পঞ্চদশ শিক্ষক নিবন্ধন পরীক্ষা-২০১৮

কলেজ পর্যায়

সিলেবাস

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	বিষয়	বিষয় কোড
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কলেজ পর্যায়

(উচ্চ মাধ্যমিক বিদ্যালয়, কলেজ, মাদরাসা, ব্যবসায় ব্যবস্থাপনা ইনস্টিটিউট ও কৃষি ডিপ্লোমা ইনস্টিটিউট প্রতিষ্ঠানের প্রভাষক / ইন্সট্রাক্টর (টেক) পদে নিবন্ধনে ইচ্ছুক সকল প্রার্থীদের জন্য)

Syllabus for Preliminary Test
বিষয় কোড: ৪০০
পূর্ণমান-১০০, সময়: ১ ঘণ্টা

ক. বাংলা (Bengali): ২৫

ভাষারীতি ও বিরাম চিহ্নের ব্যবহার, বাগধারা ও বাগবিধি, ভুল সংশোধন বা শুদ্ধকরণ, যথার্থ অনুবাদ ও শিরোনাম, সন্ধি বিচ্ছেদ, কারক বিভক্তি, সমাস, প্রত্যয় বিন্যাস, সমার্থক ও বিপরীতার্থক শব্দ, প্রায়োগিক প্রয়োজনীয়তা (বিরাম চিহ্ন, বাগধারা, সন্ধি, কারক, সমাস, কারক বিভক্তি, প্রত্যয়) প্রভৃতি।

খ. ইংরেজি (English): ২৫

Errors in composition, Fill in the blanks with appropriate preposition, Uses of article, verbs, Identify appropriate translation from Bengali to English, Identify appropriate title from story, article, Transformation of sentences, synonyms and Antonyms, completing sentences, Idioms and phrases.

গ. সাধারণ গণিত (General Mathematics): ২৫

পাটিগণিত: সূত্র ও নিয়মাবলী (পাটিগণিত সম্বন্ধীয়) গড়, ঐকিক নিয়ম, লসাগু, গসাগু, শতকরা, সুদকষা, লাভ-ক্ষতি।

বীজগণিত: উৎপাদক, বর্গ ও ঘনসম্বলিত সূত্রাবলী ও প্রয়োগ, গসাগু, বাস্তব সমস্যা সমাধানে বীজগাণিতিক সূত্র গঠন ও প্রয়োগ, সূচক ও লগারিদমের সূত্র ও প্রয়োগ, অনুপাত ও সমানুপাত।

জ্যামিতি: পরিমিতি ও ত্রিকোনমিতি সম্পর্কিত সাধারণ ধারনা, নিয়ম ও প্রয়োগ।

ঘ. সাধারণ জ্ঞান: ২৫

১. বাংলাদেশ সম্পর্কিত বিষয়
২. আন্তর্জাতিক বিষয় ও চলতি ঘটনাবলী
৩. বিজ্ঞান, প্রযুক্তি, পরিবেশ এবং রোগব্যাধি সম্পর্কিত মৌলিক জ্ঞান।

বিস্তারিত বিষয়াবলী:
বাংলাদেশের ভূপ্রকৃতি, জলবায়ু, পরিবেশ, ইতিহাস, ভাষা আন্দোলন, মুক্তিযুদ্ধ, সভ্যতা, সংস্কৃতি, বাংলাদেশের অর্থনীতি, সম্পদ (বন, কৃষি, শিল্প, পানি), যোগাযোগ ব্যবস্থা, বাংলাদেশের সমাজ জীবন, সমস্যা, জনমিতিক পরিচয়, রাষ্ট্র, নাগরিকতা, সরকার ও রাজনীতি, সরকারি ও বেসরকারি লক্ষ্য, নীতি, পরিকল্পনা (অর্থনৈতিক, সামাজিক, স্বাস্থ্য ও শিক্ষা), কর্মসূচি, আন্তর্জাতিক সম্পর্ক, মানব সম্পদ উন্নয়ন, বিশ্ব ভৌগলিক পরিচিতি, জলবায়ু পরিবর্তন ও দুর্যোগ, নবায়ন যোগ্য শক্তি, জাতিসংঘ, আঞ্চলিক ও অর্থনৈতিক সংগঠন, পুরস্কার ও সম্মাননা, আন্তর্জাতিক মুদ্রা সংক্রান্ত, আন্তর্জাতিক রাজনীতি ও আনুষঙ্গিক বিষয়াবলী, স্বাস্থ্য, চিকিৎসা, তথ্য, যোগযোগ ও প্রযুক্তি, প্রাত্যহিক জীবনে বিজ্ঞান (পদার্থ, রসায়ন ও জীব বিজ্ঞান সংশ্লিষ্ট) সাধারণ রোগ ব্যাধি ও পরিবেশ বিজ্ঞান সংশ্লিষ্ট।

কলেজ পর্যায়

(উচ্চ মাধ্যমিক বিদ্যালয়, কলেজ, মাদরাসা, ব্যবসায় ব্যবস্থাপনা ইনস্টিটিউট ও কৃষি ডিপ্লোমা ইনস্টিটিউট প্রতিষ্ঠানের প্রভাষক / ইন্সট্রাক্টর (টেক) পদে নিবন্ধনে ইচ্ছুক সকল প্রার্থীদের জন্য)

Syllabus for Written Examination

বিষয়ঃ বাংলা (Bengali)
বিষয় কোড- ৪০১
পূর্ণমান-১০০

১. নিম্নলিখিত রচয়িতাদের জীবনী ও উল্লেখযোগ্য রচনাবলিঃ চণ্ডীদাস, মুকুন্দরাম, আলাওল, ভারতচন্দ্র, ঈশ্বরচন্দ্র বিদ্যাসাগর, মধুসূদন দত্ত, বঙ্কিমচন্দ্র চট্টোপাধ্যায়, মীর মোশাররফ হোসেন, কায়কোবাদ, রবীন্দ্রনাথ ঠাকুর, প্রমথ চৌধুরী, শরৎচন্দ্র চট্টোপাধ্যায়, কাজী নজরুল ইসলাম, জসীম উদ্দীন, জীবনানন্দদাশ। **২. বাংলা সাহিত্যের বিভিন্ন ধারাঃ** পদাবলি, মঙ্গল কাব্য, জীবনী কাব্য, রোমান্টিক উপাখ্যান, অনুবাদ কাব্য, দোভাষী কাব্য, মহাকাব্য, গীতি কবিতা, উপন্যাস, নাটক, ছোটগল্প। **৩. বাংলার ব্যাকরণ ও রচনাঃ** ক. বাগধারা খ. সমার্থক শব্দ গ. বিপরীতার্থক শব্দ ঘ. ছন্দ, অলংকার ঙ.ণ-ত্ব বিধান ও ষ-ত্ব বিধান, বাংলা বানানের নিয়ম ইত্যাদি। **৪. বাংলা ভাষার সাধারণ পরিচয় (ইতিহাস)। ৫. বাংলাদেশের সাহিত্য ঃ** কবিতা, উপন্যাস, নাটক, ছোটগল্প।

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বিষয় ঃ ইংরেজি **(English)**
কোড ঃ ৪০২
পূর্ণমান-১০০

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1. **History of English Literature:** Candidates are required to have a general knowledge of English Literature from Elizabethan period to Modern period i.e. Christopher Marlowe to T.S. Eliot with special reference to the major movements and genres during different period.
2. **Literary terms:** Epic, drama, novel, tragedy, comedy, tragi-comedy, short story, romance, allegory, ode, ballad, lyric, pastoral poetry, dramatic monologue, elegy, sonnet, mock-epic, satire, three unities, miracle and morality plays, fable, interlude, soliloquy, poetic justice, parable.
3. **Figures of Speech:** Simile, metaphor, image, irony, analogy, symbol, conceit, wit, personification, hyperbol, paradox, epigram, climax, anti-climax.
4. **Individual Authors:** Candidates are expected to be familiar with the major works of the following authors - i. William Shakespeare, ii. John Milton, iii. Jonathan Swift, iv. Alexander Pope, v. Charles Dickens, vi. William Wordsworth, vii. S.T. Coleridge, viii. John Keats, ix. P.B. Shelley, x. Byron, xi. E.M.Forster. xii. Bernard Shaw and xiii. T.S. Eliot.
5. **Formal letter, letter to editors, complaint, request, job application**
6. **Summary writing**
7. **Grammar**
   Any two from the following terms: i. Changing words from one parts of speech to another and making sentence with them. ii. Synonyms and Antonyms and making sentences with them. iii. Completing sentences.

বিষয় ঃ অর্থনীতি (Economics)
কোড ঃ ৪০৩
পূর্ণমান-১০০

Micro Economics

1. **Introduction:** Definition, nature and scope of Economics, Micro Economics and Macro Economics. Positive Vs. Normative Economics. The basic problems of Economic organization. Production and exchange. Production possibility frontier. The market mechanism.

2. **Supply and Demand:** Concept of supply and demand and their determinants. Market equilibrium and shifts of market equilibrium. Consumer's and producer's surplus. Concepts and measurements of various elasticity of demand and supply.

3. **The Theory of Consumer Behavior:** Utility-total and marginal utility, cardinal and ordinal utility. Law of diminishing marginal utility. Equimarginal principle and derivation of demand curves.

4. **Theory of production:** Production function. Fixed Vs. variable factors of production. Short run and long run, total, average and marginal product. The law of diminishing returns; Returns to scale, technological change.

5. **Theory of Cost and Revenues:** Short and long run cost functions. Implicit and opportunity cost. Fixed and variable costs. Total, average and marginal cost. Envelope curves. The link between production and economic profit. Profit maximizing conditions.

6. **Market:** Perfect competition and monopoly, short and long run equilibrium of firm and industry, Profit maximization, Shut down condition, Resource allocation and economic efficiency.

Macro Economics

1. **Macro Economics Overview:** Objective and instrument of macroeconomics. Fundamental concepts of macroeconomics. Potential GNP. GNP gap, Okun's law, natural rate of unemployment. Business cycles. Budget deficit and international deficit, aggregate demand and aggregate supply.

2. **National Income Accounting:** Circular flow of income. Injections and leakages, Different concepts of national income-GNP, GDP, NNP, NI at factor price, market price and constant price, personal income, disposable income, real and national GDP. Net Economic Welfare (NEW): The Consumer Price Index (CPI) & the GDP Deflator. The methods and problems of computing national income.

3. **Consumption and Saving Function:** Concepts of MPC, APC. MPS, APS. Short run and long run viewkuznet's Puzzle.

4. **Inflation:** Measures of inflation, causes of crutlation, source of inflationary pressure, consequences of inflation, deflation.

5. **Money and Monetary Policy:** Meaning of money, different concepts of money (M1. M2. M3), credit creation by banking system, function of money, demand and supply of money, velocity of money, long run impact of money on prices, short run impact of money on output, changes in income velocity, monetary policy.

6. **Fiscal Policy:** Theory of fiscal policy, relationship of fiscal policy to monetary policy. problems in implementing fiscal policy.

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বিষয় ঃ রাষ্ট্রবিজ্ঞান (Political Science)
কোড ঃ ৪০৪
পূর্ণমান-১০০

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a. Political Science: Nature, Scope and Method and its relation to other Social Sciences. b. Selected Thinkers: Plato, Aristotle, Machievelli, Hobbes, Locke, Rousseau, J.S.Mill and Karl Marx. c. Comparative Political Systems: U.K, U.S.A. d. Constitution: Its meaning and significance: Methods of establishing constitution. Requisites of a good constitution. Comparative study of constitutional features of U.K., U.S.A; India and Bangladesh. e. Forms of Government: Democracy and Dictatorship; Unitary and Federal: Parliamentary and Presidential Governments. Organs of Government: Legislature: Executive and Judiciary: Separation of Powers; Electorate: Political Parties and Public Opinion. f. Emergence of Bangladesh: Language Movement of 1952: Elections of 1954; Autonomy. Movement and the 6 - Point Programme: Mass upsurge of 1969; Election of 1970; War of Liberation and birth of the new nation. Bangladesh Constitution 1972; Major features; Working and amendments. g. **Major Political Trends:** Awami League Government; Military intervention and the Zia Regime; Ershad Rule and the struggle for democracy: The role of political parties; Elections of 1991, 1996 and 2001 and the formation of Parliamentary Government.

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বিষয় ঃ ইতিহাস (History)

কোড ঃ ৪০৫

পূর্ণমান ঃ ১০০

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Part-1: History of Bengal (Selected topics)
a. Pala rule in Bengal: Rise of the Palas; Dharmapala, Devapala and Mahipala l, b. The Mauryan Empire: Sources of Mauryan History, Chandragupta Maurya: Origin life, extent of his Empire, administrative system and achievements. c. The Gupta: Rise of the Guptas, Chandragupta-l, Samudragupta. Chandragupta - 11 (Vikramaditya of the Legend), the Account of Fa-hien, Gupta administration, Gupta Civilization. Golden Age of Ancient India, Later Gupta Kings and the Downfall of the Guptas. d. Muslim Rule in Bengal: Bakhtiyar Khalji, Iliyas Shah, Alauddin Hussain Shah; Mughal occupation of Bengal and the Bara Bhuiyas, Shayesta Khan and Murshid Quli Khan. e. British rule in Bengal: Battle of Palashi, Permanent Settlement. Reform movement in Bengal, Partition of Bengal, 1905.

Part-2: History of the Indian Sub-continent (Since 1526) (Selected topics): a. **History of civilization:** Indias valley and Vedic civilization; b. **Mughal rule:** Babur, Humayun and Sher Shah, Akbar, Jahangir, Shahjahan, Aurangzeb, fall of Mughal rule. c. **British rule:** Battle of Buxer and the grant of Diwani: Consolidation of British rule: Waren Hastings and Cornwallis, Expansion of British rule Wellesley and Dalhousi, Social and Administrative reforms: Ripon and Bentinck, War of 1857. Growth of Nationalism: Indian National Congress, the Muslim League, Swadeshi and Khilafat Movements. Acts of 1919 and 1935, Lahore Resolution and the Partition *of* 1947.

Part-3: Emergence of Bangladesh: Language Movement of 1952. Election of 1954 and the United Front Ministry. Six-point movement and the mass upsurage of 1969, in Liberation war and the Emergence of Bangladesh 1971.

বিষয় ঃ ইসলামের ইতিহাস ও সংস্কৃতি (Islamic History & Culture)
কোড ঃ ৪০৬
পূর্ণমান-১০০

a. Social, political and economic conditions of Arabia at the time of the advent of Islam. b. Rise of Islam: Prophet Muhammad (Sm.), the pious Caliphate. c. The Ummayads: Muabivah, Abdut Malek, Al-Walid, Umar bin Abdul Aziz, fall of the Ummyads. d. Rise of the Abbasids: Al-Munsur, Harun-ur Rashid, Al Mamun fail of the Abbasids. e. Rise and Fall of Muslim Rule in Spain. f. Arab conquest of Sind, Mahmud Ghaznavi, foundation of Muslim rule in India: Muhammad Ghori. Qutubuddin Aibak, Iltutmish, Balban, Alauddin Khalji, Muhammad bin Tughluq, fall of the Delhi Sultanate. g. Advent of the Mughals: Babor, Humaun and Sher Shah, Akber, Jahangir. Shalijahan, Aurangeb, Advent of the Europeans: Battles of Palashi and Buzar, War of Independence, 1857. h. Religion: Five pillars of lslam The Quran, Hadith, Four Sunni Schools of law, Shifilcs, Kharijites. Mutazilites, Ashantes, Kuslim Jurisprudence. i. Muslim art: Attitude of Islam Towards Art and Painting - Early paintings in Islam: Sources & Subject-Niatter of Muslim painting, Schools of painting and their Characteristics. j. Pattern of Muslim architecture: Prophet's Mosque at Madinah. Great Mosque of Damascus- Place of Qusayr Amra. Cardova Mosque. Abbasid Mosques at Samarra, Shahi Jam E Mosjid. Delhi-Taj Mahal of Agra, 60 Dorned Mosque at Bagerhat, Panch Bibi's Tomb at Lalbagh (Dhaka).

বিষয় ঃ দর্শন (Philosophy)
কোড ঃ ৪০৭
পূর্ণমান ঃ ১০০

(i) **Introduction:** The nature and scope of philosophy, its relation to science, religion and life. (ii) Epistemology Rationalism, Empiricism, Criticism (kant) and Intuitionism. Idealism Vs. Realism. (iii) Theories of Evolution: Creation and Evolution, Mechanical and Emergent Evolution. (iv) Theories of Reality: Spiritualism, Materialism and Idealism, Monism and Pluralism. Philosophy of Mind: Mind as a substance, The Idealist and the Materialist theories of the self. Theories of the mind body relation. (vi) God: Deism, Pantheism and theism, Proofs for the Existence of God. (vii) Traditional Logics: Definition; Deductive and inductive logic, sentence and proposition A.E.LO, Propositions. Different aspects of syllogism. (viii) Symbolic Logic: What is symbolic Logic, Truth and Validity, Different kinds of Arguments, Truth Table, Formal Proofs of Validity. (ix) Some Theological Trends of Muslim philosophy: The Qadarites, The Jabarites, The Mutazilas and The Asharites and their Philosophical views. (x) The Muslim Thinkers: AI-Kindi, Al-Farubi, lbn-e-Sina and Al-Ghazali. (xi) Indian Philosophy: The philosophy of Charaka, The Buddhism and the philosophy of Vedanta. (xii)Moral Theories: Moral Judgement, Motive and Intension. Theories of Moral Standard: Perfectionism, Kants theory of categorical Imperative, Hedonism and Utilitarianism. (xiii) Some Contemporary Trends: Existentialism, Analytic Philosophy and Pragmatism.

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বিষয় ঃ সমাজবিজ্ঞান **(Sociology)**
কোড ঃ ৪০৮
পূর্ণমান ঃ ১০০

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(i) The Sociological Perspective: The origins and growth of sociology, nature and scope, theoretical perspectives. Sociology and other social sciences. (ii) The Process of Sociological Research: Sociology and scientific research, the research process, Sociology as science, research method and techniques. Objectives and ethics in social research. (iii) Culture: Definitions, components of culture, the diversity and unity of culture, cultural integration and cultural change. (iv) Social Institutions: Family and marriage, definitions, forms and functions of family, types of marriage, recent trends in family and marriage; Economic Institutions: Contemporary economic systems capitalism, socialism, economic system of developing countries property; Political Institutions: state, political systems, power, authority, leadership, political parties, bureaucracy, nature of civil society and democratization in developing countries; religion: definition, varieties theories, religion and social change, mass media, growth of media press radio, television, internet, impact of mass media and global culture. (v) Society and Social Structure: The Units of social structure-status role groups, institutions; types of societies: hunting and gathering societies. Horticultural societies, pastoral societies, agrarian societies, industrial societies, post industrial/post-modern societies. (vi) Social Differences and Social Inequality: Principles of stratification major forms: slavery, estate, caste, class and status group: theories of stratifications: functionalist theories, conflict theories, Lens Ki's theory. Social structure and differentiation; by age, gender, ethnicity, social class and social mobility: stratification pattern in Bangladesh. (vii) Socialization: Definitions, formation of the self-James cooley and the social self, mead and the self process, Goffman and the presentation of self; Socialization process, agents of socialization. (viii) Deviance and Social Control: Nature of deviance and crime. sociological theories of crime and deviance; Social control - agencies of social control: Religion, art, public opinion, education, mass media custom and law, state and government. Family, Agencies of social control with particular reference to Bangladesh. (ix) Population, People and Their Environment: Basic demographic concepts, the growth of populations, theories of populations, composition of the population. Population patterns in modern and developing nations; population resources and the environment; human impact on the natural world; environmental movements. (x) Urban Development and Community: Urban versus rural life- the origin and growth of the cities, urbanization after the industrial revolution, urban life and change, metropolitan problems and the urban crisis. (xi) Social change: Definitions, sources of change, social change and modernization. Types of change major theories of change: change, progress and evolution. Social History of Bangal: Impact of Muslim rule, British rule and its impact, developments of middle class, emergence of Bangladesh, tribes of Bangladesh. Racial characteristics of the population of Bangladesh, rural development in Bangladesh, role of BARD and other similar organizations in rural development including NGO's.

বিষয় ঃ সমাজকল্যাণ/সমাজকর্ম (Social Welfare/Social Work)
কোড ঃ ৪০৯
পূর্ণমান-১০০

a. Definition, objectives, history and scope of modern Social Welfare and Social work. Religious teachings and Welfare-Islam, Hinduism. Buddhism- Christianity. b. Nature of social work in pre and post industrial society with special reference to lndo-Pak-Bangladesh sub-continent. c. Industrial Revolution and its impact on social life: the emergence of new social problems and social services, d. Basic human needs: Food, clothing, shelter, health, education and their bearing on human life and welfare, with special reference to Bangladesh. e. Major social evils and social problems in Bangladesh: poverty, unemployment, ill health, beggary, over-population, illiteracy, drug addiction, crime and delinquency, slum and urban problems, family violence, child labour, gender discrimination, immoral trafficking, their causes, effects and remedies. f. Constitutional guarantee of social welfare and social security in Bangladesh, Social welfare in the national five year plans of Bangladesh g. Definition, scope, principles and significance of Social Case work, Social Group Work- Community Organization and Community Development. h. Social Case work as a problem-solving process its elements, steps methods and significance of Rapport. i. Social Group Work. Community Organization and Community Development as a problem solving process: its elements, steps, methods and importance. Definition and role of Social Administration. Social Research and Social Action in promoting Social Welfare in Bangladesh. k. Significance of Social legislations to bring about Social reforms in Bangladesh. l. Some national NGO's and international agencies working in Bangladesh: Their composition, role, contribution and future prospects in national development: BRAC, Grameen Bank, Proshika, ADAB, Bangladesh Diabetic Association. Bangladesh Probin Hitoishi Shangha, CARE, World Vision, Bangladesh Red Crescent Society.

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বিষয় ঃ মনোবিজ্ঞান (Psychology)
কোড ঃ ৪১০
পূর্ণমান ঃ ১০০

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1. **Introduction:** Definition and nature of Psychology. Psychology as a Science. Fields of Psychology: Experimental, Physiological, Clinical, Counseling, Industrial, Educational, Social and Development Psychology. Methods of Psychology: Experimental, observational, Clinical, Case histories, Survey Method.
2. **Learning:** Definition and nature of Learning. Factors of Learning. Classical Conditioning, Operant Conditioning, Cognitive Learning, Latent Learning, Insightful Learning: Memory and forgetting, Ways of measuring memory. General causes of forgetting.
3. **Perception:** The nature of Perception. Selectivity in Perception.
1. **Form Perception:** Figure and ground, contour, Perceptual organization. Depth perception: Monocular and Binocular cues to depth perception. Perception of movement, Illusion and Hallucination.
4. **Motivation and Emotion:** Defining Motivation, Motivation Cycle, and Classification of motives, Biological motives, Social motives, and Motivation theories. Nature of emotion, Theories of emotion, Physiological changes in emotion. Behavioral changes in emotion, Dealing with emotional behaviour.
5. **Personality and Intelligence:** Nature of personality. Determinants and Measuring of personality. Type of personality. Definition of Intelligence. Concept of I.Q. Measurement of Intelligence.
6. **Socialization:** Nature of Socialization. Process and agents of socialization. Effect of Socialization. Impact of Culture on Personality.
7. **Attitude and Job satisfaction:** Characteristics and components of attitude. Formation and change in attitude. Measurement of attitude and Job satisfaction.
8. **Measurement and Evaluation:** Need for measurement. Goals of the student evaluation system. Characteristics of objective and Essay type tests.
9. **Group and intergroup behaviour:** Group dynamics, crowds, Rumour. prejudices. Group cohesiveness, Sociometry inter group behaviour Conflict commitment, power and politics.
10. **Leadership:** Definition approaches to the study of leadership, functions and types of leaders; Effective leadership and its determinants. Leadership theories.
11. **Psychology of being a teacher:** Characteristics and behaviours of effective teacher. Teacher as a Learner, Teacher-Student interaction, Teacher Centered approach to learning.

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বিষয় ঃ সংস্কৃত (Sanskrit)

কোড ঃ ৪১১

পূর্ণমান-১০০

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১. **অনুবাদ ঃ** ক. বাংলা অথবা ইংরেজি থেকে সংস্কৃত অনুবাদ। খ. সংস্কৃত থেকে বাংলা অথবা ইংরেজিতে অনুবাদ।

২. **ব্যাকরণ ঃ** সন্ধি, কারক ও বিভক্তি, সমাস, আটমানচপদ বিধান, স্ত্রীপ্রত্যয়, অব্যয় এবং তদ্ধিত।

৩. **ছন্দ প্রকরণ (Posody) ঃ** ইন্দ্রভজরা, উপেন্দ ভজরা বিদ্যুণমালা, শিখারানী, মালিনি, বাসন্তাতীলাকা, রাথোদ্ধাতা, হারিনাল, বামশাস্থুবিলা, মন্দাক্রান্ত রুচিরা, ভুজং গোপ্রায়াতা, আর্যশালিনি, শার্দুলাবিক্রিরিতা।

৪. **সাহিত্য ঃ** স্বপ্রভাসাবাদান্তা, অভিজ্ঞান শকুন্তলা, মেঘদূত, কিরতুর্যনিয় কান্তে -১।

৫. **সংস্কৃত সাহিত্যের ইতিহাস।**

1. **Vectors:** Scalar triple product: Vectors triple product, scalar and rector fields, gradient, divergence & curl and their physical significance.

2. **Mechanics:** Newton's laws of motion: Force, definition and units: Frictional force: Centripetal and centrifugal forces. Work, energy and power: Definitions, Work done by constant force. Work done by variable force, kinetic energy; potential energy and principle of conservation of energy, Mass-energy relation, Freely falling body
Collisions: Impulse and momentum. Conservation of liner momentum. Elastic and inelastic collisions. Rotation: Angular velocity. Angular acceleration. Uniformly accelerated angular motion, Torque, Kinetic energy of rotation, Moment of inertia. Gravitation. Newton's law of gravitation, Cavendish's and Boys exnerimeoi for determination of G, Variation in acceleration due to gravity, Gravitational field and Gravitational potential, Simple and compound pendulum.

3. **Properties of Matter:** Elasticity: Stress and strain, Hock's Law, Determination of Young's modulus and rigidity modulus, Torsion of a cylinder, Bending moment and cantilever. Surface Tension: Molecular concept, Surface energy and surface tension, Angle of contact, Determination of surface tension by capillary method. Viscosity: Streamline and turbulent motion, Bernoulli's equation, Poiseull's equation, Determination of co-efficient of viscosity using capillary flow method.

4. **Wave and sound:** Transverse and longitudinal wave, Traveling and stationary wave, Resonance. Sources and propagation of sound - Velocity of sound, Beat, Doppler effect, Transverse vibration of a string, sonometer, Kundt's tube, Resonance air column, Ultrasonics.

5. **Heat, Thermodynamics and Kinetic Theory of Eases Thermometer,** Thermodynamics Resistance thermometers, Thermocouple Thermalexpansion. Mechanical equivalent of heat, Quantity of heat, Specific heat and heat capacity. Transfer of heat: Condiction, Determination of conductivity by Sea method, Convection, Radiation. Siefen-Boltzman law. Thermodynamics: First law of thermodynamics. Difference between C_p and C_v for an ideal gas, Adiabatic process for an ideal gap, Second law of Thermodynamics Reversible and irreversible processes, Carnot cycle, Efficiency of I engine, Joule-Thompson effect. Kinetic theory of gasses: Basic assumptions Equation of State of an ideal gas, Kenetic interpretation of temperature and pressure, Mean free path, Vander Waal equation.

6. **Electricity and Magnetism:** Charge and Matter, Electric field, Point charge in an electric field, Dipole in an electric field. Gauss's law and Coulomb's law: Application to a spherically symmetric charge distribution and charge sheet; Electric potential: Potential and field strength, Potential due to a point charge, Due to a dipole, Calculation of E from V. Capacitance and dielectric: Calculation of capacitance, Dielectric and Gauss's law, Energy storage in dielectric. Current and circuits: Ohm's law, Receptivity and atomic view. Electrometric force, Kirchoff's law whetstone bridge, Potentiometer. Magnetic field: definition of B, Ampere's law, Biot-Savart law. Magnetic force on a current, Torque on a current loop, Electric meters. Faraday's law: Inductance, Energy density and the magnetic field Diamagnetism, Paramagnetism and Fero-magnetism. Electromagnetic Oscillation: LC oscillation, Maswell's field equations. Alternating current: Alternating emf, LCR Circuit, Effective or RMS value of alternating voltage and current.

7. **Optics:** Nature and propagation of light: Light and the electromagnetic spectrum, Velocity of light, Huygen's principle and the laws of reflection and refraction. Total internal reflection. Interference and Diffraction: Young's experiment, Coherence. Michelson's in- terferomater. Diffraction from single slit, double slit and grating, X-ray diffraction and Bragg's law. Polarisation: Plane polarisation, Circular Polarisation. Polarisation.

8. **Modern Physics:** Theory of relativity Postulates of special theory, Lorentz transformation. Quantum Physics: Radiation. Planck's radiation formula, Photoelectric effect, Compton effect, Bohr's theory and hydrogen atom De Broglie matter wave, Uncertainty principle.

9. **Nuclear Physics:** The atomic nucleus: Nuclear constituents. Force between nucleus and nuclear radius, Binding energy and mass defect radioactivity. Fusion and fission: Elementary idea, nucleus reactors. Elementary Particles: General idea, Particle accelerators.

10. **Solid State Physics:** Crystalline nature of solids: Bind theory of solids. Semi-conductors, Diode and transistor.

11. **Quantum Mechanics:** Physical Basis: Failures of classical mechanics and emergence *of* quantum mechanics. Bohr atom model and Old quantum theory; Unitization of the phase integral, The particle in a box, Shortcomings of the old quantum theory, Wave particle duality, De Booglie wavelength. The Basic Concept of Quantum Mechanics: The uncertainty principle. Postulates of quantum mechanics: (a) Interpretive postulates and (b) Physical postulates (i) The correspondence principle and (ii) The complementary principle; Operators and its properties. Eigenfunctions and Eigenvalues, Scalar product of two functions and orthogonality relations of any function (x); The Heisenberg uncertainty relations for arbitary observables, Momentum eigenfunctions, Completeness.

12. **Electronics:** History of electronics: Electronic vs. Electricity, Vacuum diode, triode- I Semiconductor Diode Semiconductor diode, P-n junction forward /reverse bias. I.V curve, Diode equation, Ge and Si diode, Breakdown: Avalanche and Zener mechanism. PIV rating, DC and AC resistence. Load line ard Q-point, Diode equivalent, Circuit. Maximum current and power dissipation rating, Reverse recovery time, Ohmmeter, Testing of diode, Zenner diode, Compound semi-conductors, LED (basic concepts), Photodiode & Solar Cell (basic characteristics).

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বিষয় ঃ রসায়ন **(Chemistry)**
কোড ঃ ৪১৩
পূর্ণমান-১০০

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1. **Gaseous State:** The gas laws, Ideal gas equation, Kinetic theory and its application to ideal gases, Deviation from ideal behaviour, Vender Waals equation, Dalton's law of partial pressure; The critical state and critical constants, liquefaction of gases.
2. **Solutions:** Solubility, Henny's law, Raoult's law, Ideal and nonideals solutions, Colligative properties of solutions, Effect of electrolytes on colligative properties, Buffer solutions.
3. **Thermochemistry and thermodynamics/Energetics in Chemistry:** Work and heat, Internal energy, Three laws of thermodynamics and their application, Enthalpy, Enthalpy changes in various chemical and physical processes, Joule-Thomson effect, Entropy, Spontaneity and reversibility of chemical reaction, Hess's law and its application, Bond enthalpy.
4. **Phase Equilibrium:** Phase, Components and degrees of freedom. Phase rule, Application in one component system like water and sulfur, Completely and partially miscible liquid paris.
5. **Chemical Equilibrium and Chemical Kinetics:** Equilibrium in chemical reactions and the equilibrium law, Kp-Kc and Kx measurements and effect of temperature; Pressure of Kx measurement, Degree of dissociation, Equilibrium constant. Ostwald dilution law, Concentratyion change on dissociation of solids, Solubility product, Common ion effect, pH and buffer solution. Rate equation, Order reaction, Molecularity, Rate constant, Zero, first and second order reaction, Effect of temperature on the rate of reaction.
6. **Electrochemistry and its scope:** Electrolytes and non electrolytes, Inonic mobility and conductance, Electrochemical cells, pH, Electrode potentials-emf of cells, Transport number and their determination, Electrolytic and galvanic cells, Hulf cells, Different types of electrodes, Standard Hydrogen electrode, Measurements of electrolytic conductance.
7. **Atomic Structure:** Nuclear model of the atom, Nuclear structure, Isotopes, Isobars, Isotons, Quantum number and atomic orbital, Electronic structure of atoms, Electron spin and the Pauli exclusion principle, Hund's rule; Aufbau principle, Electronic configuration.
8. **Periodic Table and Classification of Elements:** The modern periodic tables, Usefulness and, limitations of the periodic tables, Periodic properties, Atomic radius, Ionization energy, Electron affinity and electronegativity.
9. **Modern Concepts of Chemical Bonds and Bonds Type:** Ionic bonds-energy involved in ionic bonding, ionic radii, Covalent bonds, Lewis formulas, Co-ordinate covalent bonds, Octet rule, Multiple bonds, Polar covalent bonds-electronegativity, Delocatized bonding resonance, Bond length, Bond order, Bond energy, Valance bond theory, Molecular orbital theory, Metallic bond, Hydrogen bond, Vander Waals forces.
10. **Structure of molecules**
11. **Radioactivity, Nuclear reactions and Atomic energy**
12. **Acids and Bases:** Arnhenius concept, Booronsted-Lowry concept, Lewis concept, Acid-base strength, Molecular structure and acid strength, Self ionization of water and pH.
13. **Oxidation and Reduction**

14. **Common elements and their important compounds and their uses**: Hydrogen, Group 1 or IA (The alkali metals). Group 2 or IIA (The alkaline earth metals), Group IIA, Group IVA, Group VA, Group VIA. Group VIIA (Halogens), The noble Gases, Transition Metals.

15. **General Concepts on the Following:** Aliphatic and aromatic compounds. Heterocylic compounds, Bonding in organic compound, Covalent bonds, Atomic orbitals, Hybridization of orbital, Functional group, Bond angles. Polar and non-polar molecules, Shape of molecules. Carbanion, Carbocation, Free radicals and their stability. Structure of organic molecules. General concepts of nucleophilic, electrophilic and free radical mechanism of organic reactions.

16. **Aliphatic Hydrocarbons (Alkanes, Cycloalkanes, Alkenes and Alkynes):** Structure, Nomenclature, Preparation and Properties of Alkenes, Geometrical isomerism of alkenes, Cis-Trans and E-Z systems, Mechanism of electrophilic addition, Markownikov's rule, Polymer of alkenes, Physical and Chemical Properties of alkanes and cyclo alkanes, Configuration and conformation, Optical isomerism of alkanes, CisTrans isomerism on cycloalkanes. Wurtz reaction. Free radical mechanism of halogenation, Electrophlic addition reaction of alkynes, Preparation and reaction of Alkynes; Important organic synthesis starting from alkynes, acidity of alkynes.

17. **Aromatic hydrocarbons:** Source, structure, bonding in benzene. Concept of aromaticity. Hueckel rule, Mechanism of electrophlic Substitution in aromatic rings, Halogenation, Nitration. Sulfonation, Friedel-crafts atkylation and acylation. Benzene derivatives. nomenclature and their preparation, 'Resonance, Disubstitution in benzene ring, Orientation in bewene ring and its derivatives, Activation and deactivation in aromatic disubstitution.

18. **Alkyl and Aryl Halides:** Structure, Nomenclature, Preparation, Properties, Mechanism of substitution and elimination reaction, Grignard reagent synthesis and application.

19. **Alcohol, Phenols & Ether:** Structure, Nomenclature, classification of mono hydric alcohol and phenol and their reactions, Distinction between different types of alcohols.

20. **Adehydes, Ketones and Acids:** Nomenclature, useual methods of preparation and reactions of aldehydes and ketones, Nucleophlic addition to carbonyl compound, Cannizzaro reaction, Aldo1 condensation reaction, Penkin, Knoevenagel and witting reaction, Acidity, Resonance effect and inductive effect on acidity, Preparation and reaction of carboxilic acid.

21. **Amines: Aliphatic & Aromatic:** Nomenclature, Preparation, reaction of amines; Hoffman degradation; Nomenclature, Preparation and reaction of diazonium salts; Coupling reaction; Chemistry of nitro compounds: Separations of amines.

22. **Carbohydrates, Amino acids and proteins, Nucleic acid**

23. **Environmental Chemistry:** Acid rain, Green house effect, Ozone-layer depletion, Water pollution.

24. **Chemical principles of the manufacture of common organic and inorganic industrial products under local condition.**

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বিষয় ঃ গণিত **(Mathematics)**

কোড ঃ ৪১৪

পূর্ণমান-১০০

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Part-l. Algebra (including Trigonometry): a. Inequalities: Order properties of real number, Inequalities involving different types of means, Inequalities of Cauchy, C'hebyshev. Weierstrass. b. Complex numbers and Demoiver's theorem with applications. c. Summation of algebraic and trigonometric series. d. Theory of equations: Relations between roots and co-efficients, Symmetric functions of roots, Simple transformations. e. Linear algebra with vector spaces, Eigenvalues and Eignevectors. f. Set theory: Set and subsets, Set operations, Cartesion product of two sets, Operations on family of sets. g. Functions, One-one function, Onto function, Inverse functions, Domain and Range.

Part-11. Geometry (Analytical Geometry of two and three dimensions): a. Pair of straight lines. b. General equation of the second degree: Reduction of standard forms, Properties of parabola, Ellipse, Hyperbola. c. Planes and straight lines in three dimensions, Shortest distance between two straight lines. d. Vectors in three dimensional space with applications to geometry.

Part-III Diferential Calculas: a. Limit & Continuity b. Differentiation (including successive differentiation) c. Means Value theorem, Taylor's theorem. d. Maxima and Minima. e. Tangents and Normals.

Part-IV. Intigral Calculas (Including differential equations): a. Techniques of indefinite integration b. Definite integrals: c. Determination of areas d. Defferential equation's: Equations of first order and first degree, Linear equations with constant co-efficents. The paper will consist of four parts, having 3 questions of equal value in each part. Candidates will be required to answer six questions in all, taking at least one question from each part but not more than two questions from any one part.

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বিষয় ঃ প্রাণিবিদ্যা **(Zoology)**

কোড ঃ ৪১৫

পূর্ণমান-১০০

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1. **Non-chordates and chordates:** a. Classification upto classes b. Life history and pathogenesity of Entamoeba and Ascaris. c. Life history of a mosquito and the role of mosquitoes in disease transmission. d. Migration of fish, flight adaptation in birds, life history of Toad. e. Aquatic mammals.

2. **Cytology, Genetics and Evolution:** a. Ultrastructure of animal cells, Nucleic acids, Replication of DNA, Protein synthesis. b. Mendelian rations and their modifications, Multiple allele, Sexlinked inheritance. c. Recombinant DNA technology. Production of insulin by genetic engineering, Creation of transgenic animals.

3. **Ecology, Wildlife and Zoo-geography:** a. Ecosystem of a typical pond. b. Major biomes-physical characteristics and characteristic fauna, zonation of sea. c. Zoo-geographical regions, Their characteristics, Birds and mammalian fauna, Continental drift theory. d. Causal agents of environmental degradation, Air and water pollution. Effects on human health, Global warming. e.Wild mammalian fauna of Bangladesh, Importance and significance of wild life preservation, National parks, Game resenes, Sanctuaries of Bangladesh, Ecotourism and St. Martins Island.

4. **Physiology and Human Reproduction:** a. Physiology of digestion. Muscle contraction, Transmission of nerve impulse and excretion with reference to man, Carbohydrate and hormone metabolism. b. Human reproductive system, Physiology of reproduction, Principles of population control, History of population growth and the impact of population growth rates of national economy.

5. **Embryology, Ethology, Human ecology & Biostatistics:** a. Gametogenesis, Extra-embryonic membrane, Fate of germinal b layers. b. Instinct behavior, Human types and their physical features. c. Distribution, Standard deviation.

6. **Economic Zoology & Radiation Biology:** a. Induced spawning of carps, Carp, Prawn and Shrimp culture, Factors responsible for decline of fisheries resources. b. Important insect pest of rice & their biology. c. Importance of animals in medicine, Biological control. d. Sericulture in Bangladesh. e. Types of radiation and measurement of radiation.

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বিষয় ঃ উদ্ভিদবিজ্ঞান **(Botany)**
কোড ঃ ৪১৬
পূর্ণমান-১০০

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1. a. Diversities in plant kingdom and causes of diversities.
   b. Characteristics of different major plant groups.
2. a. Necessity and basis of classification. b. Kinds of classification, Study of natural (Benthum and Hooker's classification) and phylogenetic (Engler and Prantl's classification) system of classification. c. Modern system of classification (classification of Margulis) d. Necessity of plantation and plant conservation.
3. Scientific names, parts of plants used and economic importance of important (a) Cereals (b) Pulses (c) Medicinal (d) Timber (e) Oil (f) Fibre (g) Vegetables and (h) Fruits yielding plants of Bangladesh.
4. a. Elementary knowledge of structure and function of an ecosystem, Ecosystem of a typical pond. b. Different types of forest and forest areas of Bangladesh, Their ecology and dominant plants present therein, Causes of depletion of forest in Bangladesh and their remedies. c. Different kinds of pollution, their causes and effects on plants and animals and their remedies with reference to Bangladesh. d. Green house effect and green house gasses, Ozone depletion, Desertification, aridity and drought, Salinity, Flood and water logging condition in the light of Bangladesh, Necessary step to control of green house effect. e. Role of plants in maintaining ecological balance.
5. a. Ultra structure of a plant cell and function of cell organclles. b. Cell division and its significance. c. Structure of DNA and RNA. d. Mendel's laws of inheritance.
6. a. Source of energy in earth, transformation of light energy into chemical energy reduction of CO_2 (Carbon-di-oxide).
   b. Respiration and potosynthesis.
7. **a. Principles and control measures against plant diseases.**
   b. Importance of plant introduction and plant quarantine.
8. a. Importance and achievement of Biotechnology in improvement of crop plants with special reference to Bangladesh.
   b. Hybridization technique for improvement of crop plants.

বিষয় ঃ ভূগোল ও পরিবেশ বিজ্ঞান (Geography & Environmental Science)
কোড ঃ ৪১৭
পূর্ণমান ঃ ১০০

Part 1: Physical Geography
(a) Geography as a discipline: Definition, concept, sub fields, scope and methodology. (b) The earth as a globe: form of the earth-oblate ellipsoid. Geoid, great and small circle; Meridians and parallel-longitude, latitude; Location and direction on the map and the globe, Longitude and time: local time, standard time, world time zones and International Date Line. (c) Theories on the various tectonic aspects of earth's surface process - i) Plate tectonic process ii) Wegner's Continental Drift Theory iii) Theories on Isostasy. (d) Materials of the earth crust, rocks and minerals. Types of rocks and their characteristics. Weathering and denudation. Types of major Landforms. Landforms produced by the works of river, wind glacier, sea waves etc. Volcanism and Earthquakes. Ocean currents. World soil and vegetation types. (e) Composition of atmosphere- Factors and elements of weather and climate. Atmospheric pressure and wind system. Airmass and fronto genesis, major world climates.

Part 11: Human Geography
a. Economic activities: primary, secondary, tertiary and quaternary characteristics, world pattern.
b. Agriculture: types and major food and industrial crops; livestock and livestock products. Forestry: major products and distribution, Fishing: Fishing industries and fisheries.
c. Mining and manufacturing industries: petroleum and coal industries; other energy sources. Iron and steel industry and Textile industry characteristics and global distribution.
d. Service Industries: commerce and finance, trade and transportation - regional and international context.
e. Population and human settlement. Global distribution and density of population; population and food supply: problems of over and under population and resources constraints. Rural and urban settlements: forms and function.

Part III: Geography of Bangladesh
Physiography and climate: production and distribution of major agriculture, mining and industrial products, population and settlements.

বিষয় ঃ পরিসংখ্যান (Statistics)
কোড ঃ ৪১৮
পূর্ণমান ঃ ১০০

Statistics: Definition of statistics. Scope, Nature of statistical data. Attributes and Variables, Primary data and Secondary data, Construction of frequency distribution with its use, Classification and Tabulation, Graphical representation of data.

Measures of central tendency: Various measures of central tendency with their advantage and disadvantage, Criteria of a good measure, Properties of mean with proof, related theorem on measures of central tendency, Various problems, Location of mode and median graphically.

Measures of dispersion: Various measures of dispersion, Compression among the various measures of dispersion, Important theorems and related problems on dispersion, Advantage and disadvantage of various measures.**Moments:** Moments of a distribution, Properties of moments, Use of moments, Relation between row moments and central moments, Related problems on moments, Skewness and kurtosis with their types, Various measures of skewness and kurtosis, Related theorem. **Regression and correlation:** Simple correlation and simple regression, Use of correlation and, regression, Difference between correlation and regression, Properties of correlation co-efficient, Properties of regression co-efficient, Rank correlation, Partial correlation co-efficient and Multiple correlation co-efficient. **Probability and random variable:** Meaning of probability, Definition of various terms, Laws of probability, Bayes theorem, Random variable, Probability distribution, Distribution function, Joint probability distribution, Marginal and conditinal distribution, Independence of random variable. **Mathematical expectation:** Meaning of expectation, Properties of expectation, Variance of random variable, Properties of variance, Conditional expectation, Conditional variance, Relation between moments and cumulants, Characteristic function, Related problem on expectation. **Probability distributions:** Binomial distribution. Poisson distribution, Normal distribution, Hypergeometric distribution, Negative binomial distribution Geometric distribution, Uniform distribution, Exponential distribution, Beta distribution, Properties and importance of these distributions. **Sampling Theory:** Concept of sample of population, Meaning and objective of sampling, Defination of related terms, Problems in conducting sample survey, Advantage and disadvantage of census and survey, Sampling error and non sampling error, Types of sampling. Deference between different types of sampling, Simple random sampling, stratified sampling, Systematic sampling, Cluster sampling, Method of drawing random sample, Sampling distribution derivation, Properties and use of f-distribution, t-distribution chi-square distribution, Sample variance s^2. **Design of experiments:** Definition, Important steps of design of experiment. Principles of design of experiment, Analysis of variance, Completely Randomised Design (CRD), Randomised Block Design (RBD), Latin Square Design (LSD), Factorial experiment. **Index Number:** Meaning and use of index number, Problems in construction of index numbers, Methods of constructing index numbers. Test of index numbers, Cost of living index number. **Time Series:** Meaning and use of time series analysis, Different components of I time series, Different methods of calculating trend and seasonal variation. **Interpolation:** Introduction, Derivation of different interpolation formulas, Relation between divided difference and simple difference interpolation with unequal intervals of the arguments. **Test of Significance:** Basic concepts of test of significance, Definition of the related terms, Steps in a test of significance, Confidence interval, Construction of confidence interval, The important test. Normal test, t-test, chi-square test, F-test, Test for the significance of mean, variance. Correlation co-efficient, Regression co-efficient, Propertions, Test of independence in a contingency table.

বিষয় ঃ মৃত্তিকা বিজ্ঞান **(Soil Science)**
কোড ঃ ৪১৯
পূর্ণমান ঃ ১০০

1. **Soil & soil forming process:** (a) Soil and soil forming' factors, (b) Physical and chemical weathering, (c) Genesis of podsol, laterite, chernozem, saline and alkali soils. 2. Soil classification with special reference to soils of Bangladesh. 3. Soil erosion and conservation. 4. Soil texture, structure, soil water, soil temperature, soil organic matter, irrigation & drainage. S. (a) Iron exchange capacity of soil, (b) Causes of soil acidity and alkalinity, (c) Soil reaction affecting nutrient availability in soil.6. Liming: Liming material and effects of liming on soil properties. 7. Plant nutrition: (a) Essential plant nutrients and their availability in soil, (b) Nutrient deficiency symptoms and their functions in the plant. 8. (a) Different chemical fertilizers and organic manures, (b) Time and methods of fertilizer application. 9. Biological nitrogen fixation and soil fertility. 10. Methods of soil fertility evaluation: soil testing, critical limits and fertilizer recommendation. 11. Soil fertility problems and possible means of improvement & sustenance of soil fertility.

বিষয় ঃ গার্হস্থ্য অর্থনীতি (Home Economics)
কোড ঃ ৪২০
পূর্ণমান ঃ ১০০

(a) Aims and objectives of Home Economics

(b) Home Management: (i) Definiton and scope of management
(ii) Critical analysis of values, goals and use of resources as effecting management practices in homes in Bangladesh.
(iii) Socio-Cultural and economic changes and the effect upon home management.

(c) Analysis of Housing: (i) Housing design (ii) Importance of light, colour and furnishings in a home (iii) Interior decoration.

(d) Importance of Art and its Application in Home

(e) Clothing and Textiles: (i) Textiles fibres: their classification, sources and characteristics. (ii) Simple methods of the identification of fibres. (iii) Tailoring techniques: general technique of drafting garments. (iv) Fashion and Design.

(f) Child Development and Family Relation: (i) Development by stages. (ii) Juvenile Delinquency: causes and remedies. (iii) Family disruption: Its effect on children and suggestion for family solidarity and stability. (iv) Importance of family planning, advantages of small family.

(g) Child Psychology

(h) Food and Nutrition: (i) Definition of food and nutrition (ii) Six nutries: their sources, functions in the body, requirements and deficiencies.(iii) Classification of fats, proteins and carbohydrates. (iv) Properties of vitamins; vitamins in food preparation.
(v) Energy: measuring energy, energy requirement, activity and calorie requirements, energy expenditure vs. intake, calorie content in food. (vi) Basic groups of food. (vii) Planning diets: at different ages, pregnant mother, lactating mother, diet in disease: diabetes, blood pressure, heart disease and jaundice. (viii) Applied Nutrition: Nutrition problems in Bangladesh, public health activities in nutrition.

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বিষয় ঃ ব্যবস্থাপনা **(Management)**
কোড ঃ ৪২১
পূর্ণমান-১০০

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A. **Organization:** i. Basic Concepts: Meaning of business basic elements, features-branches and their place in economy of Bangladesh, business environment, business size-location of business efficiency of business enterprises: social responsibility of business and its implication to society, business and Government. ii. Different form of Business Organization: Formation, characteristics, merits and demerits of sole Proprietorship, Partnership, Company, Cooperative society and state enterprise. iii. Institutions for furtherance of business: Chamber of Commerce and Industries EPZ-EPB-PORT Authority: BGMEA. iv. Globalization: Argument in favour and against globalization: related agency WHO, IMF, SAPTA-NAPTA-ASEAN.

B. **Management:** i. Introduction: Meaning-scope- Importance-Principles-Functions, Management a science or art Management as a Profession, Basic Managerial Roles and skills managers at different levels of the - organization. Management as a career. ii. Planning: Meaning. Importance. types-steps-Factors affecting Planning. Planning techniques. Limits to Planning. Making Planning effective. Decision making Process-Nature of Managerial decision making, factors in decision making, steps in decision making. iii. Organizing: Meaning, Importance, types of organization structure, Line Organization, Committee-span of management. Authority. Delegation of authority, Centralization and decentralization of authority. Co-ordination: meaning, importance, Principles and Procedure of Co-ordination. iv. Leading: Direction: Importance and Principles of direction, advantages and disadvantages. Consultive direction: Communication and its importance; main elements and process of communication, Motivation: meaning, importance, theories of motiivation-financial and non-financial incentives-Leadership and its importance-Leadership types. Qualities of a good leader. v. Controlling: Meaning, nature, importance, control process, requirements of an effective Control system. Control techniques, budgetary control: Meaning and process of budgetary control. vi. Technology in Modern Communication: Electronic Media in oral and written Communication, (Telephone - fax-ISD-Computer-Internet-Email-Multimedia and business related software).

c. **Legal Environment of Business:** Law of Contract-The contract act of 1872: Definition of a Contract, essential elements, offer and acceptance, Consideration, void and voidable contract, performance of Contract, breach of Contract and remedy for breach, discharge of a Contract, quasi contract, indemnity and guarantee, bailment and pledge.

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বিষয় ঃ হিসাববিজ্ঞান (Accounting)
কোড ঃ ৪২২
পূর্ণমান-১০০

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A. **Financial Accounting:** i. Introduction: Need and importance of Accounting, Accounting concepts and Conventions, Double entry system of Accounting, Accounting cycle up to Preparation of work sheet, Recent trends in Accounting. ii.Preparation of Trading. Profit and Loss Account and Balance Sheet of sole Proprietorship. Partnership and Companies. iii. Depreciation: Methods of depreciation: Provisions and Reserves and their treatment in Accounting. iv. Valuation Concept: Valuation of goodwill and shares. v. Accounting Information system: Basic concepts. Principles of Accounting information systems, developing an Accounting system Mcchairized Accounting system.

B. **Auditing:** Introduction: Objectives, advantages and techniques of Auditing-system of Internal check. Internal Control and Internal Audit. Vouching Verification and valuation of Assets and Liabilities, Auditor Duties and Liabilities-

C. **Income Tax:** Income-Classes of Income- Heads of Income, General Rules underlying Assessment of Income Tax for Individual.

D. **Cost and Management Accounting:** i. Introduction: Meaning, Objectives and Advantages of Cost and Management Accounting, Cost classification. ii. Methods of Costing. iii. Accounting for Materials, Labour and Overheads. iv. Cost-volume-Profit Analysis: Computation of break-even point, construction of break-even chart, break-even analysis for decision making, Changes in fixed cost, Volume. Price, Sales Mix and Margin of Safety. v. Budgetary Control and Elementary idea of standard costing.

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বিষয় ঃ বিপণন (Marketing)
কোড ঃ ৪২৩
পূর্ণমান ঃ ১০০

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1. **Understanding Marketing and the Marketing Process:** Marketing in a changing world, Creating Customer value and satisfaction, Strategic Planning and the Marketing Process, the Marketing environment.
2. **Developing Marketing opportunities and strategies:** Marketing research and information systems, consumer markets and consumer buyer behaviour, Market segmentation, targeting and positioning for competitive advantage.
3. **Developing the Marketing Mix:** Product and services strategy, new product development and product life cycle strategies - pricing products, Pricing considerations and approaches, pricing strategies, distribution channels and logistics management, retailing and wholesaling, integrated marketing, communications strategy. Advertising, sales Promotion and public relations, personal selling and sales management, Direct and online marketing, the new marketing model:
4. **Managing Marketing:** Competitive strategies - attracting, retaining and growing customers, the global market place, Marketing and society.
5. **Measuring and Forecasting Demand:** Measuring current Market Demand, Forecasting Future Demand.
6. **Marketing and society:** Social Responsibility and Marketing. Ethics. Social criticisms of marketing, Citizen and Public Action to Regulate Marketing, Business Actions Towards socially Responsible Marketing.
7. **The Global Marketplace:** Looking at the Global Marketing Environment, Deciding whether to go International marketing, Deciding which Markets to Enter, Deciding How to enter the market, Deciding on the Global Marketing program, Deciding on the Global Marketing organization.
8. **Designing and Managing value, Networks and Marketing Channels:** The Marketing channels, Network-What work is performed by marketing channels, Channels design decisions-Channel dynamics, Channel management decisions, Channel conflict, Cooperation and competition.
9. **Dealing with Competition:** The Process of analyzing Competitors Market leaders strategies-Market nicher strategies.

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বিষয় ঃ ফিন্যান্স (**Finance**)
কোড ঃ ৪২৪
পূর্ণমান ঃ ১০০

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Finance:

1. **Introduction:** Definition; Functions and Classifications of Finance, Scope and Functions of business finance, Principles of Finance, Goal of a firm, Profit maximization versus wealth maximization.

2. **Source of Finance:** Internal and external finance, Short term financing characteristics and types, Calculation of effective interest rate of different sources of short-term capital.

3. **Intermediate term financing:** Defirition, Characteristics, Types and sources, Advantages and disadvantages; Cost of intermediate term financing, Methods of repayment schedule.

4. **Long term Financing:** Definition, Characteristics, Importance. Sources of long term finance and methods of raising long term fund, Instruments of long-term financing- Common stock, Preferred stock capital, Debt capital, Advantages and disadvantages of long term financing.

5. **Time value of money:** Concept and importance, Time value of money. Compounding, Discounting present value and terminal value, Use of present value table, Value of an annuity, loan amortization schedule.

6. **Capital Budgeting:** Importance and application of the concept of capital budgeting, Types of investment decisions, Steps in Capital Budgeting, Techniques of Capital budgeting, Pay back period method. Average rate of return, NPV, IRR, Profitability index method and capital rationing.

7. **Cost of Capital:** Significance of cost of capital, Meaning of opportunity cost, Different sources of capital and its cost, Weighted average cost of capital and Marginal cost of capital.

8. **Risk Return Analysis:** Capital budgeting under uncertainty, Portfolio management.

9. **Financial statement analysis:** Definition, Nature, uses and importance of ratio analysis, Types of ratio analysis: liquidity ratio, leverage ratio, activity & Profitability ratio.

10. **Lease financing:** Definition, Contents, features, types, advantages and disadvantages, leasing versus borrowing decision.

11. **Capital Market:** Definition, Constitutions - their role functions of stock exchange, Procedures of trading in securities in stock exchange of Bangladesh, Security and Exchange Commission (SEC).

12. **Working Capital Management:** The concept of working Capital, Relationship between current assets and current liabilities, Components of working Capital, determinants of working capital, Working capital cycles, Estimating working capital requirements.

13. **Dividend Theories:** Divident Payments Factors influencing dividend Policy, Theories of dividend Policy, Types of dividend policy, cash dividend versus stock dividend, stock split, relationship between dividend policy and method of financing, relationship between dividend policy & value of a Campany, Walter Model, Gordon model. MM Hypothesis, Relevance of dividend policy-market imperfections.

বিষয় ঃ গ্রন্থাগার ও তথ্য বিজ্ঞান (Library and Information Science)
কোড ঃ ৪২৫
পূর্ণমান ঃ ১০০

1. **Introduction**

   Definition, Nature and scope of library and information science. Development of library and its rule in the society with a special reference to Bangladesh.

2. **History of Books and Libraries**

   Story of books and writing materials from earliest time to modern time.

3. **Collection Development**

   Principles and policies of collection development, Evaluation & selection of library materials in different types of libraries, National book policy of Bangladesh.

4. **Library Management**

   Principles of library management, Elements of library management, Library cooperation and resource sharing. Censorship, Copyright law & library legislation.

5. **Organizations of Library Materials (Classification)**

   Purpose of classification; Knowledge & book classification. Criteria and principles of book classification, Notation, Criteria of a good notation.

6. **Organizations of Library Materials (Cataloguing)**

   Purpose and functions of library catalogue and indices. Criteria of a good catalogue, Catalogue aids, Importance & types of indices. Rule Of indexing.

7. **Bibliography**

   Importance of bibliographical control, Kinds of bibliography, Difference between bibliography & catalogue, Methods of preparing bibliography.

8. **Information Sources**

   Information sources & their services in modern library and information centres.

9. **Documentation and Information Retrieval**

   Difference between librarianship and documentation, -Active documentation and passive documentation, Documentation services and information retrieval in B.D. Library computerization.

10. **Recent development in library science and information technology.**

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বিষয় ঃ আরবি (কলেজ)-**Arabic (College)**

কোড ঃ ৪২৬

পূর্ণমান-১০০

(উচ্চ মাধ্যমিক বিদ্যালয়/কলেজ)

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১. **আল কুরআন ঃ** i. সুরা আল ফাত্হ। ii. সুরা আল হুজুরাত।

২. **আল হাদিস ঃ** i. কিতাবুল ঈমান ii. কিতাবুল ইল্ম।

৩. **আরবি সাহিত্য ঃ ক. গদ্য ঃ** i. আল গনি ওয়াল ফকীর -আল মানফালুতি ii. আল মাকামাতুল উলা-আল হারিরি iii. মিন ইয়াওমিল ইসলাম-আহমদ আমিন

 খ. পদ্য ঃ i. মুয়ালাকা-জুহাইর বিন আবি সুলমা ii. বানাত সু'আদ-কাব বিন জুহাইর iii. ওয়াজিবুল মুয়ালিমিন- আহমদ শাওকি

৪. **আরবি ব্যাকরণ ঃ** ক. নাহু ও ছরফ খ. অনুবাদ বাংলা হতে আরবি

৫. পত্র/দরখাস্ত/রচনা।

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১. আল কুরআন ও উলুমুল কুরআন- ক. আল কুরআন

 i. সুরা আল হুজুরাত ii. সুরা আন-নুর iii.সুরা আল ফাত্হ

 খ. উলুমুল কুরআন ঃ (পরিচ্ছেদ ৭, ১৭, ২৬)

২. আল হাদিস ও উসুলুল হাদিস-

 ক. আল হাদিস

 i. কিতাবুল ঈমান ii. কিতাবুস সালাত।

 iii. কিতাবুল মাগাজি।

 খ. উসুলুল হাদিস

৩. আল ফিক্হ ও উসুলুল ফিক্হ-

 ক.আল ফিক্হ

 i. কিতাবুজ জাকাত ii. কিতাবুল বুজু

 খ. উসুলুল ফিক্হ

৪. ইসলামি সভ্যতা - i. ইসলামে মানবাধিকার ii. বিজ্ঞান ও প্রযুক্তিতে মুসলমানদের অবদান iii. ইসলামে শিক্ষার গুরুত্ব iv. ইসলামে সামাজিক জীবন, পারিবারিক কল্যাণ, অর্থনীতি এবং ব্যাংক ব্যবস্থা v. পরিবেশ সম্পর্কে ইসলামের ধারণা vi. উপমহাদেশে ইসলাম।

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বিষয় ঃ ইসলাম শিক্ষা (Islamic Studies)

কোড ঃ ৪২৭

পূর্ণমান-১০০

(উচ্চ মাধ্যমিক বিদ্যালয়/কলেজ)

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১. **আল কুরআন ঃ** i. সুরা আল ফাতহ। ii. সুরা আল হুজুরাত।

২. **আল হাদিস ঃ** i. কিতাবুল ঈমান ii. কিতাবুল ইল্ম।

৩. **আরবি সাহিত্য ঃ ক. গদ্য ঃ** i. আল গনি ওয়াল ফকীর -আল মানফালুতি ii. আল মাকামাতুল উলা-আল হারিরি iii. মিন ইয়াওমিল ইসলাম-আহমদ আমিন

   খ. পদ্য ঃ i. মুয়ালাকা-জুহাইর বিন আবি সুলমা ii. বানাত সু'আদ-কাব বিন জুহাইর iii. ওয়াজিবুল মুয়ালিমিন- আহমদ শাওকি

৪. **আরবি ব্যাকরণ ঃ** ক. নাহ্ ও ছরফ খ. অনুবাদ বাংলা হতে আরবি

৫. পত্র/দরখাস্ত/রচনা।

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১. আল কুরআন ও উলুমুল কুরআন- ক. আল কুরআন

   i. সুরা আল হুজুরাত ii. সুরা আন-নুর iii.সুরা আল ফাতহ

   খ. উলুমুল কুরআন ঃ (পরিচ্ছেদ ৭, ১৭, ২৬)

২. আল হাদিস ও উসুলুল হাদিস-

   ক. আল হাদিস

   i. কিতাবুল ঈমান ii. কিতাবুস সালাত।

   iii. কিতাবুল মাগাজি।

   খ. উসুলুল হাদিস

৩. আল ফিক্হ ও উসুলুল ফিক্হ-

   ক.আল ফিক্হ

   i. কিতাবুজ জাকাত ii. কিতাবুল বুজু

   খ. উসুলুল ফিক্হ

৪. ইসলামি সভ্যতা - i. ইসলামে মানবাধিকার ii. বিজ্ঞান ও প্রযুক্তিতে মুসলমানদের অবদান iii. ইসলামে শিক্ষার গুরুত্ব iv. ইসলামে সামাজিক জীবন, পারিবারিক কল্যাণ, অর্থনীতি এবং ব্যাংক ব্যবস্থা v. পরিবেশ সম্পর্কে ইসলামের ধারণা vi. উপমহাদেশে ইসলাম।

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বিষয় ঃ পালি (Pali)
বিষয় কোড- ৪২৮
পূর্ণমান-১০০

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১.	পালি গদ্যাংশ
দীঘ নিকায়	: বুদ্ধস্স অন্তিম আহার, বুদ্ধস্স অন্তিমবাণী, চত্তারি দস্সনীয়ানি।
মহাবর্গ	: সীহ সেনাপতি, দীঘ কুমার কথা।
চূল্লবর্গ	: ভিক্খুনী সংঘ পতিট্ঠা।
জাতক	: সুপ্পারক জাতক, নিগোধমিগ জাতক, কুদ্দাল জাতক, কট্ঠহারি জাতক।
মিলিন্দপঞ্হ	: সদ্ধা, বিরিয়, পঞ্ঞঞ্ঞ, কম্ম, নিব্বাণ, বুদ্ধো পূজং সাধিয়তি।

২.	পালি পদ্যাংশ
ধম্মপদ	: অপ্পমাদ বগ্গ, চিত্ত বগ্গ, যমক বগ্গ।
সুত্তনিপাত	: বাসেট্ঠ সুত্ত, কসি ভারদ্বাজ, কলহবিবাদ সুত্ত।
থেরগাথা	: অঙ্গুলিমাল, সীলব, আনন্দ, মহাকচ্চায়ন।
থেরী গাথা	: পুন্নিকা, কিসা গোতমী, খেমা, পটাচারা।

৩.	ত্রিপিটক বহির্ভূত সাহিত্যঃ
মহাসম্মত বংস, পঠম সংগীতি, দুতিয়ো সংগীতি, ততিয়ো সংগীতি।

৪.	পালি ব্যাকরণ
বর্ণ, সন্ধি, কারক বিভক্তি, শব্দ প্রকরণ, সমাস, অসমাপিকা ক্রিয়া, উপসর্গ ও নিপাত, প্রত্যয়

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পালি বিষয়ের মান বণ্টন; পূর্ণমান-১০০

গদ্যাংশঃ ২০
চারটি প্রশ্ন থাকবে। যে কোন ২টি প্রশ্নের উত্তর দিতে হবে। ১০×২=২০

পদ্যাংশঃ ২০
চারটি প্রশ্ন থাকবে। যে কোন ২টি প্রশ্নের উত্তর দিতে হবে। ১০×২=২০

ত্রিপিটক বহির্ভূত সাহিত্যঃ ২০
চারটি প্রশ্ন থাকবে। যে কোন ২টি প্রশ্নের উত্তর দিতে হবে। ১০×২=২০

ব্যাকরণঃ ২০
আটটি প্রশ্ন থাকবে। যে কোন ৪টি প্রশ্নের উত্তর দিতে হবে। ৫×৪=২০

অনুবাদ

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ধম্মপদের অপ্পমাদ বগ্গ, চিত্ত বগ্গ, যমক বগ্গ, সুত্তনিপাতের কলহ বিবাদ সুত্ত, কসি ভারদ্বাজ সুত্ত, থেকে ৪টি উদ্ধৃতাংশ থাকবে।
<div align="center">যে কোন দুটির বাংলা অনুবাদ লিখতে হবে। ৫×২=১০

টীকা

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পালি গদ্যাংশ, পালি পদ্যাংশ ও বংসসাহিত্যের উপর চারটি টীকা থাকবে। যে কোন দুটি টীকা লিখতে হবে। ৫×২=১০

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বিষয় ঃ আরবি (মাদরাসা)-**Arabic (Madrasa)**
কোড ঃ ৪২৯
পূর্ণমান-১০০

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ক. العربى (আরবি) ঃ

النثر ঃ গদ্য ঃ

১. وصية لابنه : ذوالاصبع العدوانى (যুল ইছবাইল আদাওয়ানী) ঃ ওয়াছিয়্যাতু লিইবনিহি) ।

২. خطبة الذبصلى الله عليه وسلم فمحجة الوداع (খুতবাতুন নাবী সালালাহু আলাইহি ওয়াসালাম ফি হিজ্জাতিল বিদা) ।

৩. بديع الزمان الهمدانى — المقامة الكوفية (বাদিউজ্জামান আল-হামদানী ঃ আল মাকামাতুল কুফিয়্যাহ) ।

৪. خطبة طارق بن زياد (খুতবাতু ত্বারিক বিন যিয়াদ) ।

৫. الامثال والحكم العربية (আল আমছাল ওয়াল হিকামুল আরাবিয়্যাহ) ।

৬. اول شهيدة فى الاسلام (আওয়ালু শাহদাতিন ফিল ইসলাম) ।

৭. شهر رمضان لثصأ'لابى (শাহরু রামদান লিছছাআ'লাবী) ।

৮. الصادق للرافعى (আস ছাদীক লির রাফিঈ) ।

النظم ঃ পদ্য ঃ

১. من معلقةامرا القيس (মিন মুয়ালাকাতি ইমরাইল কায়স) ।

২. قصيدةكعب بن زهير (কাছীদাতু কা'ব বিন যুহাইর (রা) ।

৩. شعر ابى تماء فى انتصار المعتصم (শে'রু আবি তামাম ফি ইনতিছারিল মু'তাছিম) ।

৪. مدرسة البنات لحافظ ابراهيم (মাদরাসাতুল বানাত লি হাফিজ ইবরাহিম) ।

৫. من اشعار ورقة بن نوفل (من السيرة النبوية لابن كثير) (মিন আশয়ারি ওয়ারাকা বিন নওফাল মিনাস সিরাতিন নাববিয়্যাহ লি ইবন কাছির) ।

৬. من قصيدة كعب بن زهير (মিন কাছীদাতি কা'ব বিন যুহাইর (রা) ।

৭. من ديوان الحماسة لابى تمام (মিন দিওয়ান হামাসা লি আবি তামাম)

৮. وصف الربيع للبحترى (ওয়াসফুর রাবী লিল বুহতারী) ।

খ. التفسير (আত তাফসীর) ঃ

১. سورة البقرة (সূরা আল-বাকারা) ২. সূরা ইয়াসীন) سورة يس ৩. সূরা الحجرات (সূরা আল-হুজুরাত) ।

গ. الحديث (আল-হাদীস) ঃ

১. كيف كان بدا الوحى (বাবুন কাইফা কানা বাদউল ওয়াহী) ।

২. كتاب الايمان (কিতাবুল ঈমান) ৩. كتاب العلم (কিতাবুল ইলম) ।

৪. كتاب المناقب (কিতাবুল মানাকিব) ৫. كتاب المغازى (কিতাবুল মাগাযী) ।

ঘ. الفقه (ফিকহ) ঃ

১. كتاب البيوع (কিতাবুল বুয়ু) ২. كتاب الكراهية (কিতাবুল কারাহিয়্যাহ) ।

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বিষয় ঃ কৃষি (Agriculture)
কোড ঃ ৪৩০
পূর্ণমান ঃ ১০০

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1. Factors affecting growth, development, yield and desirable qualities of crops. 2. Important morphological characters and production technology of some important (a) cereals, (b) pulses, (c) vegetables, (d) fruits, (e) sugar, (f) oil, (g) fibre, (h) narcotic, (i) beverage, (j) medicinal and (k) timber yielding plants of Bangladesh with their scientific name. 3. Concept on cropping pattern, multiple cropping, crop rotation, crop diversification, crop calendar, irrigation, drainage and other intercultural operations. 4. (a) Methods of vegetative propagation of some important vegetable crops and fruit trees, (b) Vegetable seed production techniques. 5. (a) Necessity and basis of classification of plant kingdom, (b) Salient features of natural and phylogenetic classification of plant kingdom, (c) Necessity of scientific naming of plants. 6. Cell & cell division: (a) Concept and structure of a plant cell, (b) Functions of different important organelles of cell, (c) Types and mechanism of different cell division and their importance. 7. Plant physiology: (a) Photosynthesis, (b) Respiration, (c) Transpiration, (d) Photopetiodism. 8. Environmental pollution: (a) Causes, harmful effects and remedies of different environmental pollution (air, water and soil), (b) Causes of green house effect and its remedies, (c) Possible causes of forest depletion in Bangladesh, its harmful effects and remedies. 9. (a) Concept of pest, pesticide and pest management, (b) Methods of pest control, (c) Integrated pest management system. 10. Scientific name with family, nature of damage and control measures of major insect pests of important (a) cereals, (b) pulses, (c) vegetables, (d) fruits, (e) sugar, (f) oil and (g) fibre yielding plants of Bangladesh. 11. Scientific name of the pathogen, symptoms and control measures of major diseases of important (a) cereals, (b) pulses, (c) vegetables, (d) fruits, (e) sugar, (f) oil and (g) fibre yielding plants of Bangladesh.12. Plant nutrition: (a) Essential plant nutrients, their deficiency symptoms and functions, (b) Different chemical fertilizers and organic manures, (c) Time and methods of fertilizer application, (d) Biological nitrogen fixation. 13. Soil fertility management: Soil fertility problems and possible means of improvement of soil fertility. 14. (a) Mendel's laws of inheritance and their major modifications, (b) Methods of plant breeding: Introduction, selection, hybridization, mutation, polyploidy, (c) Chemical composition of DNA & RNA, (d) Concept on heritability, heterosis and hybrid. (e) Methods of conservation of plant genetic resources, (f) Concept on a new variety release system. 15. Biotechnology and tissue culture: Concept, scope, application and importance in plant improvement. 16. The principles and practices of agricultural extension. 17. Agroforestry: Its concept, scope, importance and classification.

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বিষয় ঃ কম্পিউটার বিজ্ঞান (**Computer Science**)

কোড ঃ ৪৩১

পূর্ণমান ঃ ১০০

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Computer Science:

1. Introduction to Computer System: History, Basic organization of computer, Computer generations, Types of computer.

2. Programming Language: Overview of C, C++ and JAVA; Constants, variables and data types; Operator& Expression; Managing Input & Output Operators; Decision making and branching; Decision making and looping. Arrays; Handling of character string; User-defined function; Structure and union; Pointers; File management.

3. Data Structure: Array, Linked lists: Stacks, Queues, Recursion: Trees: Graphs:

4. Discrete Mathematics: Set Theory, Re^lations, Functions, Graph Theory, Algebraic Systems, group theory, homomorphism, Mathematical reasoning, Theories with induction. Recurrence functions.

5. Object Oriented Programming: Principles of Object-Oriented Programming; Tokens, Expressions and Control Structure; Functions; Classes and objects; Constructors and Destructors; Operator Overloading, Inheritance, Polymorphism and Encapsulation.

6. Operating System: Definition and types OS, OS Structures: Processes: CPU scheduling: Process Synchronization: Deadlocks: Memory management: Virtual Memory: File Concept: File System Implementation:

7. Digital Logic Design: Number systems and codes, Boolean algebra, De Morgan's theorems, logic gates and their truth tables, combinational logic circuits, karnaugh map method, decoder, encoder, multiplexed, and demultiplexer, Flip flop, Asynchronous and synchronous counters, D/A converter circuitry, A/D converter circuitry.

8. Algorithm: Analysis of algorithm, design of algorithm, mathematical foundation of algorithm, asymptotic notations, summations, recurrences, sets etc. Divide and Conquer Algorithms: The Greedy method: Dynamic programming: Basic Traversal & Search technique: Backtracking: Branch and Bound.

9. Database Management System: Database system concept, Data abstraction; Database languages: Data management; Database system structure. Database model, Relational algebra and SQL. Database design, Indexing, Normalization.

10. Computer Organization and Architecture: Instruction sets, Addressing modes; Types of Instruction; Computer System: Computer Arithmetic: Memory Organization, Caching, Input-Output Organization: Central Processing Unit, Control Units, Fundamentals of parallel and distributed processing.

11. Software Engineering: Paradigms, Requirements Analysis Fundamentals, Software Design Fundamentals, Software Testing Techniques and Strategies, Software Management and Maintenance Technique, CASE.

12. Numerical Analysis: Numerical solution of polynomials, Numerical solution of simultaneous linear equation: Numerical solution of ordinary differential equation, Direct methods for systems of linear equations, Iterative techniques for systems of linear equations.

13. Computer Graphics: Graphics Hardware, Scan Conversion, Geometric Transformations, Projection, Visible Surface Determination, Illumination and Shading.

14. Computer Design: Introduction to compiler, A simple one pass compiler, Lexical analysis, Basic parsing technique, Syntax Directed Translation, Runtime Environment, Intermediate code generation, Code generation, Code optimization.

15. Computer Network: Basic computer network concept; Network structure; Network software; Reference model; OSI Model, **TCP/IP Model, X.25 Networks.** Frame Relay, ATM Network, Medium Access sub-layer, Network Layer, Optical Fiber Network, Application Layer. Cryptography and cryptographic algorithms, Cryptography and network security.

বিষয় ঃ কম্পিউটার অপারেশন-বিএম (Computer Operation-BM)
কোড ঃ ৪৩২
পূর্ণমান ঃ ১০০

আধুনিক ডিজিটাল কম্পিউটার কম্পিউটারের বেসিক অর্গানাইজেশন, স্টোরেজ ডিভাইস, ইনপুট/ আউটপুট ডিভাইস সিস্টেমম সফটওয়্যার সি প্রোগ্রামিং ল্যাংগুয়েজ ডাটা টাইপ, এ্যারো সংক্রান্ত প্রোগ্রাম এ্যালগরিদম এবং ফ্লোচার্ট। ফাংশনাল প্রোগ্রাম মাইক্রোপ্রসেসর, মাইক্রোপ্রসেসর ইনপুট ও আউট পুট, মেমোরি ইত্যাদির সাপোর্টিং চিপ। ক্যাশ মেমোরি, RAM এবং ROM,কম্পিউটার হার্ডওয়্যার মেইনটেন্যান্স এবং ট্রাবল সুটিং। ডাটা প্রসেসিং এবং সিকিউরিটি। ডাটা ডাটাবেজ ম্যানেজমেন্ট, ডাটাবেজ ডিজাইন ও ডিজাইন টেবিল। ডাটা কমিউনিকেশন ও কমিউনিকেশন মিডিয়া কম্পিউটার নেটওয়ার্ক ও নেটওয়ার্কের প্রয়োগ। কম্পিউটার ভাইরাস ও এন্টি ভাইরাস।

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বিষয় ঃ হিসাবরক্ষণ-বিএম (Accounting-BM)
কোড ঃ ৪৩৩
পূর্ণমান ঃ ১০০

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হিসাব বিজ্ঞানের ক্রমবিকাশের সংক্ষিপ্ত ইতিহাস, হিসাব বিজ্ঞানের সার্বজনগাহ্য নীতিসমূহ, জাবেদার শ্রেণীবিন্যাস, হস্তান্তরযোগ্য দলিল, বিনিময় বিলে লেনদেন, অ-ব্যবসায়ী প্রতিষ্ঠান এবং ব্যবসায়ী প্রতিষ্ঠানের পার্থক্য। অনাদায়ী এবং সন্দেহযুক্ত পাওনার হিসাব প্রক্রিয়া। অংশীদারী ব্যবসায়ের হিসাব প্রক্রিয়া, ব্যবসায়িক লেনদেনের প্রকৃতি ও বৈশিষ্ট্য বিভিন্ন প্রকার দলিলের ব্যবহার ও ছক। উৎপাদন ব্যয় হিসাব এর উদ্দেশ্য ও আওতা, উৎপাদন ব্যয়ের উপাদান, শ্রেণীবিন্যাস ব্যয় বিবরণী প্রস্তুতকরণ, টেন্ডার বা দরপত্র প্রস্তুতকরণ কাচামাল ক্রয় গুদামজাতকরণ। খতিয়ান হিসাব ও বিন কার্ড, শ্রম ব্যয় ও এর প্রকারভেদ, উপরি ব্যয়/পরোক্ষ ব্যয় এর শ্রেণী বিভাগ ও এর গুরুত্ব।

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বিষয় ঃ ব্যাংকিং -বিএম (Banking-BM)
কোড ঃ ৪৩৪
পূর্ণমান ঃ ১০০

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ব্যাংক ও ব্যাংকের শ্রেণী বিভাগ, বিভিন্ন শ্রেণীর ব্যাংক হিসাব। বিশেষায়িত ব্যাংক ও আর্থিক প্রতিষ্ঠানসমূহ। ব্যবসায়ী ও অব্যবসায়ী প্রতিষ্ঠানের পার্থক্য। অনাদায়ী এবং সন্দেহযুক্ত পাওনার হিসাব প্রক্রিয়া অংশীদারি ব্যবসায়ের হিসাব প্রক্রিয়া ব্যবসায়িক লেনদেনের প্রকৃতি ও বৈশিষ্ট্য। বিভিন্ন প্রকার দলিলের ব্যবহার ও ছক। উৎপাদন ব্যয় হিসাব এর উদ্দেশ্য ও আওতা, উৎপাদন ব্যয়ের উপাদান, শ্রেণীবিন্যাস, ব্যয় বিবরণী প্রস্তুতকরণ। টেন্ডার বা দরপত্র প্রস্তুতকরণ। কাচামাল ক্রয় গুদামজাতকরণ, মাল খতিয়ান হিসাব ও বিন কার্ড। শ্রম ব্যয় ও এর প্রকার ভেদ, উপরি ব্যয় এর পরোক্ষ শ্রেণী বিভাগ ও এর গুরুত্ব।

বিষয় ঃ উদ্যোক্তা উন্নয়ন-বিএম (Entrepreneur Development-BM)
কোড ঃ ৪৩৫
পূর্ণমান ঃ ১০০

সংগঠন বিভিন্ন শ্রেণীর সংগঠনের শ্রেণীবিভাগ। লক্ষ ও পরিকল্পনা প্রণয়ন, কর্মী ব্যবস্থাপনা, কর্মী বাছাই, প্রশিক্ষণ ও কর্মফল মূল্যায়ন। উৎপাদন সিডিউল, উৎপাদন ব্যয় নিরূপণ ও মান নিয়ন্ত্রণ। উদ্যোগ ও প্রেষণা, আত্মকর্মসংস্থান, পেশার চাহিদা নিরূপণ। সেবা সৃষ্টি, সেবা প্রদান ও সেবার মান নিয়ন্ত্রণ। নেতৃত্বের প্রয়োজনীয়তা, নেতার শ্রেণীবিন্যাস ও গুণাবলি। শিল্প বিরোধ, শিল্প বিরোধ সংক্রান্ত সমস্যা ও সমাধান এবং এ সংক্রান্ত সিদ্ধান্ত গ্রহণ। আর্থিক ব্যবস্থাপনা, কাঁচামাল ক্রয় ও গুদামজাতকরণ। পরিসংখ্যান তথ্য, তথ্যের শ্রেণী বিভাগ ও তথ্য সংগ্রহের পদ্ধতি। চিত্র ও লেখ। সূচক সংখ্যা ও সূচক নির্ণয়।

<div align="center">

Subject: ANIMAL TREATMENT AND PRODUCTION
Code: 437
Full Marks: 100

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ANIMAL TREATMENT

Etiology, pathogenesis, clinical findings, post-mortem lesions, diagnosis, treatment, prevention and control of common livestock, pet and poultry diseases.Vaccination schedule for poultry, farm and pet animals.Rectal palpation, heat detection, pregnancy diagnosis, parturition, newborn management. Treatment & management of dystocia, anestrous, retention of placenta, uterine prolapse, abortion, pyometra and metritis. Anesthesia, wound and abscess management, amputation of tail, Cesarean section, spaying, hernia operation, castration and dehorning. Characteristics, staining properties, cultural characteristics, biochemical activities & laboratory diagnosis of different Bacteria, Viruses and Fungi.Morphology, biology, transmission & Controls of some Nematodes, Cestodes, Trematodes, Protozoa and Ectoparasites.Mode of action of Antibiotic, Antihistaminic, Anti-inflammatory drugs.Antimicrobial resistance.Inflammation, post-mortem examination of large animals and birds, clinical test for feces, urine and blood, Insurance of animals, registration of pet animals, legislation against animal diseases.Veterinary medical ethics for registered vet practitioners.Food contamination, spoilage & preservation, food borne infection & intoxication, food sanitation & legislation, public health aspect of animal product and by-product.

ANIMAL PRODUCTION

Role of livestock in the farming system of Bangladesh.Prospects, potentialities and constraints of livestock farming in Bangladesh.Classification and different breeds of common farm animals.Judging and selection of farm animals for milk and meat purposes.Housing of farm animal production.Farm planning for commercial livestock production.Feeding behavior, nutrient requirement and ration formulation of livestock. Feed processing and feed industry.Requirement and role of animal products in human nutrition.Genetic diversity and animal genetic resources.Breeding strategy of different farm animals.Reproduction of farm animals and biotechnology.Care and management at different stages of livestock production.General management practices of dairy and meat animal.Quality milk production and sanitation.Processing and preservation of milk and milk products.Dairy food technology.Animal slaughtering and meat processing.Storage and preservation of meat. Value added meat products.Marketing strategies of different animal products and by-products.Animal waste management.Animal behavior, welfare and Animal rights.Various improved technologies associated with production and reproduction of farm animals.Origin, domestication and distribution of different poultry species.Classes, breeds, varieties andstrains of different poultry species.Housing principles of poultry. Poultry feed ingredients, their classificationand nutritive value.Artificial incubation, fertility and hatchability eggs.Grand parent stock, parent stock, broiler and commercial layer production.Management of different stages of poultry.Egg and poultry meat marketing.

Subject: Fisheries
Code: 438
Total marks: 100

1. Fish Biology and Breeding Management (মৎস্য জীববিদ্যা ও প্রজনন ব্যবস্থাপনা)

(a) Morphology and classification of fish and shrimp (b) Biology of fish and shellfish (Age, sex, maturity, fecundity and natural breeding of different species) b) Fish biodiversity and conservation (c) Selection as breeding program (d) Hybridization, genetic drift and inbreeding (e) Brood stock management (f) Components of fish hatchery: hatchery proper (spawning and incubation facilities), brood rearing ponds, nursery ponds etc. (g) Hatchery operation (h) Larvae and fry rearing (i) Breeding of aquarium fish (j) Transportation of live fish (k) Layout of a typical carp hatchery and a shrimp hatchery.
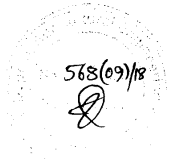
2. Aquaculture (মৎস্য চাষ)

(a) Principle of aquaculture (b) Aquaculture systems (extensive/traditional, improved traditional, semi-intensive and intensive culture; monoculture, polyculture, composite culture and integrated aquaculture; pond, tank, raceway, cage and pen culture) (c) Selection of sites, design and construction of fish pond and aquafarms (d) Water quality for aquaculture (e) Preparation and Management of ponds (f) Selection and stocking of fish (g) Nutrition and feeding (h) Nursery Management (i) Microalgae and live food culture (j) Ornamental fish rearing (k) Fish parasites and disease control (l) Harvesting and marketing of fish (m) Aquaculture economics.

3. Open water Fisheries Management (উন্মুক্ত জলাশয়ে মৎস্য ব্যবস্থাপনা)

(a) Fisheries resources (b) Aquatic Environment (c) Freshwater, marine and estuarine ecology: Ecosystem and its components, food chain and trophic levels, primary and secondary productivity (d) Concept of species, community, population and stock (e) Assessment of stocks (f) Mortality, growth and recruitment (g) Fish population dynamics (h) Objectives and ways of fisheries management (banning of fishing, fish sanctuary, MPA, beel nursery, community based management etc.) (i) Fishing gears and crafts (j) Commercial fishing methods and fishing grounds (k) Fish acts and regulation.

4. Fish Processing and Quality Control (মৎস্য প্রক্রিয়াজাতকরণ ও মান নিয়ন্ত্রণ)

(a) Fish spoilage and principles of fish preservation (b) Handling, transportation and distribution of fish (c) Methods of fish curing and processing: Chilling, freezing, canning, drying, salting, smoking, fermenting and pickling (d) Fishery products and by-products (FPC, fish meal, fish oils, fish silage etc.) etc. (e) Planning and design of cold storage and fish processing plant (f) Chemical composition and nutritional values of fish and fish products (g) Quality control methods of fish and fishery products (SOP, SSOP, HACCP, fish inspection etc.) (h) Sanitation and hygiene of fish processing plants (i) International code of hygiene practice for fish processing.

SYLLABUS FOR NTRCA (WRITTEN) EXAMINATION

Subject: Agricultural Engineering
Code: ..43.9....   Marks – 100

Agricultural Power, Machinery and Mechanization (Answer 03 x 10 = 30) : Present status and scope of utilization of tractors, power tillers and other power sources at the farm level of Bangladesh. Engines and its type, diesel-petrol, 2 and 4-strokes engines and their working principles and its different systems working inside, engine terminology and mathematical problems solution on engines, troubles shooting of engines. Types of agricultural machinery; mould board and disc ploughs, forces acting on tillage implements, harrows, types of linkages, hitching, drafts and drawbar power, seed drill, calibration of drills, combination drill, trans planters and potato trans planters, sprayers and weeder, centrifugal pumps, reapers, threshers, combine harvester, potato, sugar beet, cotton, hay and forage harvester, related problems solution. Principle of mechanization – myths of mechanization, meaningful mechanization, productivity, technology versus productivity, factors influencing mechanization, negative factors associated with mechanization, machine performance, machine and power selection and machine replacement. Status and scope of mechanization in Bangladesh.

Post Harvest Technology (Answer 01 from 02) x 10 = 10 : Grain drying, importance of drying, moisture content of grains and equilibrium moisture content, methods of determination of moisture contents, theory of thin layer and deep bed drying, methods of drying, psychometry, principles of refrigeration and air conditioning, refrigeration cycle, refrigeration calculations for air conditioning including cooling load calculation. origin of foods, classification of foods, food compositions, rheology of foods, storage of perishable commodities, principles of food processes and preservation by various methods.

Irrigation and Water Management (Answer 03 x 10 = 30) : Necessity, scope and history of irrigation development, sources and storage of irrigation as an agricultural operation, role of agricultural engineers in irrigation. Reasons for drainage, benefits of drainage in irrigated land, different methods of irrigation, factors affecting water requirement at various growth stages of crops, crop-water-yield relationship, flow of water through orifices and tubes, notches and weirs, pipes and channel, fundamentals of fluid flow; flow of fluids, path lines and stream tubes, laminar and turbulent flow, steady and unsteady flow, uniform and non-uniform flow, one, two and three dimensional flow, canal layout, design of earthen channel, lined canal and materials for canal lining, maintenance of canals, irrigation efficiencies, pumping terminology; continuity equation of flow, velocity-friction and total head of liquid, Euler's and Bernaulli's equations, irrigation pumps and tube wells, pump classification, installation of pumps, LLP, STW and DTW, working principle of centrifugal pump, characteristics curves, pump troubles and their remedial causes.

Agricultural constructions and Environmental Engineering (Answer 02 from 03) x 10 = 20 : Selection of engineering materials; bricks, cement, sand, concrete, steel and timber, estimation and costing of earth work, building, irrigation drains and canals, CC and RCC works, roads and culverts and timber works, work scheduling ; tender, quotation, surveying of irrigation canal projects, structural forces, shear force and bending moment diagrams, soil consistency, compaction and stabilization, bearing capacity. Pollutions, radioactive wastes, green house effects, biogas production, incineration.

Computer Science in Agriculture (Answer 01 from 02) x 10 = 10 : Computer fundamentals, logic gates, boolean algebra and their applications, design of combination and sequential circuits, programming fundamentals, problem solving using numerical methods, introduction to object oriented programming and assembly language programming, web page design using front page, HTML tools and its resources, linking style and publishing, java basics and networking using java, java classes, java script, java's security.

এনটিআরসিএ কর্তৃক চারুকলা (ফাইন আর্ট) বিষয়ে নিবন্ধন পরীক্ষার প্রস্তাবিত সিলেবাস

প্রভাষকঃ ড্রইং এন্ড পেইন্টিং (অঙ্কন ও চিত্রায়ণ বিভাগ)
বিষয় কোড- ~~২৪৫~~ ৪৪০
পূর্ণমান: ১০০

ক)	ড্রইং	মান: ২০
খ)	বিশেষায়িত অনুশীলন (চিত্রকলা বিষয়ক)	মান: ২০
গ)	চিত্রকলা বিষয়ক বিভিন্ন উপকরণ, করণ-কৌশল ও এর ইতিহাস	মান: ২০

- জলরং, তেলরং, এক্রেলিক বিভিন্ন মাধ্যমের উপকরণ ও কৌশল

ঘ)	শিল্পকলার ইতিহাস	মান: ৪০

- প্রাচীন যুগ (প্রাগৈতিহাসিক, মিশর, মেসোপটেমিয়া, সিন্ধু, গ্রীক ও রোমান)   মান: ১০
- পাশ্চাত্য (প্রাক রেঁনেসা থেকে উত্তরাধুনিক)   মান: ১০
- প্রাচ্য (১.চীন, জাপান ও কোরিয়া ২.পারস্য ৩. ভারত উপমহাদেশ)   মান: ১০
- বাংলাদেশের শিল্পকলার ইতিহাস ও চিত্রকলা   মান: ১০
১. ঐতিহ্যবাহী লোক ও নাগরিক শিল্প
২. সমকালীন শিল্পকলা

প্রভাষকঃ প্রিন্ট মেকিং (ছাপচিত্র বিভাগ)
বিষয় কোড- ৪৪১
পূর্ণমান: ১০০

ক)	ড্রইং	মান: ২০
খ)	বিশেষায়িত অনুশীলন (ছাপচিত্র বিষয়ক)	মান: ২০
গ)	ছাপচিত্র বিষয়ক বিভিন্ন উপকরণ, করণ-কৌশল ও এর ইতিহাস	মান: ২০

- রিলিফপ্রসেস, প্লেনোগ্রাফি, ইন্টাগ্লিও, সেরিগ্রাফি প্রভৃতি ছাপচিত্র বিষয়ক মাধ্যমের উপকরণ ও কৌশল

ঘ)	শিল্পকলার ইতিহাস	মান: ৪০

- প্রাচীন যুগ (প্রাগৈতিহাসিক, মিশর, মেসোপটেমিয়া, সিন্ধু, গ্রীক ও রোমান)   মান: ১০
- পাশ্চাত্য (প্রাক রেঁনেসা থেকে উত্তরাধুনিক)   মান: ১০
- প্রাচ্য (১.চীন, জাপান ও কোরিয়া ২.পারস্য ৩. ভারত উপমহাদেশ)   মান: ১০
- বাংলাদেশের শিল্পকলার ইতিহাস ও ছাপচিত্র   মান: ১০
১. ঐতিহ্যবাহী লোক ও নাগরিক শিল্প
২. সমকালীন শিল্পকলা

প্রভাষকঃ কমার্শিয়াল আর্ট ও কম্পিউটার গ্রাফিক্স (এ্যাপ্লাইড আর্ট)
বিষয় কোড- ৪৪৪
পূর্ণমান: ১০০

ক) ড্রইং	মান: ২০
খ) বিশেষায়িত অনুশীলন (গ্রাফিক ডিজাইন বিষয়ক)	মান: ২০
গ) গ্রাফিক ডিজাইন বিষয়ক বিভিন্ন উপকরণ, করণ-কৌশল ও এর ইতিহাস	মান: ২০

- গ্রন্থ অলংকরণ ও মুদ্রণ, পোস্টার ও বিজ্ঞাপন সংক্রান্ত নকশা ও মুদ্রণ, এনিমেশনের বিভিন্ন প্রক্রিয়া, বিভিন্ন ধরনের মুদ্রণ প্রণালী, টাইপোগ্রাফি ইত্যাদি মাধ্যমের উপকরণ ও করণ-কৌশল

ঘ) শিল্পকলার ইতিহাস	মান: ৪০
• প্রাচীন যুগ (প্রাগৈতিহাসিক, মিশর, মেসোপটেমিয়া, সিন্ধু, গ্রীক ও রোমান)	মান: ১০
• পাশ্চাত্য (প্রাক রেঁনেসা থেকে উত্তরাধুনিক)	মান: ১০
• প্রাচ্য (১.চীন, জাপান ও কোরিয়া ২.পারস্য ৩. ভারত উপমহাদেশ	মান: ১০
• বাংলাদেশের শিল্পকলার ইতিহাস ও গ্রাফিক ডিজাইন	মান: ১০

১. ঐতিহ্যবাহী লোক ও নাগরিক শিল্প
২. সমকালীন শিল্পকলা

প্রভাষকঃ ওরিয়েন্টাল আর্ট (প্রাচ্যকলা বিভাগ)
বিষয় কোড- ৪৪২
পূর্ণমান: ১০০

ক) ড্রইং	মান: ২০
খ) বিশেষায়িত অনুশীলন (প্রাচ্যকলা বিষয়ক)	মান: ২০
গ) প্রাচ্যকলা বিষয়ক বিভিন্ন উপকরণ, করণ-কৌশল ও এর ইতিহাস	মান: ২০

- ফ্রেস্কো, ওয়াশ, মিনিয়েচার সম্পর্কিত টেম্পরা ও গোয়াশ, ক্যালিগ্রাফি প্রভৃতি মাধ্যমের উপকরণ ও কৌশল

ঘ) শিল্পকলার ইতিহাস	মান: ৪০
• প্রাচীন যুগ (প্রাগৈতিহাসিক, মিশর, মেসোপটেমিয়া, সিন্ধু, গ্রীক ও রোমান)	মান: ১০
• পাশ্চাত্য (প্রাক রেঁনেসা থেকে উত্তরাধুনিক)	মান: ১০
• প্রাচ্য (১.চীন, জাপান ও কোরিয়া ২.পারস্য ৩. ভারত উপমহাদেশ)	মান: ১০
• বাংলাদেশের শিল্পকলার ইতিহাস ও প্রাচ্যশিল্প	মান: ১০

১. ঐতিহ্যবাহী লোক ও নাগরিক শিল্প
২. সমকালীন শিল্পকলা

প্রভাষকঃ সিরামিক (মৃৎশিল্প বিভাগ)
বিষয় কোড- ৪৪৬
পূর্নমান: ১০০

ক) ড্রইং

খ) বিশেষায়িত অনুশীলন (মৃৎশিল্প বিষয়ক)   মান: ২০

গ) মৃৎশিল্প বিষয়ক বিভিন্ন উপকরণ, করণ-কৌশল ও এর ইতিহাস   মান: ২০

• টেরাকোটা, গ্রেজ, স্টোনওয়ার, পোরসিলিন প্রভৃতি মাধ্যমের উপকরণ ও কৌশল   মান: ২০

ঘ) শিল্পকলার ইতিহাস

• প্রাচীন যুগ (প্রাগৈতিহাসিক, মিশর, মেসোপটেমিয়া, সিন্ধু, গ্রীক ও রোমান)   মান: ৪০

• পাশ্চাত্য (প্রাক রেঁনেসা থেকে উত্তরাধুনিক)   মান: ১০

• প্রাচ্য (১.চীন, জাপান ও কোরিয়া ২.পারস্য ৩. ভারত উপমহাদেশ)   মান: ১০

• বাংলাদেশের শিল্পকলার ইতিহাস ও মৃৎশিল্প   মান: ১০

১. ঐতিহ্যবাহী লোক ও নাগরিক শিল্প   মান: ১০

২. সমকালীন শিল্পকলা

প্রভাষকঃ স্কাল্পচার (ভাস্কর্য বিভাগ)
বিষয় কোড- ৪৪৩
পূর্নমান: ১০০

ক) ড্রইং

খ) বিশেষায়িত অনুশীলন (ভাস্কর্য বিষয়ক)   মান: ২০

গ) ভাস্কর্য বিষয়ক বিভিন্ন উপকরণ, করণ-কৌশল ও এর ইতিহাস   মান: ২০

• মাটি, প্লাষ্টার, বিভিন্ন ধাতু মডেলিং, ওয়েল্ডিং, কাস্টিং, কার্ভিং প্রভৃতি   মান: ২০
  মাধ্যমের উপকরণ ও কৌশল

ঘ) শিল্পকলার ইতিহাস

• প্রাচীন যুগ (প্রাগৈতিহাসিক, মিশর, মেসোপটেমিয়া, সিন্ধু, গ্রীক ও রোমান)   মান: ৪০

• পাশ্চাত্য (প্রাক রেঁনেসা থেকে উত্তরাধুনিক)   মান: ১০

• প্রাচ্য (১.চীন, জাপান ও কোরিয়া ২.পারস্য ৩. ভারত উপমহাদেশ)   মান: ১০

• বাংলাদেশের শিল্পকলার ইতিহাস ও ভাস্কর্য   মান: ১০

১. ঐতিহ্যবাহী লোক ও নাগরিক শিল্প   মান: ১০

২. সমকালীন শিল্পকলা

প্রভাষকঃ ক্রাফটস (কারুকলা বিভাগ)
বিষয় কোড- ৪৪৫
পূর্নমান: ১০০

ক) ড্রইং	মান: ২০
খ) বিশেষায়িত অনুশীলন (কারুকলা বিষয়ক)	মান: ২০
গ) কারুশিল্প বিষয়ক বিভিন্ন উপকরণ, করণ-কৌশল ও এর ইতিহাস	মান: ২০

- বয়নশিল্প ও ট্যাপেস্ট্রি, বাটিক ও টাই-ডাই, স্ক্রিনপ্রিন্ট, দারুশিল্প, ধাতুশিল্প প্রভৃতি মাধ্যমের উপকরণ ও কৌশল

ঘ) শিল্পকলার ইতিহাস	মান: ৪০
● প্রাচীন যুগ (প্রাগৈতিহাসিক, মিশর, মেসোপটেমিয়া, সিন্ধু, গ্রীক ও রোমান)	মান: ১০
● পাশ্চাত্য (প্রাক রেঁনেসা থেকে উত্তরাধুনিক)	মান: ১০
● প্রাচ্য (১.চীন, জাপান ও কোরিয়া ২.পারস্য ৩. ভারত উপমহাদেশ)	মান: ১০
● বাংলাদেশের শিল্পকলার ইতিহাস ও কারুশিল্প	মান: ১০

১. ঐতিহ্যবাহী লোক ও নাগরিক শিল্প
২. সমকালীন শিল্পকলা

প্রভাষকঃ সভ্যতার ইতিহাস ও শিল্পকলার ইতিহাস/ Art History
বিষয় কোড- ৪৪৭
পূর্নমান: ১০০

ক) প্রাচীন যুগ (প্রাগৈতিহাসিক, মিশর, মেসোপটেমিয়া, সিন্ধু, গ্রীক ও রোমান)	মান: ২০
খ) পাশ্চাত্য (প্রাক রেঁনেসা থেকে উত্তরাধুনিক)	মান: ২০
গ) প্রাচ্য (১.চীন, জাপান ও কোরিয়া ২.পারস্য ৩. ভারত উপমহাদেশ)	মান: ২০
ঘ) বাংলাদেশের শিল্পকলার ইতিহাস (প্রাচীন যুগ থেকে সমকালীন)	মান: ২০

১. ঐতিহ্যবাহী লোক ও নাগরিক শিল্প শিল্পচর্চার গতি-প্রকৃতি
২. সমকালীন শিল্পকলা

ঙ) বিভিন্ন মাধ্যমের উপকরণ, করণ-কৌশল ও এর ইতিহাস	মান: ২০

<div align="center">

Subject : Banking and Insurance
Code : 448
Full Marks : 100

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Part A : Banking

1. **Introduction:** Definition of banking, evolution of banks, surplus and deficit units, financial intermediation by banks, classification of banks, banking and economic development, banking systems in Bangladesh

2. **Commercial Banking:** Meaning of commercial banking, features of commercial banks, objectives and functions of commercial banks, principles of commercial banking, services rendered by banks

3. **Bankers, Customers and Customers' Accounts:** Definition of a customer, general relationship between banker and customer, obligations of a banker, obligations of a customer, Garnishee Order, banker's rights; types of deposit accounts, opening and closing of a bank account; special types of customers

4. **Cheque and Its Crossing:** Definition of a cheque, features of a valid cheque, parties to a cheque, meaning of crossing, types of crossing, liability of paying banker on crossed cheques, not negotiable crossing, account payee crossing, double crossing, obliterating a crossing, opening of crossing

5. **Payment and Collection of Cheques:** Precautions for payment of cheques, proper form of the cheque, material alterations, statutory protection to the paying banker, when the banker must refuse payment of cheques; collecting banker as holder for value, conversion by the collecting banker, statutory protection to collecting banker, liability of the collecting banker, duties of the collecting banker

6. **Loans and Advances:** Principles of sound lending, creditworthiness of borrowers, collection of credit information, types of credit, consortium advances, factors limiting the level of a bank's advances; secured advances–modes of creating charge: lien, pledge, hypothecation and mortgage

7. **Letters of Credit:** Traveler's letter of credit, letter of commercial credit, types of letters of commercial credit, transfer guarantee for the confirming bank, liabilities of the issuing banker, opening of a letter of credit, uniform customs and practice for documentary credits

Part B : Insurance

8. **Introduction:** Insurance, nature, functions and characteristics of insurance, characteristics of an ideally insurable risk, adverse selection and insurance, insurance vs. gambling, insurance vs. hedging, social benefits and costs of insurance, international insurance, insurance in Bangladesh

9. **Insurance and Risk:** Risk, chance of loss, peril and hazard, classification of risk- pure risk vs. speculative risk, particular risk vs. fundamental risk, major personal and commercial risks, burden of risk on society, types of private insurers, agents and brokers, management of risk

10. **Principles of Insurance:** Principle of utmost good faith, principle of insurable interest, principle of indemnity, principle of subrogation, principle of contribution, principle of proximate cause, insurance contract

11. **Insurance Company Operations:** Rating and rate making, underwriting, production, claim settlement, reinsurance, investment, other insurance company functions, reinsurance, insurance pricing: calculation of insurance premium, surrender value and reserve

12. **Classification of Insurance:** Life insurance: whole life insurance policies, endowment life insurance policies, term life insurance policies, property insurance: fire, marine, motor, homeowner policy, and aviation insurance; liability insurance: general liability loss exposures, commercial general liability policy, workers compensation insurance, aircraft insurance, Islamic insurance (Takaful), micro-insurance

13. **Insurance Acts:** Reasons for insurance regulation, current issues in insurance regulation, methods for regulating insurers, insolvency of insurers, Bangladesh Insurance Act 2010, Insurance Development and Regulatory Authority (IDRA) Act 2010.

<div align="center">**Subject: International Business**
Code: 449
Full Marks 100</div>

A. Theory and Practice of International Business:

Globalization: meaning of globalization, the main drivers of globalization, debate on globalization.**External Environment of International Business:** political, legal, economic, social, cultural, and technological environment and the role of innovation.**The Political Economy of International Trade:** instruments of trade policy, the case of government intervention, the development of world trading system and its implication for managers. **Regional Economic Integration and Cooperative Agreements:** levels of economic integration, economic and political arguments for and against regional economic integration, analyses on the major regional economic integration agreements and the implication for managers.**International Business Operation:** managing business function internationally, review of different business function of a firm that operate internationally, the economic, political, social, cultural, and technological differences in various countries and their effect on global business.**The Strategy of International Business:** concept of strategy and profitability, value activities and value chain of a firm, global expansion, profitability and profit growth, business strategies of international firms, global expansion strategies. **Entry Strategy and Strategic Alliances:** basic entry decisions, analyses of different entry modes and strategic alliance firm use to enter foreign markets, and factors that influence firm's choice of entry mode.**Ethics in International Business:** ethical issues and ethical dilemma, causes of unethical behavior by managers, different philosophical approaches to ethics, ways to incorporate ethical consideration in decision making.

B. International Economics

Theories of International Trade: reasons for nations to trade with one another, the Absolute Advantage Theory, Comparative Advantage Theory, role of government in promoting comparative advantage, Heckschere-Ohlin Model and Leontief paradox, and Factor Price Equalization Theorem.**International Trade Policy:** theories of tariff, tariff in a partial equilibrium setting, impact of tariff on domestic production, prices, imports, income distribution and consumption, tariffs and tariff vs. non-tariff barriers, policy of import substitution and export promotion etc.**International Trade Issues:** terms of trade, balance of payment (BoP) analysis, the exchange rate systems and modern foreign exchange policies, the international movement of labor, direct foreign investment and the multinationals.

C. International Financial Management

Markets and linkages in international financial management; Financing from international sources; Currency risks, money market hedging and hedging through derivatives; Risk measurement and management in international environment; International capital budgeting; International taxation and transfer pricing.

D. International Marketing

The Scope and Challenge of International Marketing;Internationalization of business; Emerging Markets, Multinational Market Regions and Market Groups; Global markets and multinational market group; Global Marketing Management; Products and services for consumers across the world; International marketing channels and logistics; Integrated marketing communications and international advertising; Negotiating with International customers, partners, and regulators.

<div align="center">বিষয়: গণিত, পরিমিতি ও পরিসংখ্যান</div>
<div align="center">কোড: ৪৫০</div>
<div align="center">পূর্ণমান: ১০০</div>

Part-I
Fundamental of Mathematics (Including Trigonometry): A. Set theory, Relations and functions, Real number system. **B.** Summation of algebraic and trigonometric series. **C.** Theory of equations: Relations between roots and co-efficients, Symmetric functions of roots, Simple transformations. **D.** Linear algebra with vector spaces, Eigen values and Eigenvectors.

Part-II
Geometry (Analytical Geometry of two three dimensions): A. Pair of straight lines. **B.** General Equation of second the degree: Reduction of standard forms, Properties of Parabola, Ellipse and Hyperbola. **C.** Rectangular co-ordinates, Planes and Straight lines in three dimensions, shortest distance between two Straight lines. **D.** Vectors in three dimensional space with applications to geometry.

Part-III
Differential Calculus and Integral Calculus: A. Functions, Limit, Continuity and Differentiability. **B.** Maxima and Minima. **C.** Tangents and Normal's. **D.** Techniques of Indefinite integration. **E.** Determination of areas. **F.** Multiple integral.

Part-IV
Different equations: Ordinary differential equations of first order and first degree, Ordinary differential equations with initial and boundary value problems, Laplace Transform, Legendre differential equation and Bessel differential equation.

Part-V
Functions of Complex variable: Complex numbers, Analytic functions, Contour integration.

Part-VI
Statistics:
Measures of central tendency: Mean Median, Mode and Relationship between different means.

Measures of dispersion: Mean deviation, Standard deviation, Variance, Relation between deferent Measures of dispersion.

Probability: Concepts of Probability, Different approach of probability, Theorem of probability (with problem solving).

Note: The paper will consists of five parts, having three questions of equal value in each part. Candidates will required to answer ten questions in all, taking at least one question from each part but not more than two questions from any one part.

1. Factors affecting growth, development, yield and desirable qualities of crops. 2. Important morphological characters and production technology of some important (a) cereals, (b) pulses, (c) vegetables, (d) fruits, (e) sugar, (f) oil, (g) fibre, (h) narcotic, (i) beverage, (j) medicinal and (k) timber yielding plants of Bangladesh with their scientific name. 3. Concept on cropping pattern, multiple cropping, crop rotation, crop diversification, crop calendar, irrigation, drainage and other intercultural operations. 4. (a) Methods of vegetative propagation of some important vegetable crops and fruit trees, (b) Vegetable seed production techniques. 5. (a) Necessity and basis of classification of plant kingdom, (b) Salient features of natural and phylogenetic classification of plant kingdom, (c) Necessity of scientific naming of plants. 6. Cell & cell division: (a) Concept and structure of a plant cell, (b) Functions of different important organelles of cell, (c) Types and mechanism of different cell division and their importance. 7. Plant physiology: (a) Photosynthesis, (b) Respiration, (c) Transpiration, (d) Photopetiodism. 8. Environmental pollution: (a) Causes, harmful effects and remedies of different environmental pollution (air, water and soil), (b) Causes of green house effect and its remedies, (c) Possible causes of forest depletion in Bangladesh, its harmful effects and remedies. 9. (a) Concept of pest, pesticide and pest management, (b) Methods of pest control, (c) Integrated pest management system. 10. Scientific name with family, nature of damage and control measures of major insect pests of important (a) cereals, (b) pulses, (c) vegetables, (d) fruits, (e) sugar, (f) oil and (g) fibre yielding plants of Bangladesh. 11. Scientific name of the pathogen, symptoms and control measures of major diseases of important (a) cereals, (b) pulses, (c) vegetables, (d) fruits, (e) sugar, (f) oil and (g) fibre yielding plants of Bangladesh.12. Plant nutrition: (a) Essential plant nutrients, their deficiency symptoms and functions, (b) Different chemical fertilizers and organic manures, (c) Time and methods of fertilizer application, (d) Biological nitrogen fixation. 13. Soil fertility management: Soil fertility problems and possible means of improvement of soil fertility. 14. (a) Mendel's laws of inheritance and their major modifications, (b) Methods of plant breeding: Introduction, selection, hybridization, mutation, polyploidy, (c) Chemical composition of DNA & RNA, (d) Concept on heritability, heterosis and hybrid. (e) Methods of conservation of plant genetic resources, (f) Concept on a new variety release system. 15. Biotechnology and tissue culture: Concept, scope, application and importance in plant improvement. 16. The principles and practices of agricultural extension. 17. Agroforestry: Its concept, scope, importance and classification.

Subject: Information and Communication Technology (ICT)
Code: 452
Marks: 100

Structured and Object Oriented Programming (OOP) Concept (Answer 02x10=20):
Fundamentals of C programming; Introducing C's Program Control Statements; Data types, Variables and Expressions; Exploring Arrays and Strings; Understanding Pointers and Functions; Console and File I/O; Structures and Unions.

Topics include object-oriented programming concepts, such as classes, objects, methods, interfaces, packages, inheritance, encapsulation, and polymorphism.

Introduction to Software Engineering(Answer 01x10=10): history, nature, relation of software engineering to other discipline, software development life cycle, Programming language; Software nature and qualities: product qualities, project qualities, correctness, robustness, usability, maintainability, portability, quality measurements; Software development life cycle: requirement, design, development, testing, maintenance; Software development model: waterfall, agile, spiral, RDD, V model; Software engineering principles: modularity, abstraction, generality, object oriented, component oriented, structured.; Specification and Verification: requirement specification, descriptive specification, testing, analysis, debugging; Modeling and Design: basics of modeling diagram, UI design. Software Project Management: concepts, project metrics, estimation, risks management.

Data Structure and Algorithm & Combinatorial Optimization(Answer 02x10=20):
Introduction - Data Structures and Complexity of Algorithms, Time Space Tradeoff, Searching Techniques- Linear and Binary Searching; Sorting and Recursion - Discussion of Common Sorting Techniques: Insertion Sort, Selection Sort, Bubble Sort, Quick Sort, Merge Sort, Radix Sort; Factorial and Tower of Hanoi Problem; Linked Lists - Abstract Data Types, List ADTs, and Linked Lists: Singly, Two Way and Circular Linked Lists; Stacks and Queues - Stacks and Queues and their Implementation Strategies; Prefix, Infix and Postfix Expressions, their Transformation and Evaluation Algorithms; Hashing - Hash Indices and Hash Functions, Static and Dynamic Hashing, Collisions in Hash Indices and Collision Resolving Techniques; Trees - Tree Concepts, Binary Tree, BST, Heaps, Heap Sort, Huffman Encoding Technique, AVL Tree, B Tree and B+ Tree; Graphs - Graph Terminologies, Representing Graphs, Graph Searching: BFS and DFS, Shortest Path Problems, Minimum Spanning Tree, Minimum Spanning Tree Algorithms, and Topological Sorting; Problem Solving Strategy - Greedy Algorithms, Divide and Conquer Strategy, Dynamic Programming and Backtracking. Introduction - Algorithms, Analyzing & Designing Algorithms, Correctness of Algorithms; Greedy Algorithms - Introduction to Greedy Algorithms, Greedy Choice Property, Greedy vs. Dynamic Programming, Fractional Knapsack Problem, Activity Selection Problem, Huffman Encoding, Task Scheduling Problem, Coin Changing Problem, Kruskal's and Prim's Minimum Spanning Tree Algorithms; Divide and Conquer Algorithms - Introduction to Divide and Conquer Design Technique, Quick Sort, Merge Sort, Proof of Correctness, and Run Time Analysis; Dynamic Programming - Introduction to Dynamic Programming Technique, Principle of Optimality, Optimal Substructure Property, Assembly Line Scheduling, Matrix Chain Multiplication, LCS, Viterbi Algorithm, Bitonic Euclidean Traveling Salesperson Problem and Runtime Analysis; Graph Searching and Shortest Path Problems - Breadth First Search, Depth First Search, Flow Networks, Single Source and All Pair Shortest Path Algorithms

Web Technology (Answer 01x10=10): Introduction to Html, Java Script & CSS, Server Side Programming: HTTP Server, Application Server, MVC Web Framework, Web Services, Database Access: Object Relational Mapping, Lambda Expression, Language Integrated Query, Data Reader, Writer, Web Security: Denial of Service, Buffer Overflow, Cross Site Scripting, Authentication and Access Control

Operating System (Answer 01x10=10): Overview of operating systems, functionalities and characteristics of OS. Hardware concepts related to OS, CPU states, I/O channels, memory hierarchy, and microprogramming. The concept of a process, operations on processes, process states, concurrent processes, process control block, process context. UNIX process control and management, PCB, signals, forks and pipes. Interrupt processing, operating system organization, OS kernel FLIH, dispatcher. Job and processor scheduling, scheduling algorithms, process hierarchies. Problems of concurrent processes, critical sections, mutual exclusion, synchronization, deadlock. Mutual exclusion, process co-operation, producer and consumer processes. Semaphores: definition, init, wait, signal operations. Use of semaphores to implement mutex, process synchronization etc., implementation of semaphores. Critical regions, Conditional Critical Regions, Monitors, Ada Tasks. Interprocess Communication (IPC), Message Passing, Direct and Indirect, Deadlock: prevention, detection, avoidance, banker's algorithm. Memory organization and management, storage allocation. Virtual memory concepts, paging and segmentation, address mapping. Virtual storage management, page replacement strategies. File organization: blocking and buffering, file descriptor, directory structure, File and Directory structures, blocks and fragments, directory tree, inodes, file descriptors, UNIX file structure.

Database Management System (Answer 02x10=20): Introduction to Database Systems: Evolution of file processing systems, role of databases in organizations, core components of a database environment; Data Modeling: the Entity-Relationship Diagram and its symbols and constructs; The Relational Model and Normalization: relational model, normalization, transformation of an entityrelationship data diagram into a relational model; SQL - A Standard Navigation Language for Relational

Databases; Overview of Object-Oriented Databases: object-oriented data model, implementation of object persistence using relational databases. Indexing and Hashing: Basic Concepts, Ordered Indices, B+-Tree Index Files, B-Tree Index Files, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing; Query Processing: Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Evaluation of Expressions; Query Optimization: Introduction, Transformation of Relational Expressions, Catalog Information for Cost Estimation, Statistical Information for Cost Estimation, Cost-based optimization; Transactions: Transaction Concept, Transaction State, Concurrent Executions, Serializability; Concurrency Control: Lock-Based Protocols, Timestamp-Based Protocols; Recovery System: Failure Classification, Storage Structure, Recovery and Atomicity, Log-Based Recovery, Recovery With Concurrent Transactions; Data Analysis and Mining: Data Mining, Decision tree, Bayes theory, Randomize tree; Database System Architectures: Centralized and Client-Server Systems, Server System Architectures, Parallel Systems, Distributed Systems, Network Types; Parallel Databases: Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism; Distributed Databases: Heterogeneous and Homogeneous Databases: Distributed Data Storage, Distributed Transactions, Commit Protocols; Additional should be included: Database Design, Database Tuning Security and Authorization, Multidimensional query.

Data Communications and Networking(Answer 01x10=10): Introduction: Overview of the Internet, Overview of Networking Protocols, Network Edge, Network Core, Protocol Layers / Service Model, General Networking Example; Application Layer: Principles of Networking Applications, Web and HTTP, FTP, E-mail, DNS; Transport Layer: Transport Layer Services, Multiplexing and De multiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transport, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control; Network Layer: Datagram Networks, Inside a Router, Details of the Internet Protocol (IP), IP Sub netting, Routing Algorithms (Link State, Distance Vector), Routing in the Internet (Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Border Gateway Protocol (BGP)).

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