

BBA

THE SEMESTER 1 MDC SUBJECTS ARE

1. FINANCIAL INSTITUTIONS AND MARKETS.

FOR SEMESTER 2.

1. ENTREPRENEURSHIP CONCEPT, THEORY AND PRACTICES

FOR SEMESTER 3

1. INDIA'S DIVERSITY AND BUSINESS.

INTEGRATIVE PALYNOLOGY (THEORY)

Total marks 50; Credits 2, Class 30 hours

1. Basics of Palynology: 1.1 Morphology: Palynomorphs- Pollen- symmetry, shape, aperture, exine stratification and ornamentation; Non-pollen (phytoliths)- morphology, types; Major branches of palynology- neo and palaeopalynology; 1.2 Pollen adaptation, viability and storage: Pollen adaptation- pollen wall and harmomegathic adaptation, adaptation to habitat, adaptation to mode of pollination, pollen viability and storage- causes for loss of pollen viability, factors controlling pollen viability, test for pollen viability, types and significance of pollen storage.

(9 lectures)

2. Pollination biology and apiculture: 2.1 Types of pollination, pollinator groups and floral syndromes, floral attractants and rewards, pollination threats, pollen-pistil interactions and its significance; 2.2 Nectar and its transformation into honey; bee pasturage, common Indian bee plants; 2.3 Pollen analysis of honey: determination of floral source, unifloral/ bifloral/ multifloral, geographical origin, absolute pollen count, adulteration, honey quality and gradation (ICBB).

(6 lectures)

3. Past vegetation, environment analysis, hydrocarbon exploration and archaeobotany:

3.1 Palaeopalynology in biostratigraphic correlation, palaeoenvironment and depositional facies analysis of fossil fuel hydrocarbons, palaeo-shore line detection. 3.2 Application of phytoliths- domestication of crop plants from wild ancestors (rice and maize); past vegetation and environment reconstruction.

(6 lectures)

4. Human health and Forensic science:

4.1 Immunobiology: Basic mechanism of spore/pollen allergy, 4.2 common spore/pollen allergies, 4.3 Aeroallergens-common pollen-allergy causing plants of India, important pollen allergens and their chemical nature, 4.4 Trapping of airborne pollen grains- Rotorod and Burkard Volumetric Samplers, basic tests for diagnosis- skin testing (Prick test), Radio-Immuno Assay- RAST; ELISA and treatment of allergy, 4.5 Pharmaceuticals: Brief idea of pollen grains as source of health food, medicine and cosmetics; 4.6 Pollen grains as associative evidence; sources- soil, clothing and foot wear, vehicles, human bodies, animal fur and spider-web, 4.7 Limitations of forensic palynology.

(6 lectures)

5. Biotechnology:

5.1 Development of efficient pollination control system-cytoplasmic and genetic male sterility, self-incompatibility, pollen sterility by rDNA technology 5.2 Use of pollen for genetic transformation, 5.3 Pollen storage to overcome post-fertilization barriers, food security and gene pollution.

(3 lectures)

INTEGRATIVE PALYNOLOGY (PRACTICAL)

Total marks 25; Credit 1, Class 30 hours

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|----|---|----------|
| 1. | Work out: | 15 marks |
| 2. | Class room performance (Practical notebook) | 5 marks |
| 3. | Viva-voce | 5 marks |

1. Study of pollen type- pollen morphology (aperture and exine ornamentation).
2. Palynological study of honey sample and detection of type of honey (uni-, bi- or multi-floral)
3. Study of pollens in modern sediments.
4. Study of allergic pollens (*Parthenium*, *Cheno-Amaranthus*, *grasses*, *Carica papaya*, *Cocos nucifera*).
5. Determination of viability of pollen grains by tetrazolium test.

Textbook References:

1. Erdtman, G. Pollen Morphology & Plant Taxonomy, Latest Ed., Lelden, E.G. Brill
2. Faegri, K. & Iversen, Text Book of Pollen Analysis, Latest Ed., Munksgor, Copenhagen
3. Nair, P.K. Pollen Morphology of Angiosperms, Latest Ed., Scholar Publications
4. Shivanne, K.H. Pollen Biology & Biotechnology, 2003, Oxford & IBH
5. Bhattacharya, K., Majumdar, M.R. & Gupta Bhattacharya, S. A Text Book of Palynology, 2006, New Central Book Agency.
6. Abrol, D. P. Pollination Biology- Biodiversity Conservation and Agricultural Production, Springer
7. Willmer, P. Pollination and floral ecology, 2011, Princeton University Press
8. Hughes, B. Pollination Biology and Ecology, Syrawood Publication
9. Ollerton, J. Pollinators and Pollination, Pelagic Publication
10. Piperno, D.R. Phytoliths- A comprehensive guide for archaeologists and paleoecologists, 2006, AltaMira Press

MCB-IDC: INTRODUCTION AND SCOPE OF MICROBIOLOGY
(OFFERED IN SEMESTER II ONLY)

MCB-IDC-TH (THEORY)

Full Marks : 50

Credit : 2

Unit 1 History of Development of Microbiology

Development of microbiology as a discipline, Spontaneous generation vs. biogenesis.

Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming

Role of microorganisms in fermentation, Germ theory of disease, Development of various microbiological techniques and golden era of microbiology, Development of the field of soil microbiology: Contributions of Martinus W. Beijerinck, Sergei N. Winogradsky, Selman A. Waksman Establishment of fields of medical microbiology and immunology through the work of Paul Ehrlich, Elie Metchnikoff, Edward Jenner

Unit 2 Diversity of Microorganisms

Systems of classification : Binomial nomenclature, Whittaker's five kingdom and Carl Woese's three kingdom classification systems and their utility

General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Prokarya: Archaea and Bacteria, Eukarya: Algae, Fungi and Protozoa) giving definitions and citing examples

Protozoa : Methods of nutrition, locomotion & reproduction - Amoeba, *Paramecium* and *Plasmodium*

Unit 3 Microscopy

Bright Field Microscope, Dark Field Microscope, Phase Contrast Microscope, Fluorescence Microscope, Transmission Electron Microscope, Scanning Electron Microscope

Unit 4 Sterilization

Moist Heat, Autoclave, Dry Heat, Hot Air Oven, Tyndallization, Filtration.

Unit 5 Microbes in Human Health & Environment

Medical microbiology and immunology: List of important human diseases and their causative agents of various human systems. Definitions of immunity (active/passive), primary and secondary immune response, antigen, antibody and their types

Environmental microbiology: Definitions and examples of important microbial interactions – mutualism, commensalism, parasitism, Definitions and microorganisms used as biopesticides, biofertilizers, in biodegradation, biodeterioration and bioremediation (e.g. hydrocarbons in oil spills)

Unit 6 Industrial Microbiology

Definition of fermentation, primary and secondary metabolites, types of fermentations and fermenters and microbes producing important industrial products through fermentation.

Unit 7

Food and Dairy Microbiology

Microorganisms as food (SCP), microorganisms in food fermentations (dairy and non dairy based fermented food products) and probiotics. Microorganisms in food spoilage and food borne infections.

SUGGESTED READING

1. Tortora GJ, Funke BR and Case CL. (2008). Microbiology: An Introduction. 9th edition., Pearson Education
2. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms, 14th edition. Pearson International Edition
3. Cappucino J and Sherman N. (2010). Microbiology: A Laboratory Manual. 9th edition. Pearson Education Limited
4. Wiley JM, Sherwood LM and Woolverton CJ. (2013) Prescott's Microbiology. 9th Edition. McGraw Hill International.
5. Atlas RM. (1997). Principles of Microbiology. 2nd edition. W.M.T.Brown Publishers.
6. Pelczar MJ, Chan ECS and Krieg NR. (1993). Microbiology. 5th edition. McGraw Hill Book Company.
7. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. (2005) General Microbiology, 5th edition. McMillan.

MCB-IDC-TU (TUTORIAL)

Full Marks : 25

Credit : 1

Students will have to submit a writeup within 3000 words for internal evaluation and viva voce.

COURSE STRUCTURE- CCF, 2022

INTER DISCIPLINARY COURSE (IDC)

THEORY: 50 Marks

PRACTICAL: 25 Marks

SEMESTER I: PSYCHOLOGICAL PERSPECTIVES IN EDUCATION

Unit 1: Education and Psychology: an Introduction: Education as a discipline; Contributions of Psychology to Education; Role of Play in Education; Role of a Teacher. (15 hours)

Unit 2: Classroom Management and Assessment: Issues related to Classroom Management, The IQ Creativity Controversy. Inclusive Education: Dealing with Classroom Diversity: Nature, concept and importance; Classroom Diversity: Gender, Disability. (15 hours)

Practicum: (25 hours)

Objectives: For each practicum, students are expected to know about the underlying theoretical constructs, be able to conduct the practicum and justify the method used, know about the instrument used, if any, and be able to explain the findings and link the findings with the theoretical constructs.

1. Administration of Differential Aptitude Test
2. Administration of Guilford Zimmerman Interest Inventory

Readings:

Bartlett, S., & Burton, D. (2012). *Introduction to education studies*. London: Sage.

Combs, A. (1979). *Myths in education: Beliefs that hinder progress and their alternatives*. London: Allyn& Bacon.

Dearden, R. (1967). The concept of play. In R. Peters, *The concept of education* (pp. 51-63). London:Routledge& Kegan Paul.

Leicester, M. (2008). *Creating an inclusive school*. London: Continuum International Publishing Group.

Long, M. (2000). *The Psychology of Education*. Sussex: Routledge.

Matthews, M. (1980). *The marxist theory of schooling: A study of epistemology and education*. Sussex: The Harvester Press.

COURSE STRUCTURE- CCF, 2022

INTERDISCIPLINARY COURSE (IDC)

SEMESTER 2: HUMAN RESOURCE MANAGEMENT

THEORY: 50 Marks

PRACTICAL: 25 Marks

Unit 1a: Introduction to Human Resource Management (HRM): HRM and HRD, Context and issues in HRM (8 Hours)

b) Human Resource Practices Job analysis; Recruitment and selection; Training (7 hours)

Unit 2: International human resource management (IHRM) The context of Globalization, Role of culture in IHRM, Dimensions of Cultural difference (Hofstede). (15 hours)

Practicum: 25 hours

Objectives: For each practicum, students are expected to know about the underlying theoretical constructs, be able to conduct the practicum and justify the method used, know about the instrument used, if any, and be able to explain the findings and link the findings with the theory.

1. Administration of Organizational Role Stress Scale

Readings:

Aamodt, M.G. (2001) *Industrial/ Organizational Psychology*. Thompson Wadsworth, a division of Thompson learning Inc.

Bhatnagar, J. & Budhwar, J.(2009). *The changing face of people management in India*. London: Routledge.

Briscoe, D. R., Schuler, R. S. & Claus, L. (2009). *International human resource management: Policies and practices for multinational enterprises* (3rd Ed). New York: Routledge.

Chadha, N.K. (2005) *Human Resource Management-Issues, case studies and experiential exercises*. (3rd ed.) New Delhi: Sai Printographers.

DeCenzo, D.A.& Robbins, S.P.(2006). *Fundamentals of human resource management*.(8th Ed). NY:Wiley.

COURSE STRUCTURE- CCF, 2022

INTER DISCIPLINARY COURSE (IDC)

SEMESTER 3: POSITIVE PSYCHOLOGY

THEORY: 50 Marks

PRACTICAL: 25 Marks

Unit 1: Introduction: Positive Psychology: An Introduction, Perspectives on Positive Psychology: Western and Eastern, Character Strengths and virtues. **(15 hours)**

Unit 2a): Positive Emotional States and Processes: Happiness and Well being, Emotional Intelligence, Resilience **(7 hours)**

b) Positive Cognitive States and Processes: Optimism, Hope, Wisdom, **(8 hours)**

Practicum: (25 Hours)

Objectives: For each practicum, students are expected to know about the underlying theoretical constructs, be able to conduct the practicum and justify the method used, know about the instrument used, if any, and be able to explain the findings and link the findings with the theory.

1. Administration of Oxford Happiness Questionnaire

Readings:

Baumgardner, S.R. Crothers M.K. (2010). *Positive psychology*. Upper Saddle River, N.J.: Prentice Hall.

Carr, A. (2004). *Positive Psychology: The science of happiness and human strength*. UK: Routledge.

Peterson, C. (2006). *A Primer in Positive Psychology*. New York: Oxford University Press.

Seligman, M.E.P. (2002). *Authentic Happiness: Using the New Positive Psychology to Realize Your Potential for Lasting Fulfillment*. New York: Free Press/Simon and Schuster.

Snyder, C.R., & Lopez, S.J. (2007). *Positive psychology: The scientific and practical explorations of human strengths*. Thousand Oaks, CA: Sage.

Snyder, C. R., & Lopez, S. (Eds.). (2002). *Handbook of positive psychology*. New York: Oxford University Press.

Agenda: **Physical Education** Course structure for NEP-2020 UG programme

The members, after a threadbare discussion, resolved the following under this agenda.

- (i) The nomenclature of the subject, which is now known as Physical Education, shall be named as Physical Education and Sport in NEP - 2020 4-year UG course from the academic session 2023 - 2024.
- (ii) -----
- (iii) -----
- (iv) The subjects in the subsequent semesters shall be the following (in the structure provided by CU).

	DSC/Core	Minor	IDC/MDC	Seminar/ Internship	Dissertation/ Research Work
Semester	22x4 =88	8x4=32	3x3 = 9	1x3=3	1x4=4 +1x8=8
1	1x4 = 4 (3TH +1P/TU) Introduction and History of Physical Education and Sport Practical - Marching	1x4 = 4 (3TH +1P/TU) Introduction and History of Physical Education and Sport Practical - Marching	1x3 = 3 (2TH +1P/TU) Introduction and History of Physical Education and Sport Practical - Marching		
2	1x4 = 4 (3TH +1P/TU) Health, Wellness and Yoga Education Practical - Yoga	1x4 = 4 (3TH +1P/TU) Health, Wellness and Yoga Education Practical - Yoga	1x3 = 3 (2TH +1P/TU) Health, Wellness and Yoga Education Practical - Yoga		
3	2x4 = 8 (3TH +1P/TU) (i) Contemporary Physical Education (ii) Formal Activities	1x4 = 4 (3TH +1P/TU) Contemporary Physical Education Practical - Formal Activities	1x3 = 3 (2TH +1P/TU) Contemporary Physical Education Practical - Formal Activities		

Interdisciplinary Course (IDC)

Elementary Economics (ECON-MD-IDC1-1-Th/ ECON-MD-IDC2-2-Th/ ECON-MD-IDC3-3-Th)

Marks: 50

Credits: 2

No. of Lecture hours (Th): 30

[For Semester-I/ II/ III]

1. Elementary Microeconomic Concepts:

10 Lecture Hours

- 1.1 Theory of Demand and Supply--Determinants, Law of demand and supply, Demand and supply curves
- 1.2 Elasticity of Demand and Supply--Concepts of Price and income elasticity and implications
- 1.3 Theory of Production and Cost—Production function--Concepts of TP, AP, MP, short run-long run and different cost curves-social and external costs
- 1.4 Market--Different forms-TR, AR and MR-- Pricing and Output Decisions under Perfect competition and monopoly--features and equilibrium (diagrammatic representation only)

2. Elementary Macroeconomic Concepts:

10 Lecture Hours

- 2.1 National Income Accounting –Circular flow-- concepts of GNP, GDP, NNP, NDP, National Income
- 2.2 Money and Banking--Different measures of money supply, Difference between central and commercial bank and their functions
- 2.3 Inflation --Definition, types and anti-inflationary policy
- 2.4 Fiscal Policy & Monetary Policy -Objectives and Instruments
- 2.5 International Trade and contemporary issues--Balance of Payments (BOP)--Concepts autonomous and accommodating transactions, Functions of IMF, World Bank, WTO Exchange Rates—PPP (Concepts only)

3. Elementary Economic Development Concepts:

5 Lecture Hours

- 3.1 Growth vs. Development
- 3.2 Development Indicators - Human Development Index (HDI), Gender (GDI), Poverty (MPI), Inequality (GINI) Indices—India's rank
- 3.3 Sustainable development--concepts and Goals

4. Elementary Concepts of Indian Economics:

5 Lecture Hours

- 4.1 Economic Reforms in India—Background, Basic steps of trade, industry and financial sector reforms
- 4.2 NITI AYOOG-Structure and objectives

Interdisciplinary Course (IDC)

Elementary Economics (ECON-MD-IDC1-1-Tu/ ECON-MD-IDC2-2-Tu/ ECON-MD-IDC3-3-Tu)

Marks: 25

Credit: 1

No. of Lecture hours (Tu): 15

[For Semester-I/ II/ III]

Mode of Tutorial Examination: Viva or Presentation plus viva

References:

Unit-1

1. G.Mankiw. 2007, Economics: Principles and Applications, India edition by South Western, Cengage Learning
2. R.G. Lipsey. An Introduction to Positive Economics, ELBS (6th edition)
4. Pindyck, Rubinfeld and Mehta, Microeconomics, Pearson
5. G.S.Maddala and E. Miller, 1989, Microeconomics, Prentice Hall, McGraw Hill International Editions
7. Ferguson, C.E. and Gould, J.P. : Microeconomic Theory, Aitbs Publishers and Distributors, New Delhi.

Unit-2

1. Dornbusch, Fischer and Startz, Macroeconomics, McGraw Hill, 11th edition, 2010.
2. N. Gregory Mankiw. Macroeconomics, Worth Publishers, 2010.
3. Branson, William, Macroeconomic Theory and Policy, East West Press
4. Salvatore, D, International Economics, John Wiley and sons
5. Sikdar Soumyen, Principles of Macroeconomics, Oxford University Press.
6. <https://www.imf.org/en/Home>
7. <https://www.worldbank.org/en/home>
8. <https://www.wto.org/>

Unit-3

1. Thirlwall, A.P, Growth and Development, Fourth Edition, ELBS
2. Todaro, M.P, Economic Development, Sixth Edition, AWL

Unit-4

1. Puri, V.K & Mishra, S.K, Indian Economy, Himalaya Publishing House
2. Dutt & Sundharam, Indian Economy, S. Chand

English

IDC (INTER-DISCIPLINARY COURSE)

(3 Credits – Th 2, Tu 1)

Poetry

William Shakespeare: Sonnet 18
William Wordsworth: 'Strange fits of passion'
P.B. Shelley: 'To a Skylark'
John Keats: 'To Autumn'

Short Story

James Joyce: 'Araby'
Katherine Mansfield: 'The Fly'

HIS -IDC Making of Contemporary India (1919 -1964)**Making of Contemporary India (1919 -1964)**Learning Objective

This course focusses on the major national movements that led on to India's independence in 1947 .It also discusses the impact of Partition on society and culture and finally the evolution of Parliamentary democracy and Indian foreign policy during its early days.

1. Gandhian Movements – Non –cooperation movement, Civil Disobedience, Quit India Movement
- 2 Road to Independence and Partition: Movements outside the Gandhian fold- Revolutionary nationalism, Subhas Chandra Bose and role of INA, RIN Mutiny.
- 3 Challenges of Communalism –Pakistan Resolution (1940)
- 4 Constitutional formulas –Wavell plan, Cripps and Cabinet Mission-Mountbatten Plan
- 5 Impact of Partition on Indian society and culture.
- 6 Evolution of Parliamentary Democracy
- 7 India's foreign policy in the Nehruvian era.

Suggested Readings:

- (Bengal Division: Hindu Communalism and Partition 1932-1947) অর্থাৎ
- পাবলিকেশনস, কলকাতা, ২০০৩
10. দত্ত রজনী পাম, আজিকার ভারত (India Today)
11. সরকার সুশোভন, বাংলার রেনেসাঁস, (Notes on Bengal Renaissance), দীপায়ন, কলকাতা
12. ত্রিপাঠী অমলেশ, ভারতের মুক্তিসংগ্রামে চরমপন্থী পর্ব, (The Extremist Challenge) আনন্দ পাবলিশার্স, কলকাতা
13. সুর নিখিল, ভারতীয় জাতীয়তাবাদী আন্দোলনের পটভূমি, পশ্চিমবঙ্গ রাজ্য পুস্তক পর্ষদ, ১৯৮৯
- চট্টোপাধ্যায় প্রণবকুমার, আধুনিক ভারত (১৮৫৮-১৯২০) (১ম খন্ড) পশ্চিমবঙ্গ রাজ্য পুস্তক পর্ষদ, ১৯৯৮
14. চট্টোপাধ্যায় প্রণবকুমার, আধুনিক ভারত (১৯২০-১৯৪৭) (২য় খন্ড) পশ্চিমবঙ্গ রাজ্য পুস্তক পর্ষদ, ১৯৯৯
15. সেন সুনীল, ভারতে কৃষিসম্পর্ক (১৭৯৩-১৯৪৭) (Agrarian Relations in India (1793-1847)) পশ্চিমবঙ্গ রাজ্য পুস্তক পর্ষদ, ১৯৮৫
16. ত্রিপাঠী অমলেশ, স্বাধীনতা সংগ্রামে ভারতের জাতীয় কংগ্রেস, আনন্দ পাবলিশার্স, কলকাতা
17. চন্দ্র বিপান, আধুনিক ভারতঃ ঔপনিবেশিকতাবাদ ও জাতীয়তাবাদ (Nationalism and Colonialism), কে পি বাগচি এন্ড কোং, কলকাতা .
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Philosophy of Peace and Conflict Resolution**A. Understanding Peace**

- Concept of Peace; Meaning of Peace
- Positive and Negative Peace
- Typologies of Peace
- Sustainable Peace

B. Peace Building: Different Theories

- Realist Theory
- Idealist Theory
- Liberalist Theory

C. Gender and Peace

- Gender-Equality and Peace
- Gender, Conflict and Peace

D. Some Philosophical Approaches to Peace and Conflict Resolution

- Kantian Perspective – Morality and Peace; Pre-condition and Condition of Perpetual Peace
- Gandhian Perspective – Non-Violence, Truth, Satyagraha
- Tagore's Perspective –Spiritual Idealism and Humanism

Suggested Readings:

English

- Handbook of Peace – (eds.) Charles Webel and Johan Galtung, Oxon, Routledge, 2007, <https://www.mkgandhi.org/ebks/handbook-of-peace-and-conflict-studies.pdf>, 6.
- Philosophical Perspectives of Peace – Howard P. Kainz
- Peace, War and Defence – (ed.) Johan Galtung
- The Moral and Political Writings of Mahatma Gandhi—(ed.) R. Iyer
- Conflict Resolution and Gandhian Ethics --Thomas Weber, Gandhi Peace Foundation, New Delhi, 1991.
- Gandhi, Gandhism and Gandhians – Thomas Weber, Roli Books, 2006.
- Peace Education: The Concept, Principles and Practices around the World – (eds.) Gabriel Solomon and Baruch Nevo, .
- Comprehensive Peace Education—Betty Reardon, Teachers College Press, 1988.
- Peace, Culture and Society—(eds.) Elise Boulding, Clovis Brigagao, and Kevin Clements
- 'Perpetual Peace' – Immanuel Kant, in Immanuel Kant, Political Writings of Kant, (ed.) Hans Reiss, Cambridge, Cambridge University Press, 1977.
- Kant's Political Writings –(ed.) Hans Reiss, 1977.
- Three Decades of Peace Education Around the World – (ed.) Robin J. Burns and Robert Aspeslagh, New York and London, garland Publishing, 1996.
- Conflict: Resolution and Prevention – J.W. Burton, New York, Martin's Press, 1990.
- Peace by Peaceful Means: Peace and Conflict, Development and Civilization –Johan Galtung, London, Sage, 1996.
- Gender, War and Peacebuilding –Academy for International Conflict Management and Peacebuilding (www.usip.org/npec)
- Women, War and Peace—Elizabeth G. Ferris, Life and Peace Institute, (<http://www.lifepeace.org>)
- Nationalism – Rabindranath Tagore, London, Macmillan &Co. Limited, 1950.
- 'The Nation', in R. N. Tagore, Creative Unity, EBook, Release Date - October, 21, 2007, <http://manybooks.net/>
- The English Writings of Rabindranath Tagore, (Volume 3), (ed.) Sisir Kumar Das, New Delhi, Sahitya Academy, 1996.
- Rabindranath Tagore and Universal Humanism – Saumyendranath Tagore, Published by M. Chatterjee, 1961.
- The Religion of Man ('Spiritual Union')– Rabindranath Tagore.
- Man the Universal: A Socio-Cultural Exploration of Tagore's Creative Vision of Humanity –Santi Nath Chattopadhyay, 2017.

IDC/ MDC = 3 Credits (1 X 3)

2 TH + 1P/TU

HIN-H-1DC-1-1-TH**HIN-MD-1DC-1-1-TH****कार्यालयी हिंदी****(कार्यालयी हिंदी के प्रयोग का परिचय)**

- आवेदन पत्र के प्रकार - शासकीय पत्र, अर्द्ध शासकीय पत्र , कार्यालयी आदेश , परिपत्र , अधिसूचना, कार्यालयी ज्ञापन, निविदा, टिप्पणी , मसौदा लेखन ,व्यावसायिक पत्र- लेखन , प्रारूपण
- संचार माध्यम (आकाशवाणी, दूरदर्शन, चलचित्र) की हिंदी और उसके प्रमुख लक्षण
- हिंदी में पारिभाषिक शब्द निर्माण, प्रक्रिया एवं प्रस्तुति
- परिभाषिक शब्द - 50

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1. Allotment	आवंटन
2. Allowance	अनुमोदन
3. Autonomous	स्वायत्त
4. Bye-law	उप-विधि
5. Circular	परिपत्र
6. Confirmation	पुष्टि
7. Contract	संविदा
8. Enclosure	संलग्नक
9. Honorarium	मानदेय
10. Memorandum	ज्ञापन
11. Notification	अधिसूचना
12. Postponement	स्थगन

13.Proceeding	कार्यवाही
14.Record	अभिलेख
15.Stagnation	गतिरोध
16.Account	लेखा खाता
17.Adjustment	समायोजन
18.Audit	लेखा-परीक्षा
19.Audition	स्वर/ ध्वनि परीक्षण
20.Authentic	प्रामाणिक
21.Bail	जमानत
22.Bearer	वाहक
23.Clearing	समाशोधन
24.Confiscation	अधिहरण
25.Convertible	परिवर्तनीय
26.Dividend	लाभांश
27.Endorsement	बंदोबस्ती
28.Finance	वित्त
29.Forfeiture	जब्ती
30.Indemnity Bond	क्षतिपूर्ति बंध
31.Investment	निवेश
32.Lease	पट्टा
33.Lumpsum	एकमुश्त
34.Mobilisation	संग्रहण
35.Mortgage	गिरवी
36.Payable	देय
37.progressive -note	रुक्का/हुण्डी
38.Recommendation	संस्तुति
39.Rectification	परिशोधन
40.Redeemable	प्रतिदेय

41.Revenue	राजस्व
42.Security	प्रतिभूति
43.Short-term credit	अल्पावधि उधार
44.Sur-charge	अधिभार
45.Trade mark	मार्का
46.Transaction	लेनदेन
47.Turn over	पण्यावर्त
48.Validity	वैधता
49.Warranty	आश्वस्ति
50.Withdrawal	आहरण

AEC - COMPULSARY ENGLISH

IDC/MDC = 3 Credits (1X3)

2TH + 1P/TU

HIN-H-IDC-2-2-TH

HIN-MD-IDC-2-2-TH

कार्यालयी हिंदी(कार्यालयी हिंदी के प्रयोग का परिचय)

- आवेदन पत्र के प्रकार - शासकीय पत्र, अर्द्ध शासकीय पत्र , कार्यालयी आदेश , परिपत्र , अधिसूचना, कार्यालयी जापन, निविदा, टिप्पणी , मसौदा लेखन ,व्यावसायिक पत्र- लेखन , प्रारूपण
- संचार माध्यम (आकाशवाणी, दूरदर्शन, चलचित्र) की हिंदी और उसके प्रमुख लक्षण
- हिंदी में पारिभाषिक शब्द निर्माण, प्रक्रिया एवं प्रस्तुति
- परिभाषिक शब्द - 50

○

51.Allotment	आवंटन
52.Allowance	अनुमोदन
53.Autonomous	स्वायत्त
54.Bye-law	उप-विधि
55.Circular	परिपत्र
56.Confirmation	पुष्टि
57.Contract	संविदा
58.Enclosure	संलग्नक
59.Honorarium	मानदेय
60.Memorandum	जापन
61. Notification	अधिसूचना
62.Postponement	स्थगन

63.Proceeding	कार्यवाही
64.Record	अभिलेख
65.Stagnation	गतिरोध
66.Account	लेखा खाता
67.Adjustment	समायोजन
68.Audit	लेखा-परीक्षा
69.Audition	स्वर/ ध्वनि परीक्षण
70.Authentic	प्रामाणिक
71.Bail	जमानत
72.Bearer	वाहक
73.Clearing	समाशोधन
74.Confiscation	अधिहरण
75.Convertible	परिवर्तनीय
76.Dividend	लाभांश
77.Endorsement	बंदोबस्ती
78.Finance	वित्त
79.Forfeiture	जब्ती
80.Indemnity Bond	क्षतिपूर्ति बंध
81.Investment	निवेश
82.Lease	पट्टा
83.Lumpsum	एकमुश्त
84.Mobilisation	संग्रहण
85.Mortgage	गिरवी
86.Payable	देय
87.progressive -note	रुक्का/हुण्डी
88.Recommendation	संस्तुति
89.Rectification	परिशोधन
90.Redeemable	प्रतिदेय

91.Revenue	राजस्व
92.Security	प्रतिभूति
93.Short-term credit	अल्पावधि उधार
94.Sur-charge	अधिभार
95.Trade mark	मार्का
96.Transaction	लेनदेन
97.Turn over	पण्यावर्त
98.Validity	वैधता
99.Warranty	आश्वस्ति
100. Withdrawal	आहरण

Interdisciplinary Course in Chemistry

Paper: CHEM-H-IDC1-1-Th
or
CHEM-H-IDC2-2-Th

(Credit : Theory -02, Tutorial – 01)

Quantitative Analysis and Basic Laboratory Practices

Theory: (30 Lectures)

Module : I

(10 Lectures)

Introduction to Quantitative analysis and its interdisciplinary nature:

Definitions of analysis, determination, measurement, techniques and methods. Classification of analytical techniques. Choice of an analytical method -accuracy, precision, sensitivity . Errors: Determinate and indeterminate errors, absolute error, relative error, minimization of errors. Statistical treatment of finite samples - mean, median, range, standard deviation and variance. External standard calibration -regression equation (least squares method), correlation coefficient (R^2). Presentation of experimental data and results from the point of view of significant figures.

Module : II

(10 Lectures)

Titrimetric analysis:

Principle, classification, normality, molarity, molality, mole fraction, ppm, ppb etc. Standard solutions, preparation and dilution of reagents/ solutions using $[N_1 V_1 = N_2 V_2]$, preparation of ppm level solutions from source materials (salts).

Acid-base titrimetry:

Titration curves for strong acid vs strong base, weak acid vs strong base and weak base vs strong acid titrations.

Redox titrimetry:

Theory, balancing redox equations, titration curves.

Precipitation titrimetry:

Theory, titration curves, indicators for precipitation titrations.

Complexometric titrimetry:

Theory, titration methods employing EDTA (direct, back, displacement and indirect determinations). Indicators for EDTA titrations . Determination of hardness of water.

Module : III

(10 Lectures)

Water analysis:

Water availability, requirement of water. Quality of surface water and ground water. Impurities in water. Standards of water quality for potable, domestic, industrial and agricultural purpose (color, pH, alkalinity, hardness, TDS, sulphate, fluoride, chloride etc.)

Water treatment technologies:

House hold water treatment, municipal water treatment and industrial treatment (primary and secondary treatment of industrial effluent). Softening of water. Disinfection of water. Definition and determinations of DO, BOD and COD, and their significance.

Basic laboratory practices:

Basic laboratory practices, calibration of glassware (pipette, burette and volumetric flask), Sampling(solids and liquids), weighing, drying, dissolving, Acid treatment, Rules of work in analytical laboratory, General rule for performing quantitative determinations (volumetric and gravimetric), Safety in Chemical laboratory, Rules of fire prevention and accidents, First aid. Precautions to be taken while handling toxic chemicals, concentrated/fuming acids and organic solvents.

Recommended Text

1. Douglas A. Skoog, D.M. West, F. James Holler, Stanley R. Crouch, Fundamentals of Analytical Chemistry, Cengage learning India Pvt Ltd. 10th Edition, 2022
2. Daniel C. Harris, Quantitative Chemical Analysis, 10th Edition, W.H. Freeman, 2020

Tutorial: (15 hours)

PAPER: CHEM-H-IDC1-1-Tu or PAPER:CHEM-H-IDC2-2-Tu

1. Safety Practices in the Chemistry Laboratory, knowledge about common toxic chemicals and safety measures in their handling, cleaning and drying of glass wares.
2. Calibration of glassware, pipette, burette and volumetric flask.
3. Preparation of TLC plates and separation of amino acids
4. Calibration of instruments like colorimeter, pH-meter, conductivity meter, spectrophotometer using reference standards or reference materials.
5. Determination of alkali present in soaps/detergents.

Interdisciplinary Course in Chemistry

Paper: CHEM-H-IDC3-3-Th

Theory: (30 Lectures)

(Credit : Theory -02, Tutorial – 01)

CHEMISTRY IN DAILY LIFE

Module : I

(10 Lectures)

Dairy Products:

Composition of milk and milk products. Analysis of fat content, minerals in milk and butter. Estimation of added water in milk.

Beverages: Analysis of caffeine in coffee and tea, detection of chicory in coffee, chloral hydrate in toddy, determination of methyl alcohol in alcoholic beverages.

Food additives, adulterants, and contaminants:

Food preservatives like benzoates, propionates, sorbates, disulphites. Artificial sweeteners: Aspartame, saccharin, dulcin, sucralose, and sodium cyclamate. Flavors: Vanillin, alkyl esters (fruit flavors), and monosodium glutamate.

Artificial food colorants:

Coal tar dyes and non-permitted colors and metallic salts. Analysis of pesticide residues in food.

Module : II

(10 Lectures)

Vitamins:

Classification and Nomenclature. Sources, deficiency diseases, and structures of Vitamin A1, Vitamin B1, Vitamin C, Vitamin D, Vitamin E & Vitamin K1.

Oils and fats:

Composition of edible oils, detection of purity, rancidity of fats and oil. Tests for adulterants like argemone oil and mineral oils. Halphen test.

Soaps & Detergents:

Definition, classification, manufacturing of soaps and detergents, composition and uses

Mathematics (Hons) IDC Syllabus

MATH-H-IDC1-1-Th

Mathematical Logic

Full marks: 75 (Theory: 50 and Tutorial: 25)
(45classes)

Introduction: propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions.

General Notions: Formal language, object and meta language, general definition of a Formal Theory/Formal Logic.

Propositional Logic: Formal theory for propositional calculus, derivation, proof, theorem, deduction theorem, conjunctive and disjunctive normal forms, semantics, truth tables, tautology, adequate set of connectives, applications to switching circuits, logical consequence, consistency, maximal consistency, Lindenbaum lemma, soundness and completeness theorems, algebraic semantics.

Modal Propositional Logic: Introduction, modal operators, well formed formulas, axioms of systems K, T, B, S4, S5, Rules of inference, interpretation in Kripke frame, validity, connection of accessibility relation with the systems, Statements of soundness and completeness theorems.

Predicate Logic: First order language, symbolizing ordinary sentences into first order formulae, free and bound variables, interpretation and satisfiability, models, logical validity, formal theory for predicate calculus.

Fuzzy Logic: Many-valued logic, 3-valued logic of Lukasiewicz, the truth tables of conjunction, disjunction, negation and implication, tautology and validity, Infinite valued logic, calculation of truth values of the logical connectives.

Applications (briefidea): Applications of Modal Logic in Artificial Intelligence, database theory, distributed system, cryptography. Applications of Fuzzy Logic in Artificial Intelligence, Soft computing, Decision theory, NLP, Pattern recognition.

References

- [1] Elliott Mendelson; Introduction to mathematical logic; Chapman & Hall; London, 1997.
- [2] Angelo Margaris; First order mathematical logic; Dover publications, Inc, New York ,1990.
- [3] S.C.Kleene; Introduction to Metamathematics; Amsterdam; Elsevier, 1952.
- [4] J.H.Gallier; Logic for computer science; John.Wiley& Sons, 1987.
- [5] H.B.Enderton; A mathematical introduction to logic; Academic Press; New York 1972.
- [6] Chakraborty, M., Lecture note: A journey through the logic wonderland, IEST, Shibpur, 2016.

MATH-H-IDC2-2-Th Financial Mathematics

Full marks: 75 (Theory: 50 and Tutorial: 25)
(45classes)

- Profit, Loss and discount, Dividend, Calculation of income tax, Tabulations, Bar graphs, Pie charts, Line graphs.
- Introduction to Financial Markets and Instruments: Money Market and Capital Market, Financial Instruments – Stock, Bonds, Derivatives; Concept of Value (intrinsic) vs. Price of Financial Instruments, Concept of Arbitrage.

- Time Value of Money: Interest (simple and compound, discrete and continuous), Annuities, net present value, internal rate of return (calculation by bisection and Newton-Raphson methods), Comparison of NPV and IRR.
- Bonds: Bond Valuation; Bond Prices and Yields; Duration, Convexity, Interest Rate Risk; Fixed vs. Floating Rate Bonds, Immunization.
- Portfolio Theory: Brief introduction to expectation, variance, covariance and correlation; Asset Return and Risk; Portfolio Risk (Variance) and Return—Historical and Ex-Ante; Diversification and Risk Reduction; Feasible and Optimal Portfolio – Efficient Frontier; Markowitz model (review of Lagrange multipliers for 1 and 2 constraints).

References

- [1] David G. Luenberger; Investment Science; Oxford University Press, Delhi, 1998.
- [2] John C. Hull; Options, Futures and Other Derivatives, 6th Ed.; Prentice-Hall India, Indian reprint, 2006.
- [3] Sheldon Ross; An Elementary Introduction to Mathematical Finance, 2nd Ed, Cambridge University Press, USA, 2003.
- [4] Chandra P., Investment Analysis and Portfolio Management; McGraw Hill Education, 5th Ed., 2017.
- [5] Ales Cerny: Mathematical Techniques in Finance: Tools for incomplete markets, Princeton University Press, 2009.
- [6] S.R. Pliska, Introduction to Mathematical Finance: Discrete time model, 1st Ed., Wiley, 1997.
- [7] Karatzas and S. Shreve, Method of Mathematical Finance, Springer, New York, 2016.

MATH-H-IDC3-3-Th

Bio - Mathematics

Full marks: 75 (Theory: 50 and Tutorial: 25)
(45 classes)

Mathematical biology and the modelling process: What is a model? Essential features of a modelling approach, Identification of variables, parameters, constants for a model; type of models (linear-nonlinear and continuous – discrete).

Simple single-species continuous population growth models:

Malthus model (1798): deduction (basic assumptions), analytic solution, doubling time; behavior of population size as $t \rightarrow \infty$, Stability analysis of the steady states of the Malthus model; limitations.

Logistic model (Verhulst 1838): motivation (Gause's 1934 Experiments) and formulation (basic assumptions), analytic solution, behavior of population size as $t \rightarrow \infty$ for different initial population size, carrying capacity. Effects of harvesting in a single species population: Constant-yield harvesting, constant-effort harvesting.

One dimensional models, fixed points, stability analysis of fixed points, phase diagrams.

Non-dimensionalization and re-parametrization in a model: Necessity and applications.

Bifurcation: Saddle-node, transcritical and pitchfork bifurcations in one-dimensional case.

Insect outbreak model (Morris, 1963): The spruce budworm model – deduction (basic assumptions), analysis of steady states, presence of saddle-node bifurcation; real life applications.

Interacting populations: Predator-prey model (basic assumptions) and Lotka (1925)-Volterra (1926) model (basic assumptions) – deduction, Steady states.

Chemical Reaction Kinetics; Law of mass action; Enzymatic reaction; Enzyme Kinetics; Elimination of variables – model reduction; Michaelis-Menten kinetics (proposed in 1913). Formulation of model (basic assumptions) and steady states.

Gene regulation networks: Introduction, basic assumptions, two dimensional model; Constitutive gene expression; Gene transcription regulation by activators; Gene transcription regulation by repressors; Regulation of gene transcription: auto-activation and auto-inhibition.

Epidemic models: Basic terminologies.

SI model (assumptions), Kermack-McKendrick SIR model 1927 (basic assumptions) assuming total population as constant, Formulation of the models. Concept of basic reproduction number.

Discrete single-species models: Linear models, growth models, decay models, discrete Logistic models.

Overview of nonlinear difference equations: Steady states and linear stability analysis, Graphical solution of difference equations – cobwebbing.

References

- [1] L.E. Keshet, *Mathematical Models in Biology*, SIAM, 1988.
- [2] J. D. Murray, *Mathematical Biology*, Springer, 1993.
- [3] Y.C. Fung, *Biomechanics*, Springer-Verlag, 1990.
- [4] F. Brauer, P.V.D. Driessche and J. Wu, *Mathematical Epidemiology*, Springer, 2008.
- [5] M. Kot, *Elements of Mathematical Ecology*, Cambridge University Press, 2001.
- [6] F. Brauer and C. Castillo-Chavez, *Mathematical Models in Population Biology and Epidemiology*, Springer, 2012.
- [7] S. H. Strogatz, *Nonlinear Dynamics and Chaos*, Perseus Books, 1994.
- [8] N.F. Britton, *Essential Mathematical Biology*, Springer-Verlag London, 2003.
- [9] R F Morris, *The Memoirs of the Entomological Society of Canada*, Cambridge.org, 1963.

Political Science

IDC Understanding Governance

Course Objectives:

- ◆ This paper deals with concepts and different dimensions of governance highlighting the major issues in contemporary times.
- ◆ It will facilitate understanding of the importance of the concept of and practice governance, which is essential for students across disciplines.
- ◆ It simultaneously focuses on environment, administration, development.

Learning Outcomes:

- ◆ Students will be acquainted with the changing nature of governance in the era of globalization.
- ◆ Students will acquire knowledge of some of the most contemporary motive forces of governance.
- ◆ The students become familiar with a rigorous introduction to the best practices in India on governance.

Module I

1. Governance: meaning, genesis, evolution and importance. 'Government' and "Governance'.
2. Idea of 'Good Governance'. Relations with development and democracy.
3. Role of State, Market and Civil Society since 1990s (with some focus on India).

Module II

4. Major issues in Governance I: People's Participation. Public Service Delivery.
5. Major issues in Governance II: Citizens Charter; Right to Information.
3. E- Governance. Green Governance. [Major features, Case Studies and challenges]
[India will be the prime case of discussion in Module II]

Bengali



Inter Disciplinary Course (IDC)- 3 Credits.

- যে সমস্ত পড়ুয়া CC/MIN হিসাবে বাংলা গ্রহণ করেছে তাদের জন্য এই কোর্স নয়। এই কোর্সটি প্রথম/দ্বিতীয়/তৃতীয় সেমেস্টারে পড়া যাবে।
- ৩ ক্রেডিট-এর প্রতিটি কোর্সের পূর্ণমান ৭৫। এর মধ্যে ২৫ নম্বর কোর্সভিত্তিক টিউটোরিয়ালের জন্য বরাদ্দ। বাকি ৫০ নম্বরের জন্য বিশ্ববিদ্যালয়ের সার্টিফিকার্টপন্সের তত্ত্বাবধানে লিখিত পরীক্ষা নেওয়া হবে।
- ৫০ নম্বরের লিখিত পরীক্ষায় ১০ নম্বরের তিনটি ব্যাখ্যামূলক, ৫ নম্বরের ৩টি বোধমূলক এবং ১ নম্বরের ৫টি সংক্ষিপ্ত উত্তরভিত্তিক/তথ্যমূলক প্রশ্নের উত্তর দিতে হবে। নিচের তালিকায় প্রশ্নপত্রের ধারণা পাওয়া যাবে।

প্রশ্ন নং	প্রশ্নের ধরন ও বিকল্প সংক্রান্ত নিয়ম	প্রশ্নের মান
১	মডিউল-১ থেকে একটি ব্যাখ্যামূলক প্রশ্ন। একটি বিকল্প থাকবে।	১০
২	মডিউল-২ থেকে একটি ব্যাখ্যামূলক প্রশ্ন। একটি বিকল্প থাকবে।	১০
৩	মডিউল-৩ থেকে একটি ব্যাখ্যামূলক প্রশ্ন। একটি বিকল্প থাকবে।	১০
৪	মডিউল-১ থেকে একটি বোধমূলক প্রশ্ন। একটি বিকল্প থাকবে।	৫
৫	মডিউল-২ থেকে একটি বোধমূলক প্রশ্ন। একটি বিকল্প থাকবে।	৫
৬	মডিউল-৩ থেকে একটি বোধমূলক প্রশ্ন। একটি বিকল্প থাকবে।	৫
৭	প্রত্যেকটি মডিউল থেকে কমপক্ষে একটি করে প্রশ্ন নিয়ে মোট পাঁচটি সংক্ষিপ্ত উত্তরভিত্তিক/তথ্যমূলক প্রশ্ন দেওয়া হবে। এক্ষেত্রে কোনো বিকল্প থাকবে না।	১ × ৫

BNG-MD-IDC-1-1/2/3-TH-TU

কথাসাহিত্য ও নাটক

উদ্দেশ্য : অন্যান্য বিভাগের পড়ুয়াদের জন্য এই কোর্সটির পরিকল্পনা করা হয়েছে। এই কোর্সে যে সাহিত্যকর্মগুলি পাঠ্য হিসাবে রাখা হয়েছে সেগুলির পাঠ ইতিহাস, রাজনীতি বিজ্ঞান, সমাজবিদ্যা, অর্থনীতি এবং দর্শন বিভাগের পড়ুয়াদের বিদ্যাচর্চার পরিপূরক হয়ে উঠবে বলে মনে হয়।

মডিউল-১ : উপন্যাস

পন্নীসমাজ— শরৎচন্দ্র চট্টোপাধ্যায়

মডিউল-২ : ছোটগল্প

একালের গল্প সংকলন (কলিকাতা বিশ্ববিদ্যালয় সংস্করণ)

পাঠ্য গল্প : চোর— জ্যোতিরিন্দ্র নন্দী, রেকর্ড— নারায়ণ গঙ্গোপাধ্যায়, অস্ত্রসলিলা— সাবিত্রী রায়,

আদাব— সমরেশ বসু, টোবাটেক সিং— সাদাত হোসেন মন্টো

এবং

স্ত্রীর পত্র— রবীন্দ্রনাথ ঠাকুর

মডিউল-৩ : নাটক

নবান্ন— বিজন ভট্টাচার্য

সহায়ক গ্রন্থ (নির্বাচিত)

- বাংলা ছোটগল্প : প্রসঙ্গ ও প্রকরণ— বীরেন্দ্র দত্ত
- বাংলা নাটকের ইতিহাস— অজিতকুমার ঘোষ
- গণনাট্য নবনাট্য সংনাট্য ও শব্দ মিত্র— শীওলী মিত্র
- শরৎচন্দ্র— সুবোধচন্দ্র সেনগুপ্ত
- শরৎচন্দ্র : পুনর্বিচার— অরুণকুমার মুখোপাধ্যায়
- বাংলা থিয়েটারের ইতিহাস— দর্শন চৌধুরী
- গণনাট্য আন্দোলন— দর্শন চৌধুরী
- বাংলা নাট্যমঞ্চের রূপরেখা— দুর্গাশঙ্কর মুখোপাধ্যায়
- নাট্যমঞ্চ নাট্যরূপ— পবিত্র সরকার

(a) Medical Science; (b) Mathematics & Astronomy; (c) Architecture .

References :

- i) Bose, D.M., Sen, S.N., Subbarayappa, B.V. : *A Concise History of Science in India*, Indian National Science Academy, New Delhi.
- ii) Shrushti, Keshav : *Science and Technology in Ancient India*, Vijñāna Bhārati Publication.
- iii) Naqvi, Nasim, H. : *A Study of Buddhist Medicine and Surgery in Gāndhāra*, MLBD, Delhi.
- iv) Subbarayappa, B.V. : *Medicine and Life Sciences in India : History of Science, Philosophy and Culture in India (Vol. IV, Part 2)*, D.P. Chattopadhyaya (Gen. Ed.), Centre for Studies in Civilizations, New Delhi.
- v) Shukla, D.N. : *Vāstu-Śāstra: Hindu Science of Architecture – Mānasāra Series (Vol. 1)*, Munshiram Monoharlal Publishers Pvt. Ltd., New Delhi.
- vi) Shukla, D.N. : *Vāstu-Śāstra: Hindu Canons of Iconography and Painting – (Vol. 2)*, Munshiram Monoharlal Publishers Pvt. Ltd., New Delhi.
- vii) Subbarayappa, B.V. : *The Tradition of Astronomy in India, Jyotiḥśāstraḥ: History of Science, Philosophy and Culture in India (Vol. IV, Part 2)*, D.P. Chattopadhyaya (Gen. Ed.), Centre for Studies in Civilizations, New Delhi.
- viii) Datta, Bibhutibhusan, Singh, Avadhesh Narayan : *History of Hindu Mathematics (Part I & II)*, Asia Publishing House, New Delhi.
- ix) Dhaky, M.A. : *Architecture in India : History of Science, Philosophy and Culture in India (Vol. IV, Part 2)*, D.P. Chattopadhyaya (Gen. Ed.), Centre for Studies in Civilizations, New Delhi.

Physics

PAPER: IDC (INTERDISCIPLINARY): FRONTIERS IN PHYSICS

1. Nature of Science: Role of proper reasoning and experiments, with examples. Inductive and deductive logic. The character of physical laws, including universality. Difference between science and pseudoscience.

2. Universe: The Copernican revolution, Kepler's laws and the Solar system, Galileo and birth of Telescopic Astronomy, Modern observations: Stars and galaxies, Life cycle of stars. Birth of the Universe, Big Bang and Hubble expansion, Dark matter and dark energy.

3. Matter:

Atoms and molecules: The physical basis of the Periodic table.

Heat and Thermodynamics: Basic idea about the kinetic theory of gases; Distinction between ideal and real gases; The three laws of thermodynamics. Concept of Entropy.

Radioactivity: Alpha, beta & gamma decay; X-Rays – Properties.

Structure of the atom: Electron, Nucleus: proton and neutron. Mention of the Standard Model of particles & interactions.

4. Forces: Laws of falling bodies, Inertia, Gravitation, Electricity and Magnetism, Light and its dual property. The microscopic world of Quantum Mechanics.

Special and General Theory of Relativity (brief and qualitative ideas only)

[No Mathematical derivation beyond simple algebra should be used]

Suggested Texts:

1. Six Easy Pieces – Richard P. Feynman

2. The first three minutes – Steven Weinberg

3. The character of physical laws – Richard P. Feynmann

4. Introduction to Astronomy: From Darkness to Blazing Glory – J. W Scott, JAS Educational Publications

5. আধুনিক বিজ্ঞানের ক্রমবিকাশ, সম্পাদনা সুশান্ত মজুমদার, ভূপতি চক্রবর্তী, অনুষ্টুপ প্রকাশনী।

Zoology

The University will offer Zoology related IDC as the Paper of Animal Science which will be selected by Students pursuing Major and Minor Courses other than Zoology

PART I: SEMESTER 1
IDC-1: Animal Biology IDC-1-TH

Full Marks 75	3 Credits	50 Hours
Unit 1: Animal Diversity		10
Phylum Characters and example: [Non-chordates-Porifera, Cnidaria, Ctenophora, Platyhelminthes, Nemathelminthes, Annelida, Arthropoda, Mollusca and Echinodermata]; Chordata		
Unit 2: Genetics		12
1. Mendelian Principles and Laws of inheritance 2. Linkage and Recombination basic Concepts 3. Sex Determination with reference to <i>Drosophila</i> [only genic balance theory] 4. Chromosomal Aberration [Structural and Numerical]		
Unit 3: Biodiversity and Wildlife		15
1. Biodiversity: Definition, types and value 2. Biodiversity: Indices [Shannon & Simpson] 3. Conservation: <i>in situ</i> and <i>ex situ</i> [outline idea] 4. Conservation Priority: Hotspot, Megadiversity, Sensitive Ecosystem 5. Indigenous Knowledge and PBR: Basic Concepts		
Unit 4: Insect Vectors		8
1. Concept of Vector: Biological and Mechanical Vectors with examples 2. Disease cycle & Reservoir Concept 3. Major Vectors: Mosquito (<i>Anopheles</i> sp. & <i>Aedes</i> sp.) Life cycle, control, role as vector.		
Unit 5: Laboratory techniques and Instrumentation		5
1. Basics of Light Microscopy 2. Principles and Application of Colorimetry 3. Principles and application of Ultracentrifugation		

Animal Biology Lab: IDC-1-P

Full Marks 25	1 Credit	20 Hours
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List of Practical
1. Karyotype analysis of Klinefelter, Down, Turner, Edward & Patau Syndrome 2. Identification (Phylum and specimen characters): <i>Amoeba</i> , <i>Paramecium</i> , <i>Sycon</i> , <i>Neptune's Cup</i> , <i>Taenia</i> , <i>Ascaris</i> , <i>Nereis</i> , <i>Pheretima</i> , <i>Pila</i> , <i>Lamelledens</i> , <i>Penaeus</i> , <i>Macrobrachium</i> , <i>Musca</i> , <i>Anopheles</i> , <i>Culex</i> , <i>Asterias</i> . 3. One Local-Outdoor Trip for Biodiversity Studies.

Computer Science

INTERDISCIPLINARY COURSE

Fundamentals of Computer Science and its applications 45 hrs

Course Outcome:

- Demonstrate the basic concepts of Computer science, such as Computer Architecture, Data representation, Algorithms, and Data structures.
- Write basic programs in a high-level programming language, such as Python.
- Explain how computers communicate with each other over a network.
- Explain how artificial intelligence is used in real-world applications.
- Use ICT tools to create documents, spreadsheets, and presentations.

Detailed Syllabus

- Introduction to computers and computing 08 hr.
History of computing and the different types of computers that are available today, Generations of computers, Basic Building blocks (CPU, Memory, I/O Devices), types of computer (Mainframe, Desktop, Laptop, System on Chip). Classification of Software – System and Application Software, Basic Security Anti-Virus.
- Data representation and number systems 04 hr
Concept of binary code, ASCII and how it is used to represent data in computers, How different number systems work
- Algorithms and data structures 06 hr
Basic concepts of algorithms and data structures: Common algorithms and data structures, such as sorting algorithms and linked lists.
- Office suite 08 hr
Word processors, Spreadsheets, and Presentation
- Programming languages 08 hr
Basic concepts of programming languages: types of programming languages , machine language, assembly language, high level language, Introduction to writing basic programs in Python (Finding prime numbers, finding GCD of two numbers etc,)

- Networking 05 hr

Basic concept of networking and how computers communicate with each other, LAN, WAN, Introduction to the concept of the internet and how it works. Mobile communication

- Artificial intelligence 05 hr

Basic concept of artificial intelligence and how it is used in computers. Introduction to Machine Learning, Preliminary concept of Big Data, Recommendation System, Conversation Agents like ChatGPT, Prompt Engineering

- Information and Communications (ICT) Tools 01 hr

Importance of ICT tools, different types of ICT tools and their uses

Recommended Books:

1. Computer Science: An Interdisciplinary Approach, Robert Sedgewick (Author), Kevin Wayne (Author)
2. Introduction To Computer Science, Anita Goel Pearson India

Structure of **Statistics** Interdisciplinary Course

Semester	Course / Paper Code	Course Name
1	STAT-H-IDC1-1-Th / P	Statistics for Practitioners
2	STAT-H-IDC2-2-Th / P	
3	STAT-H-IDC3-3-Th / P	

STAT-H-IDC1-1-Th / STAT-H-IDC2-2-Th / STAT-H-IDC3-3-Th

2 Credits

(Statistics for Practitioners)

THEORY

Understanding univariate data: Variable, notion of population and sample, different types of data, methods of collecting primary and secondary data, presentation of data, summary measures on data with central tendency (arithmetic mean, median, mode), dispersion (range, quartile deviation, standard deviation, coefficient of variation), ideas of skewness and kurtosis (only through diagrams), Exploratory Data Analysis. (8)

Understanding bivariate data: Paired data and ideas (without mathematical details) of different measures of associations, primarily Pearson's correlation coefficient, Spearman's Rank correlation (no tie), measures of association of attributes through contingency table, two-variable linear regression and multiple (three-variable only) linear regression (without derivation of the regression coefficients' formulae). (8)

Statistical Inference (testing of hypothesis): Basic idea of binomial and normal populations (graphical idea only, derivation of the properties excluded). Concepts of hypotheses, knowledge on test statistic and decision making in terms of critical value and p-value for some standard testing problems like test for proportion/proportions, mean based on single (normal) sample, test on comparing means based on two-sample and paired sample data. (7)

Miscellaneous discussion: Applications of one-way and two-way ANOVA with one observation per cell (without derivation and details) assuming normality, Kruskal-Wallis test (without derivation and details), sample size determination, estimation of population mean and variability for finite population, idea and application of logistic regression for binary response data. (7)

STAT-H-IDC1-1-P/ STAT-H-IDC2-2-P/ STAT-H-IDC3-3-P

(Statistics for Practitioners)

1 Credit

PRACTICAL

List of Suggested Practical

- Measures of mean, median, mode, range, QD, SD, CV for univariate data case.
- Fitting of linear regression on bivariate and on three-variable multivariate data, measures of Pearson's correlation coefficients, Spearman's Rank correlation, measures of association of attributes through contingency table.
- Tests for proportion/proportions, tests of means for single sample, two-sample, and paired sample data on normal response using p-value approach.
- Applications of ANOVA and Kruskal-Wallis test.
- Sample size determination, estimation of population mean and variability for finite population.
- Fitting of logistic regression for binary response data.

Reference Books:

Gun, A.M., Gupta, M.K. and Dasgupta, B. (2008): Fundamentals of Statistics, Vol. I, 9th Edition World Press, Kolkata.

Das, N.G.: Statistical Methods, Vol I, Tata McGraw Hill Pub. Co. Ltd.

Johnson, R.A. and Wichern, D.W.: Applied Multivariate Statistical Analysis, PHI. Hardle W. and Simar, L.: Applied Multivariate Statistical Analysis.

Kutner, M.H. et.al.: Applied Linear Statistical Models.

Belsley D.A. et.al.: Regression Diagnostics.

Draper N.R. and Smith, H.: Applied Regression Analysis.

Sociology

Interdisciplinary Course
SOC-H-IDC- 3 Credits

Knowing Indian Society

SOC-MD- IDC

Course Objectives:

The course attempts to analyze the nature and direction of change in Indian society, from traditional to modern. Show some reflections on the Social Institutions of Indian society. Understand the indicators of change and participation in democratic process while critically looking at globalization and its impact on Indian society.

1. India as a Plural Society

- 1.1. Unity and Diversity
- 1.2. Problem of National Unity
- 1.3. Communalism and Secularism: Meaning and Nature.

2. Social Institutions and Practices

2.1 Caste

- 2.1.1. Sanskritization
- 2.1.2. Changing aspects

2.2 Tribe

- 2.2.1. Features
- 2.2.2. Tribes in contemporary India

2.3 Class

- 2.3.1. Rural class
- 2.3.2. Urban class

2.4 Family and Kinship

- 2.5.1. Types of family
- 2.5.2. Kinship in India

3. India in the Globalization Era

- 3.1. Globalizing Changes in India: Negotiating the Local
- 3.2. Culture of Consumption
(Impact on Life Styles, Food Habits, Language, and Social Media)

Readings:

1. Chandhoke Neera & Priyadarshi, 2009. Contemporary India: Economy, Society, Politics: Pearson Education India.
2. Choudhury, Aniruddha. 2016. "Bharater Samaj Prasange" Chatterjee Publishers.
3. Das, Veena. 2006. Handbook of Indian Sociology: OUP India.
4. Desai, A. R. Social Background of Indian Nationalism (6Th-Edn): Popular Prakashan, 2005.
5. Ganguly & Moinuddin, Samakalin Bharatiya Samaj: PHI Learning 2008 (in Bengali)
6. Gerald James Larson, India's Agony over Religion: Suny Press, 1995
7. Ghosh, Biswajit. (Ed), 2012. Development and Civil Society: Rawat.
8. Gupta, Giri Raj. Family and Social Change in Modern India: Vikas Publishing House, 1976
9. Jayaram, N. On Civil Society: Issues and Perspectives: Sage, 2005
10. Kuppaswamy, B 1972. Social Change in India: Vikas Publications.
11. Madan, T. N. 1992. Religion in India: OUP India.
12. Shah, Ghanshyam. Dalit identity and politics. Delhi: Sage 2001
13. Sharma, Rajendra K. 2004. Indian Society: Institutions and Change: Atlantic Publishers & Dist.
14. Uberoi, Patricia Family, Kinship and Marriage in India: OUP India, 1994
15. Joseph Stiglitz - 2015 Globalization and Its Discontents. Penguin Books Limited
16. PRAMANICK, SWAPAN KUMAR and RAMANUJ GANGULY edited. 2010. GLOBALIZATION IN INDIA: NEW FRONTIERS AND EMERGING CHALLENGES. PHI Learning.
17. Somayaji, Ganesh, Sakarama Somayaji, Sakarama Somayaji (ed.By). 2009. Sociology of Globalisation: Perspectives from India. Rawat Publications.
18. Smith, Keri E. Iyall. 2018. Sociology of Globalization: Cultures, Economics, and Politics. Taylor & Francis.
19. Mandal, Bindeshwar Prasad - 2021. Globalization and Society. K.K. Publications.
20. Steve Dorné - 2008. Globalization on the Ground: New Media and the Transformation of Culture, Class, and Gender in India. SAGE Publications

9. Jayaram, N. On Civil Society: Issues and Perspectives: Sage, 2005
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15. Joseph Stiglitz · 2015 Globalization and Its Discontents. Penguin Books Limited
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17. Somayaji, Ganesha, Sakarama Somayaji, Sakarama Somayaji (ed.By). 2009. Sociology of Globalisation: Perspectives from India. Rawat Publications.
18. Smith, Keri E. Iyall. 2018. Sociology of Globalization: Cultures, Economies, and Politics. Taylor & Francis.
19. Mandal, Bindeshwar Prasad · 2021. Globalization and Society. K.K. Publications.
20. Steve Dorn · 2008. Globalization on the Ground: New Media and the Transformation of Culture, Class, and Gender in India. SAGE Publications

References:

1. Alavi, Hamaza and John Harriss (eds.) 1989. *Sociology of 'Developing Societies': South Asia*. London: Macmillan. John Harriss, „The Formation of Indian society: Ideology and Power. 126 –133.
2. Deshpande, Satish, 2003, *Contemporary India: A Sociological View*. New Delhi; Viking, pp. 125-150.
3. Dumont, L. 1997, *Religion, Politics and History in India*. Paris: Mouton, Chapter 5
4. Haimendorf, C.V.F., 1967, „The Position of Tribal Population in India, in Philip Mason (ed.), *India and Ceylon: Unity and Diversity*, New York: Oxford University Press, Chap-9.
5. Karve, Iravati, 1994, „The Kinship map of India, in Patricia Uberoi(ed.) *Family, kinship and marriage in India*. Delhi: Oxford University Press, pp.50-73.
6. Madan, T.N., 1997, *Modern Myths and Locked Minds*. Delhi: Oxford University Press, Chap 8.
7. Mason, Philip 1967. „Unity and Diversity: An Introductory Review” in Philip Mason(ed.) *India and Ceylon: Unity and Diversity*. London: Oxford University Press, Introduction.
8. Shah, A. M., 1998, *The Family in India: Critical Essays*. Orient Longman, 52-63.
9. Srinivas, M.N., 1956, “A Note on Sanskritization and Westernization”, *The Far Eastern Quarterly*, Volume 15, No. 4, pp 481-496.
10. Srinivas, M.N., 1969, “The Caste System in India”, in A. Beteille (ed.) *Social Inequality: Selected Readings*. Harmondsworth: Penguin Books, pp.265-272.
11. Srinivas, M.N., 1987, *The Dominant Caste and Other Essays*, Delhi: Oxford University Press, pp.20-59.
12. Stern, Robert W. 2003. *Changing India*. Cambridge: CUP. Introduction. Change, societies of India and Indian Society. pp. 1 – 31.
13. Thorner, Daniel, 1992. „Agrarian Structure” in Dipankar Gupta (ed.), *Social Stratification in India*, New Delhi: Oxford University Press, pp. 261-270.

Reference Web links:

1. https://www.un.org/development/desa/youth/wp-content/uploads/sites/21/2019/08/WYP2019_10-Key-Messages_GZ_8AUG19.pdf
2. <https://www.intechopen.com/chapters/38348> Globalisation and Culture: The Three H Scenarios
https://www.business-standard.com/article/education/india-s-gross-enrolment-in-higher-education-rose-marginally-in-2019-20-121061001249_1.html
3. <https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/04/Indigenous-Languages.pdf>
4. <http://employmentnews.gov.in/newemp/MoreContentNew.aspx?n=Special Content&k=53> An article on Yoga and its world wide popularity
5. <https://www.wionews.com/south-asia/yoga-indias-new-cultural-tool-of-global-dominance-17104>

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1. https://www.un.org/development/desa/youth/wp-content/uploads/sites/21/2019/08/WYP2019_10-Key-Messages_GZ_8AUG19.pdf
2. <https://www.intechopen.com/chapters/38348> Globalisation and Culture: The Three H Scenarios
https://www.business-standard.com/article/education/india-s-gross-enrolment-in-higher-education-rose-marginally-in-2019-20-121061001249_1.html
3. <https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/04/Indigenous-Languages.pdf>
4. <http://employmentnews.gov.in/newemp/MoreContentNew.aspx?n=Special Content&k=53> An article on Yoga and its world wide popularity
5. <https://www.wionews.com/south-asia/yoga-indias-new-cultural-tool-of-global-dominance-17104>
6. <https://theprint.in/world/indian-food-fourth-most-popular-in-the-world-a-studyof-cuisine-trade-Ginds/283119>
7. http://ijrar.com/upload_issue/ijrar_issue_20543741.pdf
8. <https://www.fao.org/3/y5736e/y5736e02.pdf>
9. http://www.indusedu.org/pdfs/IJRESS/IJRESS_705_90234.pdf