Khasis and Garos of Meghalaya, the Hindu Nairs of Kerala, the Bunts of Karnataka, and the Muslims of Lakshadweep. Matrilineal communities may also be male dominated because authority is exercised by a woman’s male kin, such as her brothers and maternal uncles.

Check Your Progress Exercise I

- Note: I. Use this space given below to answer the question.
- II. Compare your answer with the Course material of this Unit.

1. What is understood by patriarchy and matriarchy? Give examples.

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2. Write what doesn’t connote the term gender?

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1.4 UNEQUAL AND GENDERED DIVISION OF LABOUR

Gender is deeply intertwined with the unequal division of labour in caste societies. The patriarchal caste-linked system in India is a complex part of the social structure. The *jati* (also spelled *jat*) is a group into which a person is born. The British used the term ‘caste’ for the thousands of *jatis* (or *jats*) in the Indian subcontinent. The *jati* is specific to a region and should not be confused with the *varna*, which is a hierarchical ordering of society into four levels by brahmanical notions of purity and by occupation. The *varna* system excludes dalits/bahujans (who are now categorised as Scheduled Castes) and the adivasis / tribals (now Scheduled Tribes).

Social anthropologist **Leela Dube**⁸ has explained caste as operating on three levels which can be separately analysed but are interlinked: *jati* exclusion;

hierarchy; and interdependence:

- a) The *jati* is typically a group with a particular status into which an individual is born, and with rules that govern contact and exclusion or separation (such as for marriage).
- b) Hierarchy is the principle of order and rank based on status; and
- c) Interdependence is the division of labour among hierarchically different *jatis*.

Dube points out that women's work contributes to the 'occupational continuity' of a caste group. Women are also expected to maintain customs related to food and ritual practices and follow rigid prescriptions in the critical area of sexuality and marriage. The rules governing an individual's behaviour, actions, and interactions with other *jatis* are centred on the immediate relatives, i.e., the kinship unit of their family and household. Because the maintenance of *jati* falls upon women, their bodies are rigidly controlled. If an individual violates caste rules, the punishment usually applies to the family and household unless they disown the individual.

A *jati* or caste group is itself like a network of families and larger kinship units. The distribution of material resources among different *jatis* and within a *jati* is experienced by these family units. The unequal distribution and control of resources has led to exploitation both within the family and larger kinship units and between different *jatis*. Over the last century, the interdependence among different *jatis* has become much weaker because of urbanisation and the emergence of many new occupations. Yet, the division of labour and the control of women's bodies still persists to a considerable extent both within the family and in society. Across most of India, the degrading and low-paid occupation of sweepers and scavengers is still filled by dalits/bahujans who have been historically responsible for these tasks. Such labour is both degrading and low-paid, particularly so for women of these castes.

In the 19th century, the social reformers **Jyotibai Phule** (1826-1890) in Maharashtra and E.V. **Ramaswamy Periyar** (1879-1973) in Tamil Nadu linked the subordination of the low status castes in the community and the subordination of women in the family. Periyar also questioned conventional notions of femininity and masculinity. He argued that men's control over women's sexuality was related to their control of women's labour and that a woman who accepted the norms of an ideal wife was also accepting her servitude in the marriage. **Bhimrao Ambedkar** (1891-1956) had a key role in framing the Constitution of India that bans discrimination against so-called 'untouchables'. Ambedkar argued that the inferior status of women within caste groups was because of the violent control over women's sexuality and the prohibition of inter-marriage among castes.⁹

The ways in which labour is allocated among different groups in a community and among the members in a family sustain a diverse and unequal social and economic order. Historically, people who are categorised as 'third gender' (now legally recognised in India) include diverse groups who have

rejected typical male-female gender identities. The *hijras* known as *kinnars* in north India, the *aravani* in Tamil Nadu and the *jogappas* of Karnataka and Andhra have all had culturally assigned but economically precarious roles and been stigmatised for being different.

Gendered patterns of work are context-specific and change over time. Studies across the country have shown task-differentiation among women and men, but which specific task (collecting water, fuelwood, selecting seeds, winnowing etc.) is done by women and which by men varies in different locations. Among most farming groups, women are known as skilled seed-selectors and conservers but among some communities women's touch is believed to pollute food-crop seeds. Social practices rather than sex seem to determine the distribution of tasks.¹⁰

The most time-consuming and laborious tasks within a family are generally assigned to women and girls, and these tasks are devalued. The unequal division of labour by which women and girls are responsible for domestic work and childcare is so widely enforced that it seems 'natural'. But there is nothing natural or biological that ties women to household provisioning, cooking, cleaning and caring tasks. Indeed, when value is added to such tasks through machines and remuneration, men are quick to take over. In this case, the domestic social norms about femininity and masculinity are overturned in the public sphere (as with men serving as professional cooks).

1.5 GENDER-POWER RELATIONS

The social construction of gender is a complex and dynamic process which in turn shapes the gender relations between women, men, and third gender persons in the family, community and society. The gender relations between any two persons is a part of the hierarchical way in which the family and community control the organisation of society. Class and caste hierarchies are maintained by controlling women's sexuality and labour, and their access to ritual and modern knowledge. All hierarchical control is 'political', in that it is an exercise of power. For women and those with marginalized gender identities, their personal experience is connected to the structures of power in society – as in the feminist slogan, the 'personal is political'.

The gender-power relations within a particular social group reflect their belief systems, forms of social hierarchy and degrees of male domination. A person's position and power in society is the result of many factors or variables: their class, caste, community, ethnicity/race, gender, sexual orientation, even age. Each of these variables cuts across and intersects with the others creating a complex web of power, of domination and subordination, extending from the domestic sphere of intimate relations within the family to the public spheres of employment in society.

Gender identities are often paramount regardless of class and caste. This is particularly so when women (and those whose gender identity is not male) face sexual and gender violence, assault or harassment. Because the issue of violence is so pervasive, it brought women across society together, forming the crux of the women's movement in India in the 1980s. In more recent

decades, there has been greater awareness that women are not a homogenous group and that gender relations are different for women in different locations.

In the 1990s, dalit feminists¹¹ began to point out that the dalit woman's experience of violence and discriminatory practices was very different from that of the upper caste woman. Dalit and tribal women not only face violence from the men of their community, but also from upper caste men. For upper caste men, sexual assault and violence against poor and marginalised women is an assertion of their caste power over the woman and her community.

Indeed, poor dalit women are among the most sexually vulnerable groups. As caste operates even among non-caste-linked religions, poor Muslim dalit women may experience multiple marginalisation, because of their gender, caste, religion and poverty. The marginalised Muslim women are also the most socio-economically disadvantaged with the lowest levels of education and access to health care.

Class and/or caste sometimes reinforce and sometimes negate gender. Prejudices about caste and gender may affect, say, a woman dalit engineer, whose authority is not recognised by her privileged caste juniors, men and women. Yet, a rich or middle-class woman of a privileged caste who employs a poor dalit man to work in her house has authority and power over him, despite the social norms of masculinity in a patriarchal society. Age is also a factor. In parts of Africa, a woman over 50 is acknowledged as an 'honorary man' and treated as such. In India too, older women have certain freedoms that younger women do not.

The inter-meshing of gender with class, caste, ethnicity etc. makes it difficult to generalize about women's position. But some trends can be distinguished. Over time with increasing rural-urban migration and the anonymity of the city, certain caste rules have weakened, notably regarding food and the observance of rituals. National laws have also opened up spaces for women, such as the right to inherit property and to make an independent choice of the marriage partner through a civil marriage. But although enabling laws exist, social transformation is taking place very slowly.

Today, the family continues to be the site where hierarchy is reinforced. The joint family, with more than one generation living in the same residence, persists because of economic and cultural reasons, more so in north India (where married women move to the husband's home) than in south India. Gendered power in a patriarchal inter-generational household reinforces female subordination, taking away women's autonomy and power to make decisions, control over her sexuality, health, mobility, and material and knowledge resources.

Gender-power relations are diverse and changing in complex ways that are not necessarily empowering for women. The dalit/ bahun women's relative freedom to move about and work outside the household is lost when these castes improve their social position. The withdrawal of women from work is seen as a sign of status, conforming to privileged caste, middleclass gender norms. Economic pressures have compelled many lower middle-class families to send women out to work overcoming conventional gendered

barriers regarding night work or/and living away from home. The young women, who are employed in data processing (call centres) or move to other states to work in garment export factories, contribute hugely to the economic well-being of their families. But this rarely empowers the women to overcome their gendered environments. Their employment does not translate into greater freedom to take decisions about their life, which is still controlled by patriarchal authorities both at home and at work.

Check Your Progress Exercise II

Note: I. Use this space given below to answer the question.

II. Compare your answer with the Course material of this Unit.

1. List the three levels through which the caste system is functioning in India.

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2. “The Gender-power relations don’t necessarily empower women.” Justify the statement with the help of an example.

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1.6 LET US SUM UP

Since the 1990s, the feminist term gender has been appropriated swiftly and very widely. But gender is used as a synonym for women without any concern for the patriarchal gender-power relations in society. When different gender roles are recognised, the tendency is simply to list what women do and what men do, without any attempt to understand why there are gendered patterns of work. Women are treated as a homogenous group without addressing the diversity of their caste-class locations. Third gender persons are barely recognised. The underlying assumption is that the gender norms of middle class Brahmanical patriarchy apply, or should apply, across society.

The result is that even so-called gender sensitive initiatives reinforce patriarchal norms in society, seeing all women as mothers and wives first and not as independent productive persons. Patriarchal ideas and the norms of femininity and masculinity seem natural because they are so deeply enmeshed in society and often internalised by women themselves. When dual norms are applied to groups of people who have very different levels of

power, the hierarchical relation between them is maintained. Thus, gender and caste discrimination and inequality persist.

1.7 UNIT END QUESTIONS

1. How do concepts of femininity and masculinity shape gender identity?
2. Why is it more accurate to speak of patriarchies (in the plural) rather than patriarchy?
3. How does the division of labour contribute to inequality in the family and society?
4. Why do dalit women or transgender persons face multiple marginalization's?

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UNIT 2 GENDER AND SCIENCE

Structure

- 2.0 Introduction
- 2.1 Learning Outcomes
- 2.2 Human Nature: Sex, Sexuality and Gender
- 2.3 Gendered Construction of Scientific Knowledge
- 2.4 The Gender Dimension of Scientific Institutions
- 2.5 Let Us Sum Up
- 2.6 Unit End Questions
- 2.7 References
- 2.8 Suggested Readings

2.0 INTRODUCTION

Science is the rational understanding of nature and the human condition through systematic intellectual and practical studies of physical and natural phenomena. This understanding has transformed life on earth, the earth itself, and our view of the universe. The democratic and emancipatory aspects of science, its tools and applications, have been used to improve human lives. Yet, studies of the history, philosophies and practices of science, have shown that Science and Technology (S&T) also reflect the irrational assumptions and prejudices of society.

In the 1970s, feminist critiques of the humanities and social sciences revealed that knowledge production was not gender neutral. This led to the realisation that S&T too are not free from embedded values and gender-bias. Because of men's position in society and their access to learning, education and other patriarchal privileges, modern science has reflected men's interests and concerns about what is studied, who studies it and how. Women and other genders who do not conform to the prescribed masculine ideals, traits and behaviour have been rendered invisible or viewed negatively. This influences the culture and organisation of scientific institutions, shapes the content and methodology of scientific disciplines, and impacts all people's lives.

Across the world, many believe that women and men have biologically separate 'natures' that determine how people feel, think and act. In this view, separate 'natures' are intrinsic, essential and universal to all women, or all men, determining their sexual and social roles. Some scientists have claimed that women's nature is responsible for their historically subordinate position in the family and society, and that it cannot be altered because of hormones, genes and evolution. Other scientists and feminists have refuted this, showing that women's nature is not innate and universal but shaped by changing social circumstances.

2.1 LEARNING OUTCOMES

After studying this Unit, you will be able to:

- Learn how biological sex, sexuality and gender constitute human nature;
- Explain the gendered nature of the scientific knowledge and scientific institutions; and
- Discuss how socio-cultural contexts construct the gendered nature of scientific knowledge.

2.2 HUMAN NATURE: SEX, SEXUALITY AND GENDER

Contemporary research provides clearer insights into what constitutes human nature and the role of hormones and genes in shaping a person's nature. We now know that there is a complex interplay between a person's biological sex, sexuality (or sexual orientation) and gender.

Like gender, the words 'sex' and 'sexuality' too can be confusing. Biological 'sex' encompasses two categories: male (M) and female (F). Recently, the category Third Gender (TG) has been legally included in India. This is reflected in many official forms (like applications to open a bank account) where one must put a tick on M, F, or TG. In fact, these are not sealed boxes. Sexual categories span a spectrum of biological variations (Box 1).

Box 1: Genetic inheritance¹

Every human inherits genetic material, DNA packed into gametes, and passed on from each of the parents to the offspring. Two gametes (denoted by XX for females and XY for males) come together to create a new organism. At different stages of life, the genetic inheritance influences a person's hormones, anatomy and physiology. Biologists define two distinct sexes in many species, but that does not mean that all individuals can only be female or male. In nature, an organism may be both male and female; or neither; or first one sex then the other. The biological definition of female and male 'is not based on an essential quality that every organism is born with, but on two distinct strategies that organisms use to propagate their genes. They are not born with the ability to use these strategies – they acquire that ability as they grow up, a process which produces endless variation between individuals.' (Griffiths 2020)

Biological sex is the outcome of a process from conception, through birth and puberty. Persons may be typical female or male or have various 'intersex' conditions. Some may be female in all respects but have variations such as impaired ovaries and higher levels of certain hormones. Similarly, some males may have slight variations, such as in the sperm count. Those in the middle could display a mosaic of female and male biological characteristics. So, sex can be described as a spectrum.

Some intersex persons, even those whose biology varies very little from the typical female or male, may choose to treat these conditions to conform to the typical; others may choose not to do so. Or their families or doctors who deliver the new born may make these choices. Persons born a typical female or male may also choose to change their sex. The choices that people make depend on many factors including their gender and sexuality.

Sexuality refers to sexual orientation, a person's emotional and sexual attraction to another person. Heterosexual persons are attracted to persons of another sex (colloquially called 'straight'). Homosexual persons are attracted to persons of their own sex (termed queer/gay/lesbian in English). In India, homosexual identities are very varied – *hijra*, *kothi*, *panthi* etc.) Bisexual persons are attracted to female and male individuals. Asexual persons are not attracted to either sex. Older children and adolescents may become aware of their sexual preferences before and during puberty, or this may happen later in their lives.

In many patriarchal societies, including India, heterosexuality has been treated as the norm and any deviation from it involves a struggle against social prejudices. Section 377 of the Indian Penal Code, introduced by the British in 1861, prohibits sexual activities 'against the order of nature'. After a long struggle by various people's groups, in 2018 the Supreme Court of India ruled that Section 377 would not apply to consensual homosexual relationship between adults.

Sexual orientation is a continuum between heterosexuality and homosexuality. People at either end of the continuum may be entirely heterosexual or entirely homosexual. But across the span of the spectrum there are many variations in the degree of heterosexuality and homosexuality. This is further complicated because traits and behaviour that may be considered homosexual in some societies are not seen as such in other societies. For instance, in India boys and men commonly hold hands; in Indian society this does not have a sexual connotation. In western societies, however, men holding hands may be considered a sign of their mutual sexual attraction.

Transgender sexual orientation may also be fluid and linked to cultural identities. The revered *jogappa* singers of north Karnataka are young boys and men who marry the goddess Yellamma to become women. Among indigenous communities of North America 'two-spirit' people perform social and ceremonial roles.

The complexity of sex, sexuality and gender makes human nature varied and diverse. Women and men do not have essential and distinct natures. The interaction between biological sex, sexual orientation and gender give every person a unique sense of self and well-being, and determine how their bodies develop and grow (Box 2).

The evidence is that anatomy and physiology may define the outer limits of physical performance but within those limits all humans can develop speed, strength, flexibility and stamina through labour and practice. Muscle mass is developed by the stress to which a muscle is put, which depends on a person's socio-economic position and activities. Poor labouring women in India who carry heavy weights on their heads have stronger neck muscles than the men in their communities who prefer to carry loads on their shoulders or backs. So too, women athletes (like tennis players, javelin-throwers, pole-vaulters, weight-lifters) develop 'atypical' (so-called 'masculine') upper body strength through training because their sport requires this.

Patriarchal societies, including many scientists, confuse biological sex differences with social explanations and are slow to catch up on current scientific knowledge. This is why such societies continue to assume that women's biological sex determines their physical and mental capacities, their very nature. The difficulty is that in the past these ideas were promoted by many scientific disciplines themselves.

2.3 GENDERED CONSTRUCTION OF SCIENTIFIC KNOWLEDGE³

The stereotypical labelling of male and female, masculine and feminine, happens in many ways. The language of scientific communication, particularly in the life sciences, requires descriptions of functions and processes. Scientists convey their meaning through metaphors and images drawn from the social sphere. Science also involves systems of ordering and classification and, most importantly, the development of theories. Gendering happens at all these levels.

In 1996, socio-cultural anthropologist Emily Martin⁴ published a revealing study of the popular and scientific accounts of reproductive biology. She found that metaphors of the fusing of egg and sperm in scientific papers reflected the cultural stereotypes of female and male. The egg was most commonly described as passive and fragile, needing protection like a young woman. The sperm was described as active and attacking, like a heroic warrior coming to her rescue. Such descriptions are derived from the gender relations prevailing in society. Although new scientific studies of the biophysics of reproduction show that the egg and sperm are mutually active partners, many researchers continue to use the old imagery of the aggressive sperm and the passive egg. This reflects how deeply society influences science. Stereotypical imagery colours how we see the world.

Ideas about the passive and subordinate female have also shaped the organisation of particular disciplines. This is revealed in science historian Londa Shiebinger's⁵ analysis of the emergence of botanical taxonomy (the system of naming and classifying organisms) in 18th century Europe. Swedish biologist Carl Linnaeus, who formalised modern taxonomy, viewed biology

through the lens of human sexual relations, classifying plants according to human marriage relations. Instead of using non-sexual terms, 'stamen' for the male part of a flower and 'pistil' for the female part, Linnaeus chose the Greek words *andria* for husband and *gynia* for wife. 'Classes' depended on the numbers, relative proportions and the positions of the male parts. Below classes came 'orders', based on female parts reflecting the prevailing gender hierarchy. The class of *monandria* are monogamous (having one marriage partner). The order of *polygamia* are polygamous (more than one marriage partner). (Orders were divided into genera, and then came species and varieties – the lower classification is still used today.)

Middle class gender relations of 18th century England that viewed the sexual division of labour as complementary but unequal, helped to maintain gender hierarchies and make inequality seem naturally fixed by biology. The concept of sexual complementarity in the unequal division of labour continued into the 19th century. Feminist researches show that Charles Darwin too reflected the gendered ideas of his society. Biological anthropologist Linda Fedigan⁶ reveals that Darwin's theory of sexual selection in humans was based on his belief that human males were 'more courageous, energetic, inventive, pugnacious and sexually assertive' than human females. Darwin said that men had the advantage of size in early human societies because they 'fought to the death for access to women', and in modern times because they had to work harder than women for their subsistence. In Darwin's view, evolution does not select assertive traits in women; so women are nurturing, reclusive and altruistic, with 'maternal instincts' for infants and others. 'Thus man has become superior to woman', concludes Darwin in *The Descent of Man*.⁷

These stereotypes, the passive-nurturing female and active-aggressive male, seeped into the science of human evolution in the 20th century when accounts of 'Man the Hunter' held sway. In this type of narrative, women in early modern times were said to be confined to the home, providing sexual and reproductive services in exchange for protection and provisioning by men. Small game hunting by women was described as gathering while the same activity by men was called hunting. Contrary to the theory of Man the Hunter, there is considerable evidence that women's reproductive functions (pregnancy, child birth and lactation) did not make them less productive than men. Indeed, women did hunt, besides providing food through gathering.

In India, women hunters are depicted in the pre-historic rock shelters of Bhimbetka (Madhya Pradesh). A stone frieze in Udaygiri-Khandagiri (1st century BCE, Odisha) shows two women and a man battling elephants. Bas reliefs at Hampi (15th century ACE, Karnataka) of strong energetic women with bows and arrows, suggest that women did participate in hunts. In tribal/adivasi areas too women have been part of ritual hunting.⁸

The apparent 'logic' of gendered science masks many assumptions. As Sumi Krishna⁹ has pointed out, when the gender-power relations in the hierarchy of dominant and subordinate positions in society enters science, three inter-related threads of belief may be discerned: that genes produce particular behaviours; that certain behaviours are universal for all women and all men; and that these behaviours have become fixed through evolution and natural

selection. ‘From this follows the argument that the division of labour in society is functional and determined by biology. So men’s productive capabilities are perceived as balancing women’s reproductive and nurturing capacities.’ This makes it easier to side-step problems of inequity and blame individuals for their presumed short-comings, rather than question the assumptions and practices of scientific disciplines and institutions.

In the 1970s, the entomologist and socio-biologist **E.O.Wilson**¹⁰ claimed that biology favours patriarchy; men continue to hunt game, now represented by ‘money’ and that denying this would lead to loss of efficiency. He said: ‘Even with identical education and equal access to all professions, men are likely to continue to play a disproportionate role in political life, business and science’. In recent decades, ideas about an inherent and essential predisposition in female and male natures have emerged in evolutionary psychology.

Such claims, based on adaptation and genetics, to justify gender hierarchies in society have been comprehensively refuted by several scientists and feminists. Evolutionary geneticist **R.H.Lewontin**, neurobiologist Steven Rose and psychologist **Leo Kamin**¹¹ emphasise that there is no ‘significant human behaviour that is built into our genes in such a way that it cannot be modified and shaped by social conditioning. Humans are not born blank slates. Yet, ‘even biological features such as eating, sleeping and sex are greatly modified by conscious control and social conditioning. The sexual urge in particular may be abolished, transformed or heightened by life history events.’

Feminists have furthered the argument that human biological and social life are inter-related. Biologist **Lynda Birke**¹² points out that while female bodies do bear children, the body is not isolated from the rest of a person’s life, ‘bodily processes both affect, and are affected by, our experiences. Today, with more freedom to make reproductive decisions (such as the use of contraception), even reproductive potential is ‘more malleable’. Therefore, ‘Gender is not an edifice built upon a biological dichotomy (sex); rather our experiences in a gendered world can themselves influence those biological processes.’

Check Your Progress Exercise I

Note: I. Use this space given below to answer the question.

II. Compare your answer with the Course material of this Unit.

1. Explain the terms such as: Sex, Sexuality and Gender.

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2. How feminist researchers viewed the Darwin's theory of evolution?

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2.4 THE GENDER DIMENSION OF SCIENTIFIC INSTITUTIONS

The process of doing science involves a range of institutions – an interlinked system of universities, national (and international) research institutes, professional organisations and government (and international) agencies. In India, as in many other nations, these institutions are largely dominated and controlled by men from privileged caste and class backgrounds. The relative under-representation of women (and other genders) in science is only the most visible aspect of exclusion and gendering of science institutions in patriarchal societies.

Most scientists believe that they are engaged in rational, objective work, unaffected by their social location. Yet, the history of science shows that their view of nature and human nature is moulded by their particular social experience. Science reflects its social context (and reinforces it) by valuing so-called male qualities of mind and rationality over so-called female qualities of heart and feeling. Moreover, high achieving Indian scientists, who are predominantly men from upper caste, middle class backgrounds, take their deep-rooted class-caste identities for granted, and are unconscious of the social advantages that have propelled them into their positions.

As educationist **Mina Swaminathan**¹⁴ says, 'people who are convinced of their intellectual superiority' are 'unaware of what has produced it', and sincerely claim to be casteless. She points out that upper-caste, upper-class male scientists who 'talk with pride of their lineage and family with a long tradition of scholarship', do not see 'that those without these (caste-class) credentials cannot be expected to catch up in one generation, even with support, which they rarely get.' Women scientists who have to deal with their own struggles, rarely speak out about their achievements or about discrimination, and are silent on the contentious concept of merit in science institutions.

'Merit' is an instrument of marginalisation that strengthens male domination of science in patriarchal-caste societies. Feminist mathematician **Jayasree Subramanian's**¹⁵ research has revealed the many ways in which this happens. Men scientists doubt 'women's competence and commitment' and attribute women scientists' achievements to 'hard work' rather than 'talent for science'. Women are often excluded by assuming that they will leave science to care for their families. Women are also unable, for many social reasons, to establish the personal connections and collaborations that are necessary to further scientific research. There may not be overt inequity but

all those who do not conform to the masculine ideals of science face everyday discrimination and subtle forms of harassment.

‘When does a woman’s contribution gain recognition as knowledge or as being significant in building up a profession?’ asks Mandira Sen¹⁶, writing about **Ajita Chakraborty**, India’s first practising woman psychiatrist (Box 3). Chakraborty remains largely unrecognised but her ideas resonate with women’s critiques of medical and mental health practice today.

Box 3: Establishing a discipline

Ajita Chakraborty came from a privileged background and trained in Britain. She joined the West Bengal Government Health Service in 1960 and her career was contiguous with the formation and growth of the discipline of psychiatry in India. She was an uncompromising woman with strong views that ran counter to the discipline that was being established; she fought marginalization at every step. Chakraborty argued that academic psychiatry was so strongly biological and medical that it was ‘almost devoid of social and human dimensions’. For a new orientation to emerge, she felt, there had to be greater awareness of the local experience and cultural context – this was especially important for women. She held that mental illness may be caused by biological factors but was manifested through language and non-verbally in a particular social context.

Indeed, the success of aspiring scientists from conventionally excluded backgrounds who clear the merit gateway and forge a scientific career lies in their ability to negotiate spaces in the institutional structure and culture of science. Their presence does not necessarily change the culture of the institution or of the science. As biologist Evelyn Fox Keller¹⁷ argued, ‘for women scientists as *scientists*, the principal point is that measures of scientific performance admitted of only a single scale, according to which to be different was to be lesser. Under such circumstances, the hope of equity, indeed the very concept of equity, appeared – as it still appears – to depend on the disavowal of difference.’ Assumed gender-based difference is the basis both for women being excluded from science and for women scientists being viewed as somehow not being womanly, feminine.

Check Your Progress Exercise II

Note: I. Use this space given below to answer the question.

II. Compare your answer with the Course material of this Unit.

1. Write a short note on the Gender dimensions of the scientific institutions in India.

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2. How merit relates to women's marginalisation from science? Give one example to write your answer.

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2.5 LET US SUM UP

Today, science is a collaborative effort but the public perception of science, fostered by the media, largely centres on individually successful and usually privileged male scientists. The 'star' renders invisible the large numbers of other scientists and technicians in the background, including women. In India, casual observation shows a swift rise in the number of women technicians (such as pharmacists, opticians, laboratory workers), but there is little data on this trend. From experience in other work spaces, we know that the number of women in an institution does bring about change, at the very least in practical facilities – the availability of washrooms, the height of a lectern, the provision of crèches etc. A 'critical mass' of women colleagues may also provide a support system against some forms of workplace harassment.

There have been many well-intentioned programmes to encourage girls to study science and for women to choose and remain in scientific careers. This is an important goal but initiatives continue to be grounded in dual norms and a hierarchical characterisation of women's and men's work. Gains in enrolment are not maintained at higher stages of education and employment. We now need to move beyond numbers to address the gendered attitudes of scientists, the gendering of scientific knowledge and the underlying assumptions in the deep structures of scientific institutions and practices.

2.6 UNIT END QUESTIONS

1. Why is the spectrum of biological sex relevant to understanding human natures? Discuss.
2. How do the metaphors and narratives of science reflect its social context? Analyse.
3. How does the concept of 'merit' marginalise women and less privileged groups in science? Examine with the help of suitable case studies.

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UNIT 3 GENDER AND TECHNOLOGY

Structure

- 3.0 Introduction
- 3.1 Learning Outcomes
- 3.2 Women's Contribution & Technological Development: Uncovering its History
- 3.3 Gender and Reproductive Technology
- 3.4 Gender Relations and Domestic Technology
- 3.5 Let Us Sum Up
- 3.6 Unit End Questions
- 3.7 References
- 3.8 Suggested Reading

3.0 INTRODUCTION

Technologies are a predominant medium through which gender attributes are expressed. Often men are viewed as active innovators, producers, service providers and lovers of technology, whereas women are projected as the passive beneficiaries of technology. Association of masculinity with technology finds expression in academic fields as well as in the distribution of power in the everyday lives of people. During the 1970s, a significant section of feminist scholarship focused on interrogating the relationship between technology and women. Two major areas of investigation were: a) uncovering the hidden history of women's contribution to technological development b) mapping the effects of new technologies (more particularly household technology and reproductive technology) on women.

3.1 LEARNING OUTCOMES

After studying this Unit, you will be able to

- Explain the inter-linkages between gender and technology historically;
- Contextualize the interface between gender and technology in the sphere of reproduction and domesticity; and
- Critically analyse women's subordination to technology in the contemporary situations.

3.2 WOMEN'S CONTRIBUTION & TECHNOLOGICAL DEVELOPMENT: UNCOVERING ITS HISTORY

Throughout history though women have contributed substantially to the development of technologies, the mainstream history depicts the prototype inventor of technology as male (Wajcman, 1991). Hence, the task of

feminists was to detect the biased approach of history of technological development and to uncover the hidden history of women's contribution to technological development. Scholars like **Wajcman (1991)**, **Stanley (1995)**, **Dusek (2006)** argue that the historical account of innovation of technologies has often either completely excluded or downplayed the contribution of women.

Dusek (2006) points out that the unifying theory of 'man-the-hunter' was propagated by the mainstream anthropological scholarship in 1960s, as a predominant explanation to describe the historical development of modern human-beings. In such theory, big game hunting was perceived as crucial to the development of intelligence and social cooperation among the humans. As men were depicted to be predominant in the big game hunting, they were projected to be responsible for the advancement of human-beings' social nature (Dusek, 2006:138). Since 1970s feminist anthropologists have challenged the mainstream anthropological generalization of 'man-the-hunter'. They have argued that 'man-the-hunter' is a myth, which serves in maintaining the male hegemony (Lerner, 1986). Feminist historian **Gerda Lerner (1986)** points out that 'man-the-hunter' theorizations are biologically deterministic. In such explanations, women's reproductive role as mothers is cited as primary to women's lives. A corollary to this explanation claims that men possess greater physical strength, so they can run faster and lift heavy weights, and that this makes them fit for being hunters. It is said that men used tools to hunt for food and in warfare to protect the women of their clan. However, **Gerda Lerner** terms such explanations as 'dubious' claims (Lerner, 1986: 17).

According to **Lerner**, anthropological evidence from the hunting and gathering societies shows that regular food supplies are made through activities like gathering and small-scale hunting, in which women and children participate. Women also occasionally participate in big-game hunting, which is an auxiliary source of food. According to Lerner, women's contribution to invention of technology is supported through women's food preserving activities like basketry, pottery and their knowledge of horticulture. Feminist scholars have also drawn attention to the fact that the over-identification of technology with machines and weapons has led to exaggerating the role of men in invention of technologies, whereas the significance of technological innovations such as grain storage techniques in containers requiring knowledge and skills of basketry, for instance, are often ignored.

Similarly **Wajcman (1991)** suggests that women were the first technologists. According to her, 'after all, women were the main gatherers, processors, and storers of plant food from earliest human times onward. It was therefore logical that they should be the ones to have invented the tools and methods involved in this work such as the digging stick, the carrying sling, the reaping knife and sickle, pestles and pounders.' (Op. cit. p17)

Wajcman (1991) also points out that even during industrial era, although women significantly contributed to the invention of crucial machines such as the cotton gin, sewing machine, small electric motor, McCormick reaper, and

the Jacquard loom, these inventions were credited to the women's husbands and the men's names were registered in the patent records. The limited property rights of women often stood as a stumbling block in registering their names as the original inventors (Wajcman, 1991:16).

Feminist scholars have also highlighted the deeply gendered nature of industrial technologies. Both **Cynthia Cockburn** (1985) and **Wajcman** (1991) argue that one of the crucial ways in which gender division interfaces with technology in the industrial work set up is through the cost of labour. As women's labour costs less than men's labour, many factory owners and industrialists prefer to replace expensive skilled male workers with machines or less skilled, low-paid, less unionized female workers.

The way new technological interventions reinforce gender hierarchy gets more explicit if we analyze the effects of new technologies like reproductive technology and domestic technology. Let us read about the impact of reproductive technologies in the lives of women.

3.3 GENDER AND REPRODUCTIVE TECHNOLOGY

Martin (1987) and **Wajcman** (1991) in drawing our attention to the history of childbirth practices in the West, point out that till seventeenth century childbirths were predominantly assisted by women midwives and relatives. In Britain, only on rare occasions surgeons were called during difficult child deliveries. However, in the eighteenth century, the technological invention of obstetric forceps and its usage in the process of child delivery by male midwives, enabled them to compete with female midwives who used their own hands. Subsequently, the whole process of childbirth, which was in women's domain, was captured by men with the help of technology. Medicalization of pregnancy and hospitalization of childbirth came to be established as standard practice in the West in the subsequent period. In colonized countries like India, the medicalization of pregnancy and hospitalization of childbirth were promoted as a civilizing and modernizing agenda by the colonial state. After independence, the Indian state also promoted such colonial model as more scientific and rational practice. Hospitalization of childbirth is often credited to have played a crucial role in reducing maternal mortality rate and infant mortality rate. However, **Ram** (1998) points out that through hospitalization of childbirth the rural, under privileged and lower-class women have become the objects of reform agenda by the government. Similarly, **Biswal** (2018) also argues that the statist promotion of hospitalization of childbirth is linked with pressurizing lower-class women to adopt sterilization. The feminist scholar, **Ann Oakley** (1976), has also argued that medicalization of pregnancy and hospitalization of childbirth led to the control of childbirth by male professionals, who approach women as reproductive objects. Contrary to this, the female midwives and relatives often played a sympathetic and supportive role.

In the later part of the twentieth century, a series of technological advancements have taken place in the West in the domain of biomedicine. The spread of these technologies has also happened at the global scale which

have both positive and negative outcomes for women. The biomedical technological developments in the realm of human reproduction include In-Vitro fertilization, embryo transfer, surrogacy, contraceptive methods, surgical sterilization, fetal monitoring through ultrasound, amniocentesis, genetic testing, and so on.

Box 1: What is New Reproductive Technology Project?

The advent of New Reproductive Technologies is often projected by the scientific establishment as a positive intervention, which is claimed to have significantly contributed to change women's life and paved the way for gender equality. These technological interventions are hailed to have reduced painful and difficult child deliveries. On the one hand, these new reproductive technologies are claimed to be having the potential of ensuring birth of healthy babies through monitoring of the development of fetus during the early stages of pregnancy, whereby the 'abnormalities' in the fetus could be detected at an early stage of pregnancy and the 'defective' fetus could be aborted. On the other hand, the advancement of new reproductive technologies is also projected to have opened the possibility for the infertile heterosexual couple, single women and same sex couple, to have their biological child.

However, a nuanced approach towards such technological intervention is needed to understand the interventions of such technologies in the lives of people. On the one hand, while such technology has the potential to offer some amount of security in case of life-threatening circumstances, on the other hand these technologies have the potential to colonize the lives of people and marginal groups. Some of the feminist scholars argue that such technologies act like an instrument of patriarchal domination. For example, **Emily Martin** (1987) argues that through the introduction of fetal monitoring techniques like amniocentesis and ultrasounds, new standards of fetal growth have been set up. Through these techniques pregnant women's lives are much more subjected to scrutiny and control by the doctors.

Further, **Anne Fausto-Sterling** (2000) argues that the fetal monitoring systems like amniocentesis and ultrasound are used to identify the sex of the fetus and the intersexual fetuses are identified with the help of these techniques and are aborted. On other occasions, upon the birth, the intersexual babies are assigned either a male or female sex with the medical technological intervention, through which a two-sex system is attempted to be maintained. In India, where preference for male child is a predominant phenomenon, sonography and amniocentesis have been used for the sex determination of the fetus, followed by abortion of the female fetus. Followed by much criticism by feminists in India, the Indian government has banned sex determination of the fetus through the use of such technology. Indian government passed Pre-natal Diagnostic Techniques (PNDT) Act in 1994 to prohibit the practice of diagnosis of the sex of the fetus. Soon it was also found that through a newer technological intervention a pre-conception through which sex of the desired child could be chosen before conceiving the child. Keeping this in view, the PNDT Act of 1994 was amended and

renamed in 2002 as “The Preconception and Pre-natal Diagnostic Technique Act. This Act came to force in the year 2003 (Patel, 2007). Apart from the negative effect of sex determination and girl child elimination, the modern technological intervention of prenatal screening has also been critically examined by scholars from diverse angles. **Browner and Press (1995)** perceive the technological intervention of prenatal genetic screening as a ‘neo-eugenic’ programme. According to them, during the eugenic movement in the US in 1930s, it was believed that the negative traits of people and their behavior are genetically transmitted from generation to generation. Hence, attempts were made to sterilize alcoholics, drug addicts, poor, disabled people and people with mental health conditions, so that their deviant characters do not get passed on to the next generation. **Browner and Press** argue that, though the prenatal genetic techniques are presented as humanitarian methods to prevent the suffering of the disabled child and their families, these techniques have the same eugenic potential which you will read in the next course BGS-003. With the help of the genetic screening technology, the pregnant women and their health care providers decide what kind of life is worth living, and what physical and mental traits a fetus needs to survive.

Reproductive technology such as in-vitro fertilization is perceived to have narrowed the concept of parenthood to a biological base, rather than conceiving it as a social relationship. However, scholars like **Amrita Pande (2009)**, **Spar (2005)** and **Dillaway (2008)** offer a much more complex understanding of technology and its relation to women. They argue that the advancement in reproductive technologies rather than being inherently favorable to men or serving patriarchal interest, have diverse effects on different groups of women depending on the social context in which these women are situated. For example, the expensive technique of in-vitro fertilization becomes beneficial to women who can afford such treatment. Contrary to this, on many occasions the poor women are drawn into the reproductive industry as egg donors or to serve as surrogate mothers for the rich couple at a low price and are subjected to much exploitation. You will read about surrogacy in the course BGS 004: Gendered Dimensions of Health. Most of the money is syphoned by the infertility clinics and the middlemen rather than being availed by the surrogate mothers and egg donors. Hence, it could be argued that these reproductive technological interventions reproduce social inequalities like gender, class, race etc. And such technologies are used to serve the interests of the powerful groups in the society.

Often female contraceptive methods are hailed to have empowered women by giving them the opportunity to exercise control over their own reproduction, enabling them to choose how many children they want and when. Contrary to such claims, scholars like **Mohan Rao (2004)**, **Rachel Simon-Kumar (2006)** have criticized such claims and pointed out that much of the birth control techniques have mainly become female centered. Not much research is done on male contraceptive methods. Further, much of the contraceptive methods are tested on the poor women of the Global South, mainly women from vulnerable social categories. These women are subjected

to clinical trials of injectable contraceptives like Depo-provera and Norplant, without their informed consent. In pointing to the historical pattern of such clinical trials in the domain of medical technologies, **Emily Martin** (1987) argues that medical technologies are often tested on poorer patients and only after the physicians learn to use the new methods, if it is recognized as an accepted practice only then it is passed on to the private sector and presented as a modern practice. The hegemonic potential of reinforcing intersecting hierarchies of gender and class get well demonstrated through the studies on new reproductive technologies.

However, the upper- and also middle-class women are not able to escape the gendered nature of the new technological interventions. The studies on new domestic technologies effectively demonstrate how middle-class women are trapped into playing gender roles in a much more systematic way through the introduction of new domestic technologies. The following section critically examines the impact of new domestic technologies on the domestic division of labour.

Check Your Progress Exercise I

Note: I. Use this space given below to answer the question.

II. Compare your answer with the Course material of this Unit.

1. Write a short note on “The Preconception and Pre-natal Diagnostic Technique Act”.

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2. What is meant by the New Reproductive Technology? Provide one example to write the answer.

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3.4 GENDER RELATIONS AND DOMESTIC TECHNOLOGY

Feminist critical examination of domestic technology also started emerging during 1970s, soon after feminist scholars started analyzing housework (see Wajcman 2000). Mainly the Marxist feminist scholars started arguing that the domestic labour is the key to women’s oppression. According to them,

capitalism was based on a fundamental separation between household work and the profit-oriented work. Since the household work such as washing, cleaning, and caring tasks do not generate profit, it is often considered as unproductive and inferior form of work. Under capitalism domestic labour came to be seen as women's main responsibility. The feminist protagonists of the domestic labour debate, argued that housework is also productive work, as it has economic significance like any other forms of productive labour. Hence, they argued that women are exploited through their unpaid household labour. Subsequently, the feminist historians of technology argued that even though households have become mechanized with modern technological interventions, this did not mean substantially reducing the amount of time spent by women on household chores. According to **Wajcman (1991)** modern domestic technology has reinforced the sexual division of labour between men and women at home. In her view gender relations are obviously implicated in the development of domestic technology, as reallocation of household labour has not happened through the introduction of modern domestic technologies. Even though modern technologies have been introduced at home, women have not been relieved from the burden of housework. Hence, technology has failed in providing solution to the gender inequality at home. Further **Wajcman** argues that the sexual division of labour becomes demonstrated in an explicit way as most of the domestic technologies are designed by men as engineers or scientists and are repaired by men. But these technologies are meant to be used by women in the household.

The question of sexual division of household labour and its relation to modern technological appliances get a sharper articulation in the work of **Ruth Schwartz Cowan (1985)**. Cowan traces the development of modern household technology in the US and its effects on gender relations in the early 20th century. According to her, in the early 20th century drastic changes in the patterns of housework took place in the middle-class households. By 1930s most of the houses were electrified. Electrification also meant changes in the routine work of housewives, since soon electric appliances like iron, washing machine followed. However, the introduction of washing machine did not reduce the time that women spent on laundry, as washing clothes became a daily affair, unlike the earlier times while washing was done once in a week.

According to **Cowan** the series of changes that took place in terms of household technology during early 20th century is somewhat of a scale of industrial revolution. Along with the changes in the household technology also the notions of personal hygiene got transformed during this time. More bathrooms were built in homes, with modernized water heating systems. Though with the introduction of modernized water heating systems women were relieved of some works like heating water manually, maintaining kitchen fire, but other works like cleaning yet another room (bathroom) was added. Hence, Cowan argues that the mechanization of household led to change in the structure of household labour as well as change in the ideology of housewife. New standards of competence were expected from housewife, which did not exist previously at all. The development of germ theory of

disease, led by the scientific theorization that germs are responsible for most of the diseases, also informed the household labour. Along with germ theory, home science movement and the idea of scientific motherhood, led to the introduction of new standards of household care. As the concern with the cleanliness of home increased, women were expected to wash cloths, clean toilets, sinks and bathtubs more frequently. With the development of the idea of scientific mothering also child centered approach to parenting demanded more time and effort on the part of mother towards her childcare practice than her previous generation women. Hence, with the mechanization of household though some works of women decreased, new works were created. With the change in household technology, the ideology of housework and housewife also changed. In view of Cowan, mechanization of housework was accompanied by emotionalization of housework.

Box 2: Ruth Schwartz Cowan's study on Mechanization of Housework

After the War, housework changed: it was no longer a trial and a chore, but something quite different- an emotional 'trip'. Laundering was not just laundering, but an expression of love; the housewife who truly loved her family would protect them from the embarrassment of tattletale gray. Feeding the family was not just feeding the family, but a way to express the housewife's artistic inclinations and a way to encourage feeling of family loyalty and affection. Diapering the baby was not just diapering, but a time to build the baby's sense of security and love for the mother. Cleaning the bathroom sink was not just cleaning, but an exercise of protective maternal instincts, providing a way for the housewife to keep her family safe from disease. Tasks of this emotional magnitude could not possibly be delegated to servants, even assuming that qualified servants could be found (Cowan, 1985-194).

Cowan's study provides a good illustration of the relationship between household labour and domestic technology. It challenges the assumption that mechanization of household has led to lessening the burden of household labour of women. In her view mechanization of household gave rise to new tasks which was though not physically strenuous, were nevertheless time consuming.

The above discussions on reproductive technologies and domestic technologies bring forth the point that these new technologies have the potential of reinforcing gender hierarchy in an effective way. However, one should not be left with the assumption that women are the passive recipients of technology and they do not challenge the way technologies are introduced.

The history of introduction and promotion of telephone provides a good example of the way women subverted the original purpose of its initial introduction. The designers and promoters of technology may intend that the technology be used in a particular way, whereas the actual usage of it may contradict this. In that sense the designers cannot control or predict the final uses of the technology. The history of diffusion of telephone in the US could be cited as an example how women actively subverted the original purpose of

development and promotion of technology. Study by **Claude Fischer (1988) and Michele Martin (1988)** show the mismatch between the promoters' prescription of the use of telephone and women's use of it. They argue that telephone industry during its initial decades of development discouraged sociability, whereas women insistently used it for sociability purposes. In the early decades of invention of telephone, the telephone industry took up the step of educating people the advantages of telephone through advertising, informal campaigns. Around 1910, the initial advertisements mostly addressed businessmen, suggesting its usage for business interests, such as office use and household management. It was suggested that the subscribers of telephone could use it for household management like contacting the inns, rental agents, schools, coal dealers, dressmakers etc. (Fischer, 1988). Sociability themes in advertisements such as using telephone to keep in touch with friends and relatives were disapproved. The early telephone advertisers often strongly disapproved social conversations by labeling them as 'unnecessary' and 'frivolous' and 'trivial gossip'. The issue of sociability was linked to gender. While criticizing the 'unnecessary' chatting on telephone, the speaker was always referred as 'she' by the telephone industry. However, in 1930s, there was a shift in the advertising appeals of the telephone, where there was approval for social conversations over telephone. Hence, though the telephone industry constantly pressurized to orient telephone uses for specific usages, women had their ways of using telephone, which was unexpected by the telephone companies (Martin, 1988). Mostly, the women subscribers of telephone did not abide by the prescriptions of the telephone industry. These activities of women forced the telephone company to change its policy of advertisement over the years. The kinds of usage of telephone which was labeled as 'unnecessary' came to be described as legitimate in course of time. The lengthy chats which were strongly condemned earlier by the telephone company, came to be described as psychological support of women against stress and loneliness.

Check Your Progress Exercise II

Note: I. Use this space given below to answer the question.

II. Compare your answer with the Course material of this Unit.

1. What is understood by mechanization of housework? Explain.

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2. Does telephone industry portray women as users of telephone in its initial years of development? Explain.

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3.5 LET US SUM UP

A closer scrutiny of the relationship between gender and technology reveals that technology becomes a tool in the hands of powerful to reproduce gender hierarchy along with class, race and caste hierarchy. In the past, mainstream history and anthropology omitted or downplayed women's contribution to technological development. Hence, the prototype inventor is often projected as male. Critical examination of new reproductive and domestic technologies also reveals that new technological inventions act in twin ways in relation to women. On the one hand, while these technologies have the potential to offer some amount of relief to women, on the other hand these technologies also help in reinforcing gender hierarchy along with other intersecting hierarchies like class, race and caste. However, women cannot be termed as universally passive recipients of technology. On some occasions women subvert the designers and promoter's intentions and use technologies in ways suiting their own interests.

3.6 UNIT END QUESTIONS

1. Is technology gendered in nature? Justify your arguments with suitable examples.
2. How do you explain the growth and use of New Reproductive Technologies in the Global South? Use data or case studies to substantiate your answer.
3. How do feminist scholars contribute to the understanding of gender and technology interface? Analyses.

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