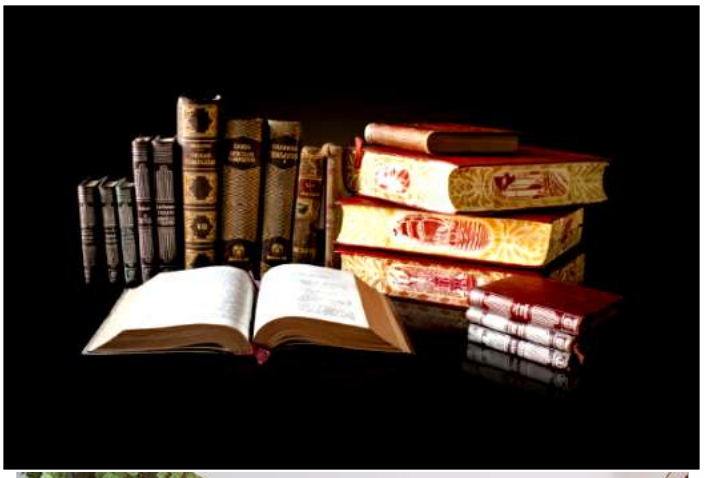
ST.MARY'S PUBLIC SCHOOL

Study Material



Note:-

1. Check the website regularly.
2. Visit relevant subject links.
3. Utilize your time well to explore, learn and share.

Class: XI (English Core)

Snapshots (Supplementary Reader)

Lesson: The Summer of the beautiful White horse
By William Saroyan

Work sheet No. 2

Q.1 Answer the following questions in about 40-50 words each.

a. What did Aram see when he looked out of the window? Why could he not believe what he saw?

b. What do we learn about uncle Khosrove from the extract?

c. What was Mourad's hide out for the horse?

d. How did Khosrove react to John Byro's problems?

e. The farmer studied the horse carefully. What do you think John must be thinking?

f. Why was Aram delighted and frightened at the same time when he saw his cousin, Mourad on a beautiful white horse?

Q.2 Answer the following questions in about 120-150 words each.

a. Both boys in the story are adventure lovers. Discuss

b. Describe the ride of Mourad and Aram on the stolen horse

Chapter – 2

The Address by Marga Minco

Q.3. Answer the following questions in about 40-50 words each.

1. Why did the narrator ask the woman; do you still know me & what could be the relationship between the woman and the girl who stood outside the door?

2. What is the importance of the question: Have you agreed with her that she should keep everything?

3. What memories did the girl have of Mrs. Dorling?

4. Why did the narrator feel horrified and oppressed once she was in the living room?

5. Mention some of the precious possessions that Mrs Dorling has carried to her place?

Q.4 Answer the following questions in about 120-150 words each.

1. Describe the narrators meeting with Mrs Dorling after the war was over.

Old memories are not always pleasant.

Discuss in relation to the story. 'The Address'.

CBSE Class 11 Accountancy

Chapter-1 Introduction to Accounting

Learning Objectives:

After studying this chapter, you should be able to understand:

- Meaning of Accounting
- Accountancy, Accounting and Book-keeping
- Relationship between Accountancy, Accounting and Book-keeping
- Distinguish between Book-keeping and Accounting
- Users of Accounting information
- Advantages and limitations of Accounting.
- Basic Accounting terms
- Double Entry System of Book-keeping

Introduction

According to American Institute of Certified Public Accountants, "Accounting is the art of recording, classifying and summarising the economic information in a significant manner and in terms of money, transactions and events which are, in part at least, of a financial character, and interpreting the results thereof."

Accounting Principles Board (APB) of AICPA (U.S.A) defined accounting as "Accounting is a service activity. Its function is to provide quantitative information, primarily financial in nature, about economic entities that is intended to be useful in making economic decisions."

In Simple words, accounting is the process of collecting, recording, classifying, summarising and communicating financial information to the users for judgment and decision-making.

Objectives of Accounting

1. To keep systematic and complete records of financial transactions in the books of accounts according to specified principles and rules to avoid the possibility of omission and fraud.
2. To ascertain the profit earned or loss incurred during a particular accounting period which further help in knowing the financial performance of a business.

3. To ascertain the financial position of the business by the means of financial statement i.e. balance sheet which shows assets on one side and Capital & Liabilities on the other side.
4. To provide useful accounting information to users like owners, investors, creditors, banks, employees and government authorities etc who analyze them as per their requirements.
5. To provide financial information to the management which help in decision making, budgeting and forecasting.
6. To prevent frauds by maintaining regular and systematic accounting records.

Advantages of Accounting

1. It provides information which is useful to management for making economic decisions.
2. It help owners to compare one year's results with those of other years to locate the factors which leads to changes.
3. It provide information about the financial position of the business by means of balance sheet which shows assets on one side and Capital & Liabilities on the other side.
4. It help in keeping systematic and complete records of business transactions in the books of accounts according to specified principles and rules, which is accepted by the Courts as evidence.
5. It help a firm in the assessment of its correct tax Liabilities such as income tax, sales tax, VAT, excise duty etc.
6. Properly maintained accounts help a business entity in determining its proper purchase price.

Limitations of Accounting

1. It is historical in nature; it does not reflect the current worth of a business. Moreover, the figures given in financial statements ignore the effects of changes in price level.
2. It contains only those informations which can be expressed in terms of money. It ignores qualitative elements such as efficiency of management, quality of staff, customers satisfactions etc.
3. It may be affected by window dressing i.e. manipulation in accounts to present a more favorable position of a business firm than its actual position.
4. It is not free from personal bias and personal judgment of the people dealing with it. For

example different people have different opinions regarding life of asset for calculating depreciation, provision for doubtful debts etc.

5. It is based on various concepts and conventions which may hamper the disclosure of realistic financial position of a business firm. For example assets in balance sheet are shown at their cost and not at their market value which could be realised on their sale.

Book Keeping - The Basis of Accounting

Book keeping is the record-making phase of accounting which is concerned with the recording of financial transactions and events relating to business in a significant and orderly manner.

Book Keeping should not be confused with accounting.Book keeping is the recording phase while accounting is concerned with the summarizing phase of an accounting system. The distinction between the two are as under.

Book keeping	Accounting
1. It is the recording phase of an accounting system.	1. It is the summarizing phase of an accounting system.
2. It is a primary stage and basis for accounting.	2. It is a Secondary Stage which begins where the Book keeping process ends.
3. It is routine in nature and does not require any special skill or knowledge	3. It is analytical in nature and required special skill or knowledge.
4. It is done by junior staff called book-keepers	4. It is done by senior staff called accountants.
5. It does not give the complete picture of the financial conditions of the business unit.	5. It gives the complete picture of the financial conditions of the business unit.

Types of accounting information

Accounting information can be categorized into following:

1. Information relating to profit or loss i.e. income statement, shows the net profit of business operations of a firm during a particular accounting period.
2. Information relating to Financial position i.e. Balance Sheet. It shows assets on one side and Capital & Liabilities on the other side.

3. Schedules and notes forming part of balance sheet and income statement to give details of various items shown in both of them.

Subfields/Branches of Accounting

1. **Financial Accounting:-** It is that subfield/Branch of accounting which is concerned with recording of business transactions of financial nature in a systematic manner, to ascertain the profit or loss of the accounting period and to present the financial position of the business.
2. **Cost Accounting**:- It is that Subfield/Branch of accounting which is concerned with ascertainment of total cost and per unit cost of goods or services produced/ provided by a business firm.
3. **Management Accounting**:- It is that subfield/Branch of accounting which is concerned with presenting the accounting information in such a manner that help the management in planning and controlling the operations of a business and in better decision making.

Interested users/parties of Accountings information's and their Needs

There arenumber of users interested in knowing about the financial soundness and the profitability of the business.

Users	Classification	Information the user want
Internal	1. Owner	Return on their investment, financial health of their company/business.
	2. Management	To evaluate the performance to take various decisions.
External	1. Investors and potential investors	Safety and growth of their investments, future of the business.
	2. Creditors	Assessing the financial capability, ability of the business to pay its debts.
	3. Lenders	Repaying capacity, credit worthiness.
	4. Tax Authorities	Assessment of due taxes, true and fair disclosure of accounting information.
	5. Employees	Profitability to claim higher wages and bonus, whether

		their dues (PF, ESI, etc.) deposited regularly.
	6. Others	Customers, Researchers etc., may seek different information for different reasons.

Qualitative Characteristics of Accounting Information

Accounting information is useful for interested users only if it posses the following characteristics:

1. **Reliability**: Means the information must be based on facts and be verified through source documents by anyone. It must be free from bias and errors.
2. **Relevance**: To be relevant, information must be available in time and must influence the decisions of users by helping them to form prediction about the outcomes.
3. **Understandability**: The information should be presented in such a manner that users can understand it well.
4. **Comparability**: The information should be disclosed in such a manner that it can be compared with previous year's figures of business itself and other firm's data.

Basic accounting terms

Business Transaction

An Economic activity that affects financial position of the business and can be measured in terms of money e.g., purchase of goods for use in business.

Account: Account refers to a summarized record of relevant transactions of particular head at one place. All accounts are divided into two sides. The left side of an account is called debit side and the right side of an account is called credit side.

Capital: Amount invested by the owner in the firm is known as capital. It may be brought in the form of cash or assets by the owner.

Drawings: The money or goods or both withdrawn by owner from business for personal u is known as drawings. Example: Purchase of car for wife by withdrawing money from business.

Assets: Assets are valuable and economic resources of an enterprise useful in its operations. Assets can be broadly classified as:

1. **Current Assets**: Current Assets are those assets which are held for short period and can be converted into cash within one year. For example: Debtors, stock etc.
2. **Non-Current Assets**: Non-Current Assets are those assets which are hold for long period and used for normal business operation. For example: Land, Building, Machinery etc. They are further classified into:
   a. **Tangible Assets**: Tangible Assets are those assets which have physical existence and can be seen and touched. For Example: Furniture, Machinery etc.
   b. **Intangible Assets**: Intangible Assets are those assets which have no physical existence and can be felt by operation. For example: Goodwill, Patent, Trade mark etc.

Liabilities: Liabilities are obligations or debts that an enterprise has to pay after some time in the future.

Liabilities can be classified as:

1. **Current Liabilities**: Current Liabilities are obligations or debts that are payable within a period of one year. For Example: Creditors, Bill Payable etc.
2. **Non-Current Liabilities**: Non-Current Liabilities are those obligations or debts that are payable after a period of one year. Example: Bank Loan, Debentures etc.

Receipts

1. **Revenue Receipts**: Revenue Receipts are those receipts which are occurred by normal operation of business like money received by sale of business products.
2. **Capital Receipts**: Capital Receipts are those receipts which are occurred by other than business operations like money received by sale of fixed assets.

Expenses: Costs incurred by a business for earning revenue are known as expenses. For example: Rent, Wages, Salaries, Interest etc.

Expenditure: Spending money or incurring a liability for acquiring assets, goods or services is called expenditure. The expenditure is classified as :

1. **Revenue Expenditure**: If the benefit of expenditure is received within a year, it is called revenue expenditure. For Example: rent, Interest etc.
2. **Capital Expenditure**: If benefit of expenditure is received for more than one year, it is called capital expenditure. Example: Purchase of Machinery.

3. **Deferred Revenue Expenditure**: There are certain expenditures which are revenue in nature but benefit of which is derived over number of years. For Example: Huge Advertisement Expenditure.

Profit: The excess of revenues over its related expenses during an accounting year is profit.
Profit = Revenue - Expenses

Gain: A non-recurring profit from events or transactions incidental to business such as sale of fixed assets, appreciation in the value of an asset etc.

Loss: The excess of expenses of a period over its related revenues is termed as loss.
Loss = Expenses - Revenue

Goods: The products in which the business deal in. The items that are purchased for the purpose of resale and not for use in the business are called goods.

Purchases: The term purchases is used only for the goods procured by a business for resale. In case of trading concerns it is purchase of final goods and in manufacturing concern it is purchase of raw materials. Purchases may be cash purchases or credit purchases.

Purchase Return: When purchased goods are returned to the suppliers, these are known as purchase return.

Sales: Sales are total revenues from goods sold or services provided to customers. Sales may be cash sales or credit sales.

Sales Return: When sold goods are returned from customer due to any reason is known as sales return.

Debtors: Debtors are persons and/or other entities to whom business has sold goods and services on credit and amount has not received yet. These are assets of the business.

Creditors: If the business buys goods/services on credit and amount is still to be paid to the persons and/or other entities, these are called creditors. These are liabilities for the business.

Bill Receivable: Bill Receivable is an accounting term of Bill of Exchange. A Bill of Exchange is Bill Receivable for seller at time of credit sale.

Bill Payable: Bill Payable is also an accounting term of Bill of Exchange. A Bill of Exchange is Bill Payable for purchaser at time of credit purchase.

Discount: Discount is the rebate given by the seller to the buyer. It can be classified as :

1. **Trade Discount**: The purpose of this discount is to persuade the buyer to buy more goods. It is offered at an agreed percentage of list price at the time of selling goods. This discount is not recorded in the accounting books as it is deducted in the invoice/cash memo.
2. **Cash Discount**: The objective of providing cash discount is to encourage the debtors to pay the dues promptly. This discount is recorded in the accounting books.

Account : Account refers to a summarised record of relevant transaction of particular head at one place.

Income: Income is a wider term, which includes profit also. Income means increase in the wealth of the enterprise over a period of time.

Stock : The goods available with the business for sale on a particular date is known as stock.

Cost : Cost refers to expenditures incurred in acquiring manufacturing and processing goods to make it saleable.

Voucher: The documentary evidence in support of a transaction is known as voucher. For example, if we buy goods for cash we get cash memo, if we buy goods on credit, we get an invoice, when we make a payment we get a receipt.

Goods and Service Tax (GST) : GST is an indirect tax which is levied on the supply of goods and service.

CBSE Class 11 Business Studies
Revision Notes CHAPTER – 1
NATURE AND PURPOSE OF BUSINESS

Video Watch : https://youtu.be/fFgla2NApGM

ECONOMIC AND NON ECONOMIC ACTIVITIES

AllHumanbeingshavedifferenttypesofneeds.So,inordertofulfillthoseneedstheyhave toperformsomeortheotheractivity.Humanactivitiesareclassifiedinto Economic&non-economicactivities.

Basic Meaning	Economic	Non-Economic
Purpose/ Notice	Those activities whose Objective is to earn money and to create wealth.	Those activities whose aim is not to earn money, but to satisfy social, psychological and emotional needs. For example love, sympathy, patriotism.
Examples	People work in factories Cookingfoodinrestaurant. A teacher teaching in a school.	Ahousewifecookingfoodforher family. A teacher training his daughter athome.

ConceptofBusiness:-Businessreferstothoseeconomicactivitiesinvolvingthepurchase productionand/orsaleofgoodsandserviceswithamotiveofearningprofitbysatisfying human needs insociety.

Characteristics of Business:

1. Aneconomicactivity: Businessinconsideredasaneconomicactivitybecauseitis undertaken with the objective of earningmoney.

2. Productionorprocurementofgoodsandservices: Businessincludesalltheactivities concerned with the production or procurement of goods & services for sales. Services includetransportation,banking,Insuranceetc.Goodsmayconsistofconsumableitems.

3. Saleorexchangeofgoods&services-Thereshouldbesaleorexchangeofgoodsand service between the seller & thebuyer.

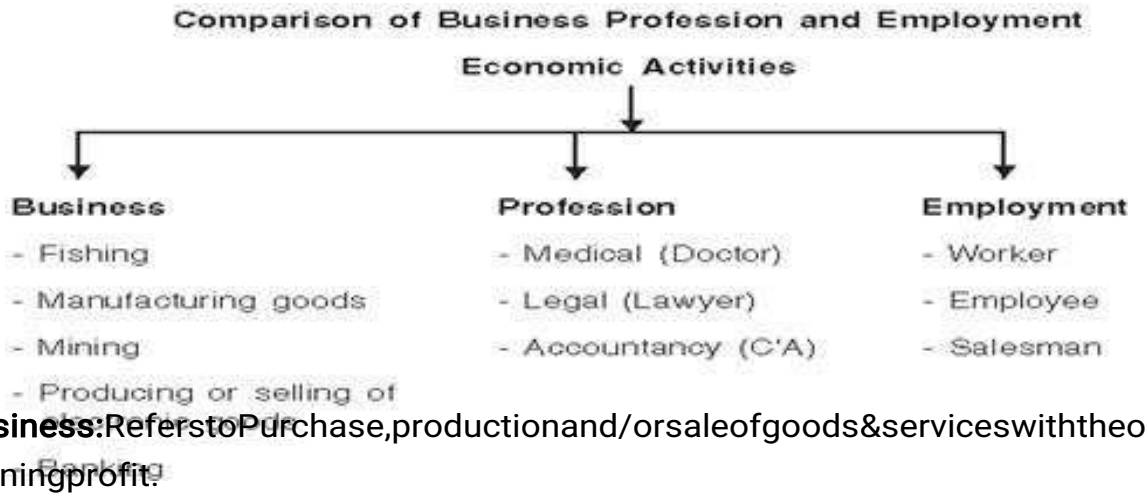
4. Dealingingoods&servicesataregularbasis: Thereshouldberegularityofdealingsor

exchangeofgoods&services.Onesingletransactionofsaleorpurchasedoesnotconstitute business.

5. ProfitEarning: Themainpurposeofbusinessistoearnprofit.Abusinesscannotsurvive without makingprofits.

6. Uncertaintyofreturn: Everybusinessinvestsmoneywiththeobjectiveofearningprofit buttheamountofprofitearnedmayvary.Alsothereisalwaysapossibilityoflosses.

7. Elementofrisk: Allbusinessactivitiescarrysomeelementsofriskbecausefutureis uncertain and business has no control over several factors like, strikes, fire, theft, and change in consumer tasteetc.



Business: ReferstoPurchase,productionand/orsaleofgoods&serviceswiththeobjective of earningprofit.

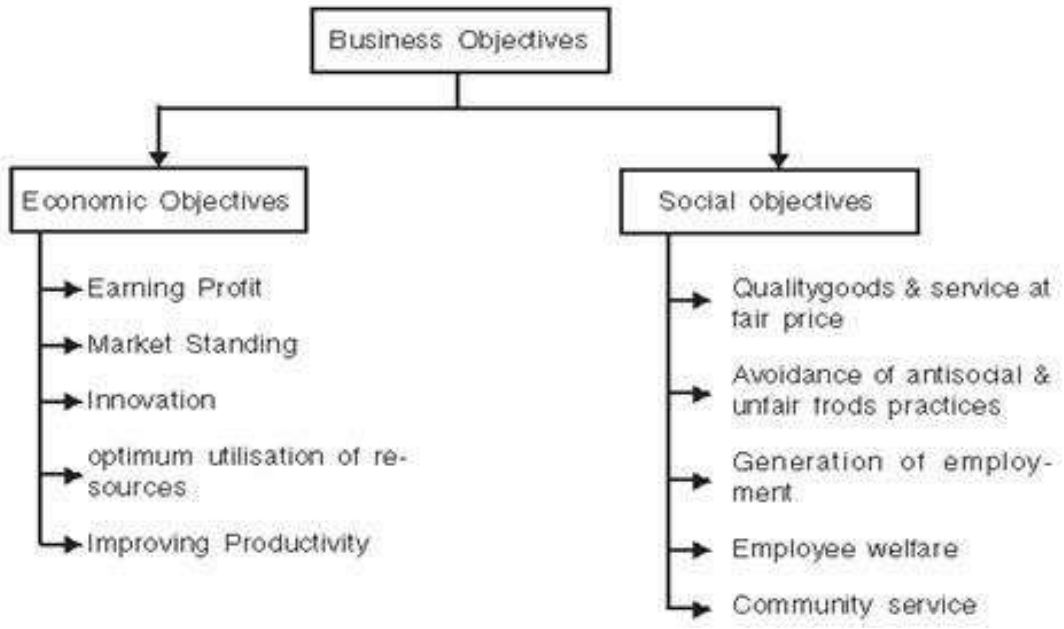
Profession: Includesthoseactivitieswhichrequirespecialknowledge&skillsinthe occupation.

Employment:Referstotheoccupationinwhichpeopleworkforothersandget remuneration inreturn.

Basis of Destruction	Business	Profession	Employment
Mode of establishment	Starts after completing some legal formalities if needed.	Membership of a professional body and certificate of practice required.	Start after getting appointment letter.
Nature of work	Provision of goods and service to the public.	Personalized services of expert nature.	Work allotted by the employer according to the

			contract.
Qualification	No minimum qualification is necessary.	Professional Qualification and training required.	Qualification and training as prescribed by the employer.
Capital investment	Capital needed according to its size and capacity.	Limited capitalfor established	No capital required.
Reward/ Returns	Profits	Professional fee	Salary or wages
Risk	High Risk	Low Risk	No Risk
Code of Conduct	No code of conduct	Professional code of conduct	The terms and conditions of services contract are to be allowed.

ObjectivesofBusiness: Theobjectiveofbusinessmeansthepurposeforwhichabusinessis established and carried on. Proper selection of objectives is essential for the success of a business.
Thebusinessmenalwayshavemultipleobjectives.Allobjectivemaybeclassifiedintotwo broadcategories.Theseare(1)Economicobjectivesand(2)SocialObjectives



1. EconomicObjectives

Businessisaneconomicactivityandtherefore,itspurposeistoshoweconomicresults.The economic objectives of business arefollows:

(i) Earningprofit: Profitmeansexcessofincomeovertheexpenditure.Theforemostand primeobjectiveofeverybusinessmanistoearnprofit.Abusinesscannotservicewithout earning profit. Not only for survival but it is also required for growth and expansion of business.

(ii) Marketstanding/creationofcustomer: Businesscansurviveforalongerperiodonlyif isabletocaptureabigshareinthemarket&hasmarketstanding.Itispossibleonlywhen businessprovidesgoodsandservicestosatisfytheneeds&wantsofcustomers.Therefore, creationandsatisfactionofcustomers(market)isanimportantobjectiveofbusiness.

(iii) Innovations: Innovation means making new products or adding new features of old products for making it more useful, improving methods of production & distribution exploringnewmarkets,etc.Inthesedaysofcompetition,abusinesscanbesuccessfulonly whenitcreatesnewdesigns,bettermachines,improvedtechniques,newvarietiesetc.

(iv) Optimumutilizationofresources: Itreferstothebestuseofmen,material,moneyand machinery employed in business. The resources of business are scarce so these must be utilizedinthebestpossiblemannersothatthebusinesscangetmaximumbenefitfromtheir resources.

(v) Improvingproductivity: Itisusedasameasureofefficiency.Everybusinessenterprise mustaimatgreaterproductivity-toensurecontinuoussurvivalandgrowth.Thisobjective can be achieved by reducing wastages and making efficient use of machines and equipments, human resources, moneyetc.

2.SocialObjectives

Businessisanintegralpartofsociety.Itmakesuseofresourcesofsociety.Itearnsprofitby sellingitsproductsorservicestomembersofsociety.Soitbecomesobligatoryonthepartof thebusinessmantodosomethingforthesociety.Theimportantsocialobjectivesofbusiness are asfollows:

(i)Quality goods and services at Fair Price: The first social objective of business is to providebetterqualityproductatreasonablericeandinproperquantityoncontinuousbasis to consumersexamples.

Example:ConsumerslookforISImarkonelectricalgoods,FPOmarkonfoodproducts. Hallmark onJewellery.


(i) AvoidanceofAnti-SocialandUnfairtradepractices:Anti-Socialpracticesinclude hoarding,blackmarketingandadulteration.Makingfalseclaimsinadvertisementsto misleadandexploitpeopleisanexampleofunfairtradepractice.Businessshouldnot indulge in suchpractices.

(ii) GenerationofEmployment:Nowdays,employmentisthebiggestproblemofsociety. Business should provide employment to more and more people living in the country. Handicappedanddisabledpeopleshouldbegivenextracare.

(iii) Employee Welfare: Employees are a valuable asset and they make significant contributions towards the success of business. Another social objective of business, therefore, is to ensure welfare of employees by providing good working conditions, fair wagesandfacilitiessuchashousing,medicalandentertainmentetc.suchwelfarefacilities helptoimprovephysicalandmentalhealthofemployees.

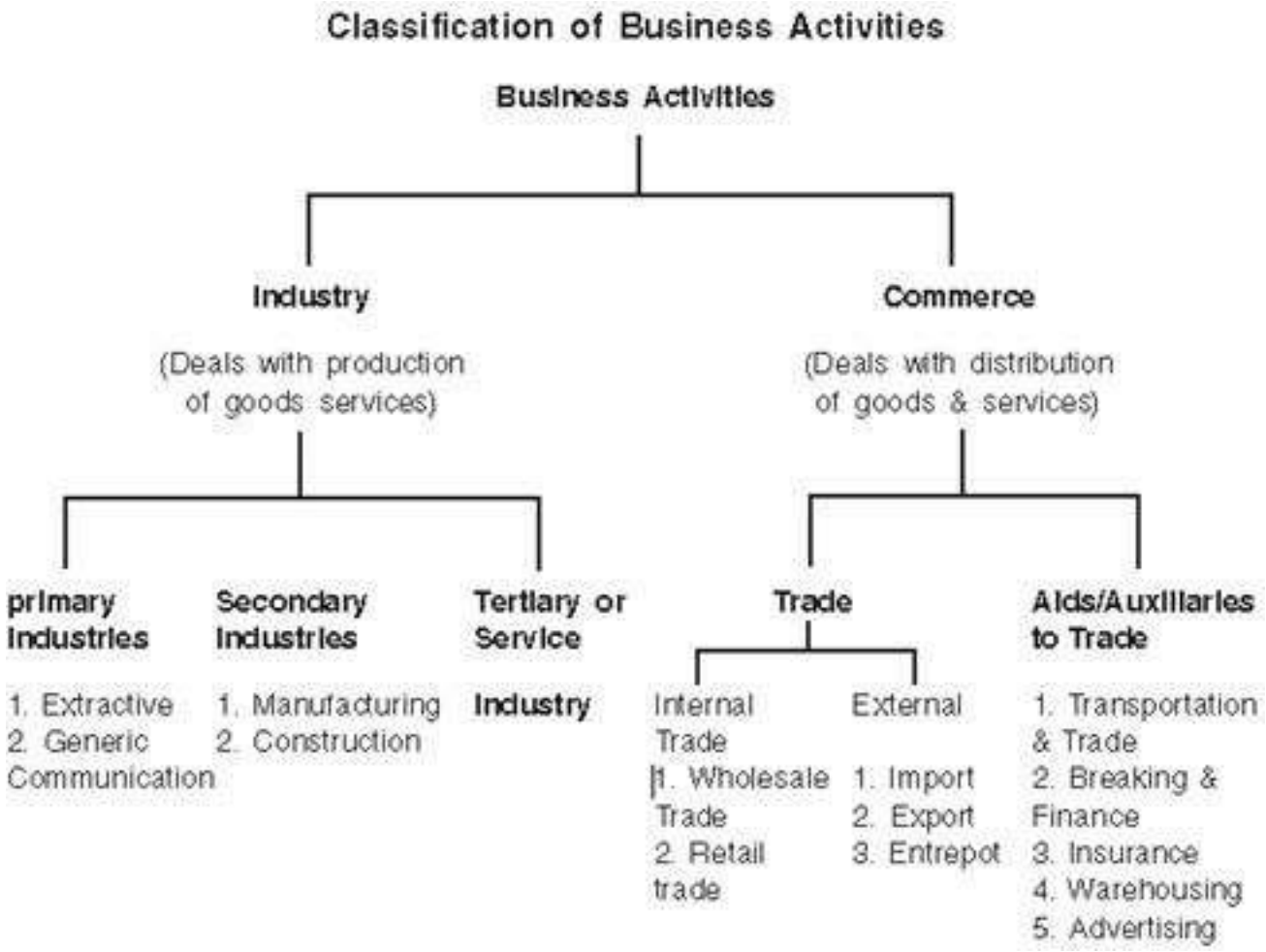
(iv) Communityservice:Businessshouldcontributesomethingtothesocietywhereitis established and operated Library, dispensary, educational institutions etc. are certain contributionswhichabusinesscanmakeandhelpinthedevelopmentofcommunity.

Role of Profit in Business

Businessisestablishedforthepurposeofearningprofit.Profitplaysaveryimportantrolein business.Theroleofprofitinbusinesscanbebroughtoutbythefollowingfacts:-

(1) **ForLongSurvival:**Profitalonehelpabusinesstocontinuetoexistforalongperiod.In theabsenceofprofittheestablishmentofaparticularbusinesslosesitsjustification.
(2) **Forgrowth&Expansion**:Allbusinessmenwanttheirbusinesstoexpandandtogrow. Fordevelopmentofbusinessadditionalcapitalisneeded.Retainedearningsisaverygood

source of capital.
(3) **Forincreasingefficiency**:Profitisthatpowerwhichmotivatesboththeparties-owner and workers to do their best. As they know that in case of good profits they will get good compensationfortheireffortssoitfinallyhelpsinincreasingtheefficiencyofbusiness.
(4) **ForBuildingprestigeandRecognition**:ForgainingprestigeintheSociety,Businesshad to satisfy all the parties concerned. It has to supply good quality product/service at reasonable price to customers, adequate remuneration to employees, to pay sufficient dividend to the shareholdersetc. and all these are possible only if the business is earning goodprofit.



PrimaryIndustry:Theprimaryindustryincludesthoseactivitiesthroughwhichthenatural resources are used to provide raw material for other industries Primary industries are of twotypes.

ExtractiveIndustryreferstothoseindustriesunderwhichsomethingisextractedoutofthe earth,wateroraire.g.,coal,iron,gasetc.Farming,mining,lumbering,hunting&fishing

come under this category of industry

GeneticIndustryreferstothoseindustriesunderwhichthebreedofanimalsandvegetables areimprovedandmademoreusefule.g.,poultryfarms,dairyfarming,fishhatchery,cattle breedingetc.

Secondary Industry: Under this industry new products are manufactured by using the previouslyproducedthingse.g.,producingcottonisaprimaryindustryandmanufacturing clothoutofcottonisasecondaryindustry.Itisoftwotypes.

Manufacturing: These industries convert raw materials or semi-finished products into finishedproductse.g.,paperfrombamboo,sugarfromsugarcane.Itisfurtherdividedinto fourparts.
(i) Analytic: Differentthingsaremanufactureddoutofonemateriale.g.,petrol,diesel, gasoline out of crudeoil.
(ii) Processing: Thoseindustrieswhereinusefulthingsaremanufacturedbymakingtheraw material to pass through different production process e.g., steel from iron ore, sugar and paperindustries.
(iii) Synthetic: Manyrawmaterialsaremixedtoproducemoreusefulproducte.g.,paints, cosmetics,cement.
(iv) Assembling: Whereinthepartsmanufacturedbydifferentindustriesareassembledto producenewandusefulproducte.g.,computers,watchescars,televisionetc.

2.Constructionindustries: Industriesthatareinvolvedintheconstructionofbuildings, dams, bridges, roads as well as tunnels andcanals.

3 Tertiary or Service Industry: Includes those services which help business to move smoothly e.g. transport, bank, Insurance, storage and Advertising.

COMMERCE:

Meaning:Commercereferstoallthoseactivitieswhichareconcernedwiththetransferof goods and services from the producers to the consumers. It embraces all those activities whicharenecessaryformaintainingafreeflowofgoodsandservices.

The functions of commerce are as follows.

1. Removingthehindranceofpersonbymarkinggoodsavailabletoconsumersfromthe producers. throughtrade.
2. Transportationremoveshindranceofplacebymovinggoodsfromtheplaceofproduction to the markets forsale.
3. Storageandwarehousingactivitiesremovethehindranceoftimebyfacilitatingholdingof stockofgoodstobesoldasandwhenrequired.
4. Insuranceremoveshindranceofriskoflossordamageofgoodsduetotheft,fire,accidents etc.
5. Bankingremoveshindranceoffinance-byprovidingfundstoabusinessmanforacquiring assets, purchasing raw materials and meeting otherexpenses.
6. Advertisingremoveshindranceofinformation-byinformingconsumersaboutthegoods and services available in themarket.

Commerce includes two types of activities:

Trade: Referstobuyingandsellingofgoodsandserviceswiththeobjectiveofearningprofit. It is classified into twocategories:

1. **InternalTrade**:Takesplacewithinacountry.InternalTradeisclassifiedintotwo categories:
(i) WholesaleTrade:Referstobuyingandsellingofgoodsinlargequantities.Awholesaler buysgoodsinlargequantitiesfromtheproducersandsellthemtootherdealers.Heserves as a connecting link between the producer andretailer.
(ii) RetailTrade:Referstobuyingofgoodsandservicesinrelativelysmallquantities& selling them to the ultimateconsumers.

2. **ExternalTrade**:Tradebetweentwoormorecountries.Externaltradecanbeclassified into threecategories:

(i) Importtrade:Ifgoodsarepurchasedfromanothercountry,ifiscalledimporttrade.

(ii) ExportTrade:Ifgoodsaresoldtoothercountriesitiscalledexporttrade.

(iii) Enterpot: Wheregoodsareimportedforexporttoothercountriese.g.Indianfirmsmay importsomegoodsfromAmericaandexporttheservicetoNepal.

AuxiliariestoTrade:Allthoseactivitieswhichhelpinremovingvarioushindranceswhich arise in connection with the production and distribution of goods are called auxiliaries to trade.Anoverviewoftheseactivitiesisgivenbelow.

(i) TransportationandCommunication:Theproductionofgoodstakesplaceatoneplace where as these are demanded in different parts of the country The obstacle of place is removedbythetransport.Alongwithtransportcommunicationisalsoanimportantservice. It helps in exchange of information between producers, consumers and traders. The commoncommunicationservicesarepostalservice,telephone,fax,internetetc.

(ii) BankingandFinance:Businessneedsfundsforacquiringassets,purchasingraw materialsandmeetingotherexpenses.Necessaryfundscanbeobtainedfromabank.

(iii) Insurance:Itprovidesacoveragainstthelossofgoods,intheprocessoftransit,storage, theft, fire and other naturalcalamities.

(iv) Warehousing:Thereisgenerallyatimelagbetweentheproductionandconsumptionof goods. This problem can be solved by storing the goods in warehouses from the time of productiontillthetimetheyaredemandedbycustomers.

(vi)Advertising: Advertising brings goods and services to the knowledge of prospective buyers.Itisthroughadvertisingthatthecustomerscometoknowaboutthenewproducts and theirutility.

BusinessRisk: Businessriskreferstothepossibilityofinadequateprofitsorevenlossesdue touncertainities or unexpected events. For example: demand for a particular product may declineduetochangeintastespreferencesofconsumers,orincreaseincompetitionetc.
There are two types of business risks:

Nature of Business Risks

1. Businessrisksariseduetouncertainties:Lackofknowledgeofwhatisgoingtohappenin future create uncertainties in business. It may be due to natural calamities, change in demand and prices, strikesetc.

2. Riskisanessentialpartofeverybusiness:Nobusinesscanavoidriskalthoughtheamount ofriskmayvaryfrombusinesstobusiness.Riskcanbeminimizedbutcannotbeeliminated.

3. Degreeofriskdependsmainlyuponthenatureandsizeofbusiness:

Level of risk is lower for small scale business while it is higher for large scale organization.

4. Profitistherewardforrisktaking:Abusinessgetsprofitasreturnforundertakingrisk. Greatertheriskinvolvedinabusiness,higheristhechanceofprofit.

Causes of Business Risks

1. Natural Causes: Human beings have little control over natural calamities like flood, earthquake,famineetc.Theyresultinheavylossesoflife,property&incomeinbusiness.

2. HumanCauses:Humancausesincludesuchunexpectedeventslikedishonesty, carelessnessornegligenceofemployees,strikes,riots,managementinefficiencyetc.

3. Economiccauses:Theyarerelatedtoachanceoflossduetochangeinmarketcondition e.g.,fluctuationsindemandandprices,competition,changeintechnologyetc.

4. Physicalcauses:Mechanicaldefectsorfailuresmayalsoleadtolossese.g.,burstingof boiler or machine may cause death ordestruction.

5. Othercauses:Theseincludeunforeseeneventslikepoliticaldisturbances,fluctuationin exchange ratesetc

Starting a Business: Basic Factors

Selectingthelineofbusiness:Thefirstthingtobedecidedbytheentrepreneuristhelineand type of business to beundertaken.

1. Scaleorsizeofbusiness: Afterdecidingthelineofbusinessthebusinessmanmustdecide whetherhewantstosetuplargescaleorsmallscalebusiness.

2. ChoiceofformofBusinessorganization: Thenextdecisionmustbetakenistofinalize theformofbusinessi.e.,tosetupsoleproprietorship.,partnershiporjointstockcompany.

3. LocationofBusinessEnterprise: Theentrepreneurhastodecidetheplacewherethe enterprisewillbelocated.Beforetakingthisdecisionhemustfindoutavailabilityofraw materials, power, labour, banking, transportationetc.

4. FinancialRequirement: Thebusinessmanmustanalyzetheamountofcapitalhemight requiretobuyfixedassetsandforworkingcapital(Daytodayexpenses)Properfinancial planningmustbedonetodeterminetheamountoffundsneeded.

5. Physicalfacilities:includemachineryequipmentbuildingetc.Thisdecisiondepends uponthesize,scaleandtypeofbusinessactivitieshewantstocarryon.

6. Plantlayout: Showingthephysicalarrangementofmachinesandequipmentneededto manufacture aproduct.

7. CompetentandcommittedWorkforce: Theentrepreneurmustfindouttherequirement ofskilledandunskilledworkersandmanagerialstafftoperformvariousactivities.

8. Taxplanning: Theentrepreneurmusttrytoanalyzethetypesoftaxesbecausetherearea numberoftaxlawsinthecountrywhichaffectthefunctioningofbusiness.

9. SettingupoftheEnterprise: Afteranalyzingtheabovementionedpointscarefullythe entrepreneurcanstartthebusinesswhichwouldmeanmobilizingvariousresourcesand completing legalformalities.

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Class XI

Micro Economics

Chapter 1

Economics and Economy

Economics

Economics is a subject matter which focuses on rational management of scarce resources in such a way so that our economic gains are maximised at micro and macro level.

What economics is about-

" Economics is about making choice in the presence of scarcity."

Economics is that branch of knowledge in which those activities of human beings are studied which they undertake to acquire means to satisfy their unlimited wants.

Economics is a science of human behaviours concerned with the allocation of scarce means in such a manner that consumers can maximise their satisfaction, producer can maximise their profit and the society can maximise its social welfare.

Scarcity and choice is the essence of Economics

Scarcity :- It refers to a situation when supply of resources is less than the demand for resources.

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choice

choice is the outcome of scarcity. It emerges when limited resources are to be used for the satisfaction of unlimited wants.

choice refers to the process of selection from available limited alternatives. It emerges because :-

(1) Resources are scarce
(2) Resources can be allocated to alternative uses.

Thus :-

(1) 'scarcity' causes 'choice'
(2) choice implies decision-making
(3) Decision making relates to usage of limited resources in a manner that consumer maximising his satisfaction, producer maximises his profit, and a society maximises its social welfare.

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Q1. Distinguish between micro and macro Economics

Ans :-

Micro Economics	Macro Economics
1. Micro Economics is the study of Individual Economic unit.	1. Macro Economics is the study of the economy as a whole
2. Examples :- An individual, a firm, an industry	2. Examples :- Aggregate demand, Aggregate supply, Aggregate Consumption, National Income
3. Demand and Supply are the main tools of micro Economics	3. Aggregate demand and Aggregate supply are the main tools of macro Economics.
4. Here we are concer with the determination of equilibrium level of price of goods and factors of production. So it is called price theory	4. It is concerned with the determination of Equilibrium level of output, Employment and Income for Economy. so it is called Income and Employment theory
5. Micro Economics explains how resources are allocated among various goods and Services and national Income is distributed in the Economy	5. Macro Economics explains how productive capacity and national Income of the Country increase over time.

Positive Economics and Normative Economics—The Difference

Positive Economics	Normative Economics
(i) Positive economics deals with economic issues (or economic behaviour) related to past, present and future.	(i) Normative economics deals with opinions of the economists related to economic issues or economic problems.
(ii) Statements of positive economics relate to 'what was', 'what is' and 'what would be'.	(ii) Statements of normative economics relate to 'what ought to be'.
(iii) Statements of positive economics are not necessarily the statements of truth. These may be true or false. **Example:** Somebody says population of India is more than the population of China, it is definitely a positive statement. But, it is wrong. One can verify it.	(iii) Normative statements cannot be termed as true or false. These statements involve opinions only. **Example:** Somebody says that old-age pensions should be stopped. It is just an opinion.
(iv) Facts and figures (as elements of positive economics) are verifiable for truth.	(iv) Normative statements are not verifiable at all.
(v) Positive economics does not involve value judgement.	(v) Normative economics involves value judgement.

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What is an Economy

Economy is a system, or an organisation in which people perform a number of activities to earn money

Nature and type of Economy

Nature of Economic activities of the people of an area reveals the nature of the Economy of that area. If most people in an area are engaged in agricultural activity, Economy of that area is an agricultural Economy, likewise if most people in an area are engaged in industrial activity, the Economy of this area is an industrial Economy.

Type of Economy :- It depends on the degree of Control of Economic activities of the people.

Economic activities : Consumption, production, Investment exchange, distribution are controlled by the Government of a country, degree of control varies across different nations.

Such Economies where the degree of control is very high are called Controlled Economy.
Examples :- China, Russia and North Korea.
Economies where the degree of control is very low, are called free Economies or market-Economies. Like USA and UK.
There are the Economies where the degree of Control is moderate are called mixed Economies. Like India.

Controlled or Centrally Planned Economy	Free Economy or Market Economy	Mixed Economy
(i) These are the economies where the economic activities (production consumption, investment and exchange) are firmly controlled by the government or some central authority.	(i) These are the economies where the economic activities are controlled by the market forces.	(i) These are the economies where the economic activities are governed by the free play of market forces but are regulated by the government.
(ii) Economic decisions are driven by the motive of social welfare.	(ii) Economic decisions are driven by the motive of profit maximisation.	(ii) Economic decisions are driven by the motive of both profit maximisation and social welfare.
(iii) The consumer is not sovereign (the central authority decides what goods are to be produced for the people).	(iii) The consumer is sovereign. The consumer buys goods according to his choice.	(iii) The consumer is sovereign. However, PDS (Public Distribution System) ensures the supply of essential goods to the consumers.
(iv) Most resources are controlled (or owned) by the government. The government decides at what price the goods are to be sold in the market.	(iv) Most resources are controlled (or owned) by the people. The market determines the prices of goods and services.	(iv) Resources are controlled both by the government and by the people. Prices are determined by the market. But, the government regulates/ controls the prices of essential goods.
(v) Public sector dominates the economic activity.	(v) Private sector dominates the economic activity.	(v) Both public and private sectors dominate the economic activity.

CHAPTER-1 INTRODUCTION TO COMPUTER SYSTEM

Introduction to Computer

Computer: Computer is an advanced electronic device that takes raw data as input from the user and processes these data under the control of set of instructions (called program) and gives the result (output) and saves output for the future use. It can process both numerical and non-numerical (arithmetic and logical) calculations.

A computer is a combination of **hardware and software** resources which integrate together and provides various functionalities to the user. Hardware are the physical components of a computer like the processor, memory devices, monitor, keyboard etc. while software is the set of programs or instructions that are required by the hardware resources to

perform various operations as per the requirement of users.

Evolution of computing device

First Generation (1940-56): The first generation computers used vaccum tubes & machine language was used for giving the instructions. These computers were large in size & their programming was difficult task. The electricity consumption was very high. Some computers of this generation are ENIAC, EDVAC, EDSAC & UNIVAC-1.

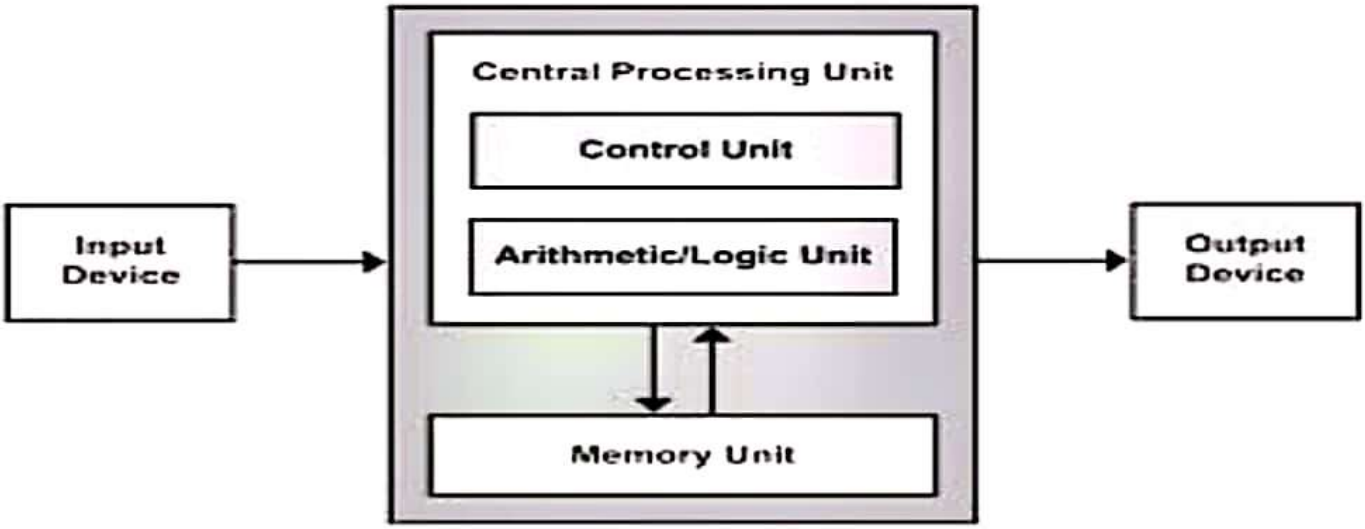
Second Generation (1956-63): In 2nd generation computers, vaccum tubes were replaced by transistors. They required only 1/10 of power required by tubes. This generation computers generated less heat & were reliable. The first operating system developed in this generation.

Third Generation (1964-71): The 3rd generation computers replaced transistors with Integrated circuit known as chip. From Small scale integrated circuits which had 10 transistors per chip, technology developed to MSI circuits with 100 transistors per chip. These computers were smaller, faster & more reliable. High level languages invented in this generation.

Fourth Generation (1972- present): LSI & VLSI were used in this generation. As a result microprocessors came into existence. The computers using this technology known to be Micro Computer. High capacity hard disk were invented. There is great development in data communication. The Fifth Generation (Present & Beyond): Fifth generation computing devices, based on artificial intelligence, are still in development, though there are some applications, such as voice recognition, that are being used today. The use of parallel processing and superconductors is helping to make artificial intelligence a reality. Quantum computation and molecular and

nanotechnology will radically change the face of computers in years to come.

Component of a Computer system



Block diagram of computer system

In the above diagram, both **control (control unit or CU)** and **arithmetic & logic unit (ALU)** combinely called as **Central Processing Unit (CPU)**.

Let's describe about all the parts as included in the above diagram one by one.

The Processor Unit (CPU)

It is the brain of the computer system. All major calculation and comparisons are made inside the CPU and it is also responsible for activation and controlling the operation of other unit.

This unit consists of two major components, that are arithmetic logic unit (ALU) and control unit (CU).

Arithmetic Logic Unit (ALU)

Here arithmetic logic unit performs all arithmetic operations such as addition, subtraction, multiplication and division. It also uses logic operation for comparison.

Control Unit (CU)

And the control unit of a CPU controls the entire operation of the computer. It also controls all devices such as memory, input/output devices connected to the CPU.

CU fetches instructions from memory, decodes the instruction, interprets the instruction to know what the task are to be performed and sends suitable control signals to the other components to perform for the necessary steps to executes the instruction.

Input/Output Unit

The input/output unit consists of devices used to transmit information between the external world and computer memory.

The information fed through the input unit is stored in computer's memory for processing and the final result stored in memory can be recorded or display on the output medium.

Memory Unit

Memory unit is an essential component of a digital computer. It is where all data intermediate and find results are stored.

The data read from the main storage or an input unit are transferred to the computer's memory where they are available for processing.

This memory unit is used to hold the instructions to be executed and data to be processes.

Disk Storage Unit

Data and instruction enters into a computer system through input device have to stored inside the computer before actual processing start.

Two types of storage unit are primary and secondary storage unit.

Primary Storage Unit

Primary memory has direct link with input unit and output unit. It stores the input data, calculation result.

Secondary Storage Unit

The primary storage is not able to store data permanently for future use. So some other types of storage technology is required to store the data permanently for long time, it is called secondary or auxiliary storage.

Input Output Devices

Input Devices: Those devices which help to enter data into computer system. Eg. Keyboad, Mouse, Touchscreen, Barcode Reader, Scanner, MICR, OMR etc.

Bar Code Reader

MICR used in Bank

OMR

Output Devices: Those devices which help to display the processed information. Eg. Monitor, Printer, Plotter, Projector

Printer

Plotter

Projector

Computer Memory

Memory: It facilitates the remembrance power to computer system. It refers to the physical devices used to store programs (sequences of instructions) or data (e.g. program state information) on a temporary or permanent basis for use in a computer or other digital electronic device. The term primary memory is used for the information in physical systems which are fast (i.e. RAM), as a distinction from secondary memory, which are physical devices for program and data storage which are slow to access but offer higher memory capacity. Primary memory stored on secondary memory is called virtual memory. Primary Memory can be categorized as Volatile Memory & Non-Volatile Memory.

Memory Units

The smallest unit is bit, which mean either 0 or 1.

1 bit = 0 or 1

1 Byte = 8 bits

1 Nibble = 4 bits

1 Kilo Byte = 1024 Byte= 2^10 Byte

1 Mega Byte = 1024 KB= 2^10 KB

1 Gega Byte = 1024 MB= 2^10 MB

1 Tera Byte = 1024 GB= 2^10 GB

1 Peta Byte =1024 TB= 2^10 TB

1 Exa Byte =1024 PB= 2^10 PB

1 Zetta Byte = 1024 EB= 2^10 EB

1 Yotta Byte = 1024 ZB= 2^10 ZB

Primary and Secondary Memory

Primary Memory :

Volatile memory(RAM) - RAM means Random Access Memory (Read/ Write Memory). It's known as Volatile Memory. Volatile memory is computer memory that requires power to maintain the stored information. Most modern semiconductor volatile memory is either Static RAM or dynamic RAM. SRAM retains its contents as long as the power is connected and is easy to interface to but uses six transistors per bit.

Dynamic RAM- is more complicated to interface to and control and needs regular refresh cycles to prevent its contents being lost. However, DRAM uses only one transistor and a capacitor per bit, allowing it to reach much higher densities and, with more bits on a memory chip, be much cheaper per bit. SRAM is not worthwhile for desktop system

memory, where DRAM dominates, but is used for their cache memories.

Non Volatile Memory (ROM)- ROM means Read Only Memory. Non-volatile memory is computer memory that can retain the stored information even when not powered. Examples of non-volatile memory are flash memory and ROM/PROM/EPROM/EEPROM memory (used for firmware such as boot programs).

Data deletion and its Recovery and security concern

You can conveniently ***delete*** personal ***data*** stored in survey responses, tickets, and contacts, no matter where the ***data*** originated.

Examples of reasons for deleting the data are:

- Freeing the disk space
- Removing duplicate or unnecessary data to avoid confusion
- Making sensitive information unavailable to others
- Removing an operating system or blanking a hard drive

All operating systems include commands for deleting files (**rm** on Unix, **era** in CP/M and DR-DOS, **del/erase** in MS-DOS/PC DOS, DR-DOS, Microsoft Windows etc.).

Data Recovery

In computing, **data recovery** is a process of salvaging (retrieving) inaccessible, lost, corrupted, damaged or formatted data from secondary storage, removable media or files, when the data stored in them cannot be accessed in a normal way. The data is most often salvaged from storage media such as internal or external hard disk drives (HDDs), solid-state drives (SSDs), USB flash drives, magnetic tapes, CDs, DVDs, RAID subsystems, and other electronic devices. Recovery may be required due to physical damage to the storage devices or logical damage to the file system that prevents it from being mounted by the host operating system (OS).

The most common data recovery scenario involves an operating system failure, malfunction of a storage device, logical failure of storage devices, accidental damage or deletion, etc. (typically, on a single-drive, single-

partition, single-OS system), in which case the ultimate goal is simply to copy all important files from the damaged media to another new drive.

Another scenario involves a drive-level failure, such as a compromised file system or drive partition, or a hard disk drive failure. In any of these cases, the data is not easily read from the media devices. Depending on the situation, solutions involve repairing the logical file system, partition table or master boot record.

Computer security- It is also known as **IT security**, is the protection of information systems from theft or damage to the hardware, the software, and to the information on them, as well as from disruption or misdirection of the services they provide. It includes controlling physical access to the hardware, as well as protecting against harm that may come via network access, data and code injection, and due to malpractice by operators,

whether intentional, accidental, or due to them being tricked into deviating from secure procedures.

What are the concerns of computer security?

Computer Security is concerned with four main areas:

1. Confidentiality:- Only authorized users can access the data resources and information.
2. Integrity:- Only authorized users should be able to modify the data when needed.
3. Availability:- Data should be available to users when needed.
4. Authentication:- are you really communicating with whom you think you are communicating with

Software and its types

Software -Software, simply are the computer programs. The instructions given to the computer in the form of a program is called Software. Software is the set of programs, which are

used for different purposes. All the programs used in computer to perform specific task is called Software.

Types of software

1. System Software

The system software is a collection of programs designed to operate, control, and extend the processing capabilities of the computer itself. System software is generally prepared by the computer manufacturers. These software products comprise of programs written in low-level languages, which interact with the hardware at a very basic level. System software serves as the interface between the hardware and the end users.

Some examples of system software are Operating System, Compilers, Interpreter, Assemblers, etc.

2. Application Software

Application software products are designed to satisfy a particular need of a particular environment. All software applications prepared in the computer lab can come under the category of Application software.

Examples of Application software are the following –

- Payroll Software
- Student Record Software
- Inventory Management Software
- Income Tax Software
- Railways Reservation Software
- Microsoft Office Suite Software
- Microsoft Word
- Microsoft Excel

3. Utility Software:

Utility software is designed to aid in analyzing, optimizing, configuring and maintaining a computer system. It supports the computer infrastructure. This software focuses on how an OS functions and then accordingly it decides its trajectory to smoothen the functioning of the

system. Software's like antiviruses, disk cleanup & management tools, compression tools, defragmenters, etc are all utility tools. Some examples of utility tools are:

1. K7 Antivirus
2. WinRar
3. Winzip etc.

ST. MARY'S PUBLIC SCHOOL

H.H.W
(2020-2021)

Mathematics

CLASS-XI

NOTES

CHAPTER-1

SETS

(40 MARKS)

Mathematics (041)

SETS

1. SET

A set is a collection of well-defined and well distinguished objects of our perception or thought.

1.1 Notations

The sets are usually denoted by capital letters A, B, C, etc. and the members or elements of the set are denoted by lower-case letters a, b, c, etc. If x is a member of the set A, we write $x \in A$ (read as 'x belongs to A') and if x is not a member of the set A, we write $x \notin A$ (read as 'x does not belong to A,). If x and y both belong to A, we write $x, y \in A$.

2. REPRESENTATION OF A SET

Usually, sets are represented in the following two ways :

(i) Roster form or Tabular form

(ii) Set Builder form or Rule Method

2.1 Roster Form

In this form, we list all the member of the set within braces (curly brackets) and separate these by commas. For example, the set A of all odd natural numbers less that 10 in the Roster form is written as :

$A = \{1, 3, 5, 7, 9\}$

Note..

(i) In roster form, every element of the set is listed only once.

(ii) The order in which the elements are listed is immaterial.

For example, each of the following sets denotes the same set $\{1, 2, 3\}$, $\{3, 2, 1\}$, $\{1, 3, 2\}$

2.2 Set-Builder Form

In this form, we write a variable (say x) representing any member of the set followed by a property satisfied by each member of the set.

For example, the set A of all prime numbers less than 10 in the set-builder form is written as

$A = \{x \mid x \text{ is a prime number less that } 10\}$

The symbol '|' stands for the words 'such that'. Sometimes, we use the symbol ':' in place of the symbol '|'.

3. TYPES OF SETS

3.1 Empty Set or Null Set

A set which has no element is called the null set or empty set. It is denoted by the symbol ϕ.

For example, each of the following is a null set :

(a) The set of all real numbers whose square is -1.

(b) The set of all rational numbers whose square is 2.

(c) The set of all those integers that are both even and odd.

A set consisting of atleast one element is called a non-empty set.

3.2 Singleton Set

A set having only one element is called singleton set.

For example, {0} is a singleton set, whose only member is 0.

3.3 Finite and Infinite Set

A set which has finite number of elements is called a finite set. Otherwise, it is called an infinite set.

For example, the set of all days in a week is a finite set whereas the set of all integers, denoted by $\{\ldots\ldots -2, -1, 0, 1, 2, \ldots\}$ or $\{x \mid x \text{ is an integer}\}$, is an infinite set.

An empty set ϕ which has no element in a finite set A is called empty of void or null set.

3.4 Cardinal Number

The number of elements in finite set is represented by n(A), known as Cardinal number.

3.5 Equal Sets

Two sets A and B are said to be equals, written as A = B, if every element of A is in B and every element of B is in A.

3.6 Equivalent Sets

Two finite sets A and B are said to be equivalent, if n (A) = n (B). Clearly, equal sets are equivalent but equivalent sets need not be equal.

For example, the sets A = {4, 5, 3, 2} and B = {1, 6, 8, 9} are equivalent but are not equal.

3.7 Subset

Let A and B be two sets. If every elements of A is an element of B, then A is called a subset of B and we write $A \subset B$ or $B \supset A$ (read as 'A is contained in B' or B contains A'). B is called superset of A.

Note..

(i) Every set is a subset and a superset itself.

(ii) If A is not a subset of B, we write $A \not\subset B$.

(iii) The empty set is the subset of every set.

(iv) If A is a set with $n(A) = m$, then the number of subsets of A are 2^m and the number of proper subsets of A are $2^m - 1$.

For example, let A = {3, 4}, then the subsets of A are ϕ, {3}, {4}. {3, 4}. Here, $n(A) = 2$ and number of subsets of $A = 2^2 = 4$. Also, $\{3\} \subset \{3,4\}$ and $\{2,3\} \not\subset \{3, 4\}$

3.8 Power Set

The set of all subsets of a given set A is called the power set of A and is denoted by P(A).

For example, if A = {1, 2, 3}, then

P(A) = {ϕ, {1}, {2}, {3}, {1,2} {1,3}, {2,3}, {1, 2, 3}}

Clearly, if A has n elements, then its power set P (A) contains exactly 2^n elements.

4. OPERATIONS ON SETS

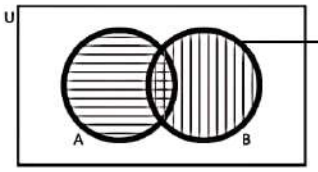
4.1 Union of Two Sets

The union of two sets A and B, written as $A \cup B$ (read as 'A union B'), is the set consisting of all the elements which are either in A or in B or in both Thus,

$A \cup B = \{x : x \in A \text{ or } x \in B\}$

Clearly, $x \in A \cup B \Rightarrow x \in A \text{ or } x \in B$, and

$x \notin A \cup B \Rightarrow x \notin A \text{ and } x \notin B$.



Combination of the shaded regions together represent the union of sets.

For example, if A = {a, b, c, d} and B = {c, d, e, f}, then $A \cup B$ = {a, b, c, d, e, f}

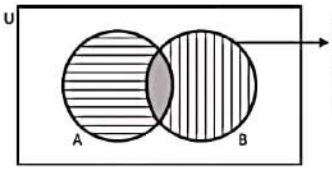
4.2 Intersection of Two sets

The intersection of two sets A and B, written as $A \cap B$ (read as 'A' intersection 'B') is the set consisting of all the common elements of A and B. Thus,

$A \cap B = \{x : x \in A \text{ and } x \in B\}$

Clearly, $x \in A \cap B \Rightarrow x \in A \text{ and } x \in B$, and

$x \notin A \cap B \Rightarrow x \notin A \text{ or } x \notin B$.

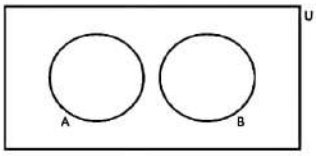


The shaded region which is common to both the shaded regions represents intersection of sets

For example, if A = {a, b, c, d) and B = {c, d, e, f}, then $A \cap B$ = {c, d}.

4.3 Disjoint Sets

Two sets A and B are said to be disjoint, if $A \cap B = \phi$, i.e. A and B have no element in common.



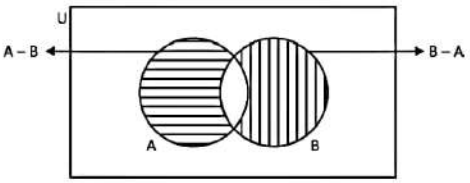
For example, if A = {1, 3, 5} and B = {2, 4, 6}, then $A \cap B = \phi$, so A and B are disjoint sets.

4.4 Difference of Two Sets

If A and B are two sets, then their difference A - B is defined as :

$A - B = \{x : x \in A \text{ and } x \notin B\}$.

Similarly, $B - A = \{x : x \in B \text{ and } x \notin A\}$.



For example, if $A = \{1, 2, 3, 4, 5\}$ and $B = \{1, 3, 5, 7, 9\}$ then $A - B = \{2, 4\}$ and $B - A = \{7, 9\}$.

Important Results

(a) $A - B \neq B - A$

(b) The sets A - B, B - A and $A \cap B$ are disjoint sets

(c) $A - B \subseteq A$ and $B - A \subseteq B$

(d) $A - \phi = A$ and $A - A = \phi$

4.5 Symmetric Difference of Two Sets

The symmetric difference of two sets A and B, denoted by $A \Delta B$, is defined as

$A \Delta B = (A - B) \cup (B - A)$.

For example, if $A = \{1,2,3,4,5\}$ and $B = \{1, 3,5,7,9\}$ then

$A \Delta B = (A - B) \cup (B - A) = \{2,4\} \cup \{7,9\} = \{2,4,7,9\}$.

4.6 Complement of a Set

If U is a universal set and A is a subset of U, then the complement of A is the set which contains those elements of U, which are not contained in A and is denoted by A'or A^c. Thus,

$A^c = \{x : x \in U \text{ and } x \notin A\}$

For example, if $U = \{1,2,3,4 ...\}$ and $A \{2,4,6,8,...\}$, then, $A^c = \{1,3,5,7,...\}$

Important Results

a) $U^c = \phi$ b) $\phi^c = U$ c) $A \cup A^c = U$

d) $A \cap A^c = \phi$

5. ALGEBRA OF SETS

1. For any set A, we have

   a) $A \cup A = A$ b) $A \cap A = A$

2. For any set A, we have

   c) $A \cup \phi = A$ d) $A \cap \phi = \phi$

   e) $A \cup U = U$ f) $A \cap U = A$

3. For any two sets A and B, we have

   g) $A \cup B = B \cup A$ h) $A \cap B = B \cap A$

4. For any three sets A, B and C, we have

   i) $A \cup (B \cup C) = (A \cup B) \cup C$

   j) $A \cap (B \cap C) = (A \cap B) \cap C$

5. For any three sets A, B and C, we have

   k) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

   l) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

6. If A is any set, we have $(A^c)^c = A$.

7. Demorgan's Laws For any three sets A, B and C, we have

   m) $(A \cup B)^c = A^c \cap B^c$

   n) $(A \cap B)^c = A^c \cup B^c$

   o) $A - (B \cup C) = (A - B) \cap (A - C)$

   p) $A - (B \cap C) = (A - B) \cup (A - C)$

Important Results on Operations on Sets

(i) $A \subseteq A \cup B, B \subseteq A \cup B, A \cap B \subseteq A, A \cap B \subseteq B$

(ii) $A - B = A \cap B^c$ (iii) $(A - B) \cup B = A \cup B$

(iv) $(A - B) \cap B = \phi$ (v) $A \subseteq B \Leftrightarrow B^c \subseteq A^c$

(vi) $A - B = B^c - A^c$ (vii) $(A \cup B) \cap (A \cup B^c) = A$

(viii) $A \cup B = (A - B) \cup (B - A) \cup (A \cap B)$

(ix) $A - (A - B) = A \cap B$

(x) $A - B = B - A \Leftrightarrow A = B$ (xi) $A \cup B = A \cap B \Leftrightarrow A = B$

(xii) $A \cap (B \Delta C) = (A \cap B) \Delta (A \cap C)$

Example – 1

Write the set of all positive integers whose cube is odd.

Sol. The elements of the required set are not even.

[$\because$ Cube of an even integer is also an even integer]

Moreover, the cube of a positive odd integer is a positive odd integer.

$\Rightarrow$ The elements of the required set are all positive odd integers.

Hence, the required set, in the set builder form, is :

$\{2k+1 : k \geq 0, k \in Z\}$.

Example – 2

Write the set $\left\{\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}, \frac{7}{8}\right\}$ in the set builder form.

Sol. In each element of the given set the denominator is one more than the numerator.

Also the numerators are from 1 to 7.

Hence the set builder form of the given set is :

$\{x : x = n/n+1, n \in N \text{ and } 1 \leq n \leq 7\}$.

Example – 3

Write the set $\{x : x$ is a positive integer and $x^2 < 30\}$ in the roster form.

Sol. The squares of positive integers whose squares are less than 30 are : 1, 2, 3, 4, 5.

Hence the given set, in roster form, is $\{1, 2, 3, 4, 5\}$.

Example – 4

Write the set {0, 1, 4, 9, 16, ...} in set builder form.

Sol. The elements of the given set are squares of integers :

$0, \pm 1, \pm 2, \pm 3, \pm 4, \ldots\ldots$

Hence the given set, in set builder form, is $\{x^2 : x \in Z\}$.

Example – 5

State which of the following sets are finite and which are infinite

(i) $A = \{x : x \in N$ and $x^2 - 3x + 2 = 0\}$

(ii) $B = \{x : x \in N$ and $x^2 = 9\}$

(iii) $C = \{x : x \in N$ and x is even$\}$

(iv) $D = \{x : x \in N$ and $2x - 3 = 0\}$.

Sol. (i) $A = \{1, 2\}$.

[$\because x^2 - 3x + 2 = 0 \Rightarrow (x-1)(x-2) = 0 \Rightarrow x = 1, 2$]

Hence A is finite.

(ii) $B = \{3\}$.

[$\because x^2 = 9 \Rightarrow x = \pm 3$. But $3 \in N$]

Hence B is finite.

(iii) $C = \{2, 4, 6, \ldots\ldots\}$

Hence C is infinite.

(iv) $D = \phi$. $\left[\because 2x - 3 = 0 \Rightarrow x = \frac{3}{2} \notin N\right]$

Hence D is finite.

Example – 6

Which of the following are empty (null) sets ?

(i) Set of odd natural numbers divisible by 2

(ii) $\{x : 3 < x < 4, x \in N\}$

(iii) $\{x : x^2 = 25$ and x is an odd integer$\}$

(iv) $[x : x^2 - 2 = 0$ and x is rational$]$

(v) $\{x :$ x is common point of any two parallel lines$\}$.

Sol. (i) Since there is no odd natural number, which is divisible by 2.

$\therefore$ it is an empty set.

(ii) Since there is no natural number between 3 and 4.

$\therefore$ it is an empty set.

(iii) Now $x^2 = 25 \Rightarrow x = \pm 5$, both are odd.

$\therefore$ The set $\{-5, 5\}$ is non-emptry.

(iv) Since there is no rational number whose square is 2,

$\therefore$ the given set is an empty set.

(v) Since any two parallel lines have no common point,

$\therefore$ the given set is an empty set.

Example – 7

Find the pairs of equal sets from the following sets, if any, giving reasons :

$A = \{0\}$, $B = \{x : x > 15$ and $x < 5\}$,

$C = \{x : x - 5 = 0\}$, $D = \{x : x^2 = 25\}$,

$E = \{x :$ x is a positive integral root of the equation $x^2 - 2x - 15 = 0\}$.

Sol. Here we have,

$A = \{0\}$

$B = \phi$

[$\because$ There is no number, which is greater than 15 and less than 5]

$C = \{5\}$ [$\because x - 5 = 0 \Rightarrow x = 5$]

$D = \{-5, 5\}$ [$\because x^2 = 25 \Rightarrow x = +5$]

and $E = \{5\}$.

[$\because x^2 - 2x - 15 = 0 \Rightarrow (x-5)(x+3) = 0 \Rightarrow x = 5, -3$. Out of these two,

5 is positive integral]

Clearly $C = E$.

Example – 8

Are the following pairs of sets equal ? Give reasons.

(i) $A = \{1, 2\}$, $B = \{x :$ x is a solution of $x^2 + 3x + 2 = 0\}$

(ii) $A = \{x :$ x is a letter in the word FOLLOW$\}$,

$B = \{y :$ y is a letter in the word WOLF$\}$.

Sol. (i) $A = \{1, 2\}$, $B = \{-2, -1\}$

[$\because x^2 + 3x + 2 = 0 \Rightarrow (x+2)(x+1) = 0 \Rightarrow x = -2, -1$]

Clearly $A \neq B$.

(ii) $A = \{F, O, L, L, O, W\} = \{F, O, L, W\}$

$B = \{W, O, L, F\} = \{F, O, L, W\}$.

Clearly $A = B$.

Example – 9

Let $A = \{1, 2, 3, 4, 5\}$, $B = \{3, 4, 5, 6, 7\}$, $C = \{6, 7, 8, 9\}$ and $D = \{7, 8, 9, 10\}$. Find :

(a) **(i)** $A \cup B$ **(ii)** $B \cup D$

(iii) $A \cup B \cup C$ **(iv)** $B \cup C \cup D$

(b) **(i)** $A \cap B$ **(ii)** $B \cap D$ **(iii)** $A \cap B \cap C$.

Sol. (a) (i) $A \cup B = \{1, 2, 3, 4, 5\} \cup \{3, 4, 5, 6, 7\}$

$= \{1, 2, 3, 4, 5, 6, 7\}$.

(ii) $B \cup D = \{3, 4, 5, 6, 7\} \cup \{7, 8, 9, 10\}$

$= \{3, 4, 5, 6, 7, 8, 9, 10\}$.

(iii) $A \cup B \cup C = \{1, 2, 3, 4, 5\} \cup \{3, 4, 5, 6, 7\} \cup \{6, 7, 8, 9\}$.

$= \{1, 2, 3, 4, 5, 6, 7\} \cup \{6, 7, 8, 9\} = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$.

(iv) $B \cup C \cup D = \{3, 4, 5, 6, 7\} \cup \{6, 7, 8, 9\} \cup \{7, 8, 9, 10\}$.

$= \{3, 4, 5, 6, 7, 8, 9\} \cup \{7, 8, 9, 10\} = \{3, 4, 5, 6, 7, 8, 9, 10\}$.

(b) (i) $A \cap B = \{1, 2, 3, 4, 5\} \cap \{3, 4, 5, 6, 7\} = \{3, 4, 5\}$.

(ii) $B \cap D = \{3, 4, 5, 6, 7\} \cap \{7, 8, 9, 10\} = \{7\}$.

(iii) $A \cap B \cap C = \{1, 2, 3, 4, 5\} \cap \{3, 4, 5, 6, 7\} \cap \{6, 7, 8, 9\} = \{3, 4, 5\} \cap \{6, 7, 8, 9\} = \phi$.

Example – 10

If $A_1 = \{2, 3, 4, 5\}$, $A_2 = \{3, 4, 5, 6\}$, $A_3 = \{4, 5, 6, 7\}$, find $\cup A_i$ and $\cap A_i$, where $i = \{1, 2, 3\}$.

Sol. (i) $\cup A_i = A_1 \cup A_2 \cup A_3 = \{2,3,4,5\} \cup \{3,4,5,6\} \cup \{4,5,6,7\}$

$= \{2,3,4,5\} \cup \{3,4,5,6,7\} = \{2,3,4,5,6,7\}$.

(ii) $\cap A_i = A_1 \cap A_2 \cap A_3 = \{2,3,4,5\} \cap \{3,4,5,6\} \cap \{4,5,6,7\}$

$= \{2,3,4,5\} \cap \{4,5,6\} = \{4,5\}$.

Example – 11

Let U = {1, 2, 3, 4, 5, 6, 7, 8, 9}, A = {1, 2, 3, 4}, B = {2, 4, 6, 8}. Find :

(i) A^c (ii) B^c (iii) $(A^c)^c$ (iv) $(A \cup B)^c$

Sol. (i) A^c = Set of those elements of U, which are not in $A = \{5, 6, 7, 8, 9\}$.

(ii) B^c = Set of those elements of U, which are not in $B = \{1, 3, 5, 7, 9\}$.

(iii) $(A^c)^c$ = Set of those elements of U, which are not in $A' = \{1, 2, 3, 4\} = A$.

(iv) $A \cup B = \{1,2,3,4\} \cup \{2,4,6,8\} = \{1,2,3,4,6,8\}$.

$(A \cup B)^c$ = Set of those elements of U, which are not in $(A \cup B) = \{5, 7, 9\}$.

Example – 12

If U = {x : x is a letter in English alphabet}, A = {x : x is a vowel in English alphabet}.

Find A^c and $(A^c)^c$.

Sol. (i) Since $A = \{x : x \text{ is a letter in English alphabet}\}$,

$\therefore A^c$ is the set of those elements of U, which are not vowels $= \{x : x \text{ is a consonant in English alphabet}\}$.

(ii) $(A^c)^c$ is the set of those elements of U, which are not consonants = {x : x is a vowel in English alphabet} = A.

Hence $(A^c)^c = A$.

Example – 13

Let A = {1, 2, 3, 4, 5, 6}, B = {3, 4, 5, 6, 7, 8}. Find (A – B) ∪ (B – A).

Sol. We have, $A = \{1, 2, 3, 4, 5, 6\}$ and $B = \{3, 4, 5, 6, 7, 8\}$.

$\therefore A - B = \{1, 2\}$ and $B - A = \{7, 8\}$

$\therefore (A - B) \cup (B - A) = \{1, 2\} \cup \{7, 8\} = \{1, 2, 7, 8\}$.

Some Basis Results about Cardinal Number

If A, B and C are finite sets and U be the finite universal set, then

(i) $n(A^c) = n(U) - n(A)$

(ii) $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

(iii) $n(A \cup B) = n(A) + n(B)$, where A and B are disjoint non-empty sets.

(iv) $n(A \cap B^c) = n(A) - n(A \cap B)$

(v) $n(A^c \cap B^c) = n(A \cup B)^c = n(U) - n(A \cup B)$

(vi) $n(A^c \cup B^c) = n(A \cap B)^c = n(U) - n(A \cap B)$

(vii) $n(A - B) = n(A) - n(A \cap B)$

(viii) $n(A \cap B) = n(A \cup B) - n(A \cap B^c) - n(A^c \cap B)$

(ix) $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A) + n(A \cap B \cap C)$

(x) If $A_1, A_2, A_3, \ldots A_n$ are disjoint sets, then

$n(A_1 \cup A_2 \cup A_3 \cup \ldots \cup A_n) = n(A_1) + n(A_2) + n(A_3) + \ldots + n(A_n)$

(xi) $n(A \Delta B)$ = number of elements which belong to exactly one of A or B.

Example – 14

If A = {1, 2, 3}, B = {4, 5, 6} and C = {7, 8, 9}, verify that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.

Sol. We have, $A = \{1, 2, 3\}$, $B = \{4, 5, 6\}$ and $C = \{7, 8, 9\}$.

$A \cup B = \{1,2,3\} \cup \{4,5,6\} = \{1,2,3,4,5,6\}$ ...(1)

$A \cup C = \{1,2,3\} \cup \{7,8,9\}$

$= \{1,2,3,7,8,9\}$ ...(2)

and $B \cap C = \{4,5,6\} \cap \{7,8,9\} = \phi$ ...(3)

Now $A \cup (B \cap C) = \{1, 2, 3\} \cup \phi = \{1,2,3\}$ ...(4)

and $(A \cup B) \cap (A \cup C) = \{1,2,3,4,5,6\} \cap \{1,2,3,7,8,9\}$

$= \{1,2,3\}$ ...(5)

From (4) and (5), $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$, which verifies the result.

Example – 15

Let U = {1, 2, 3, 4, 5, 6, 7, 8, 9}, A = {2, 4, 6, 8} and B = {2, 3, 5, 7}. Verify that

(i) $(A \cup B)^c = A^c \cap B^c$ **(ii)** $(A \cap B)^c = A^c \cup B^c$.

Sol. We have, A = {2, 4, 6, 8} and B = {2, 3, 5, 7}.

(i) $A \cup B = \{2,4,6,8\} \cup \{2,3,5,7\}$

$= \{2,3,4,5,6,7,8\}$

$(A \cup B)^c = \{1,9\}$ ...(1)

Also $A^c = \{1,3,5,7,9\}$

and $B^c = \{1,4,6,8,9\}$

$A^c \cap B^c = \{1,3,5,7,9\} \cap \{1,4,6,8,9\}$

$= \{1,9\}$ ...(2)

From (1) and (2), $(A \cup B)^c = A^c \cap B^c$, which verifies the result.

(ii) $A \cap B = \{2,4,6,8\} \cap \{2,3,5,7\} = \{2\}$

$(A \cap B)^c = \{1,3,4,5,6,7,8,9\}$ ...(3)

and $A^c \cup B^c = \{1,3,5,7,9\} \cup \{1,4,6,8,9\}$

$= \{1,3,4,5,6,7,8,9\}$ ...(4)

From (3) and (4), $(A \cap B)^c = A^c \cup B^c$, which verifies the result.

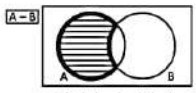
Example – 16

If A and B are any two sets, prove using Venn Diagrams

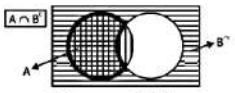
(i) $A - B = A \cap B^c$ **(ii)** $(A - B) \cup B = A \cup B$.

Sol.

(i)

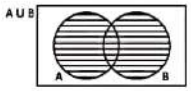


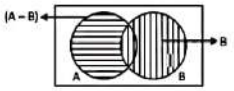
Shaded region in both are the same.



The common shaded area represents the intersection.

(ii)





Combination of all the shaded regions represents the union.

Example – 17

Prove that :

$A \cap (B - C) = (A \cap B) - (A \cap C)$

Sol. Let x be an arbitrary element of $A \cap (B - C)$.

Then $x \in A \cap (B - C)$

$\Rightarrow$ $x \in A$ and $x \in (B - C)$

$\Rightarrow$ $x \in A$ and $(x \in B$ and $x \notin C)$

$\Rightarrow$ $(x \in A$ and $x \in B)$ and $(x \in A$ and $x \notin C)$

$\Rightarrow$ $x \in (A \cap B)$ and $x \notin (A \cap C)$

$\Rightarrow$ $x \in \{(A \cap B) - (A \cap C)\}$

$A \cap (B - C) \subseteq (A \cap B) - (A \cap C)$ ...(1)

Let y be an arbitrary element of $(A \cap B) - (A \cap C)$.

Then $y \in (A \cap B) - (A \cap C)$

$\Rightarrow$ $y \in (A \cap B)$ and $y \notin (A \cap C)$

$\Rightarrow$ $(y \in A$ and $y \in B)$ and $(y \in A$ and $y \notin C)$

$\Rightarrow$ $y \in A$ and $(y \in B$ and $y \notin C)$

$\Rightarrow$ $y \in A$ and $y \in (B - C)$

$\Rightarrow$ $y \in A \cap (B - C)$

$(A \cap B) - (A \cap C) \subseteq A \cap (B - C)$ ...(2)

Combining (1) and (2).

$A \cap (B - C) = (A \cap B) - (A \cap C)$.

Example – 18

Prove the following :

$A \subset B \Leftrightarrow B^c \subset A^c$

Sol. Let $x \in B^c$, where x is arbitrary.

Now $x \in B^c$

$\Rightarrow$ $x \notin B$

$\Rightarrow$ $x \notin A$ $[\because A \subset B]$

$\Rightarrow$ $x \in A^c$

$B^c \subset A^c$ ...(1)

Conversely : Let $x \in A$, where x is arbitrary.

Now $x \in A$

$\Rightarrow$ $x \notin A^c$

$\Rightarrow$ $x \notin B_c$ $[\because B^c \subset A^c]$

$\Rightarrow$ $x \in B$

$A \subset B$

Combining (1) and (2), $A \subset B \Leftrightarrow B^c \subset A^c$.

Example – 19

Prove the following :

$A - B = A - (A \cap B)$

where U is the universal set.

Sol. Let $x \in (A - B)$, where x is arbitrary.

Now $x \in (A - B)$

$\Leftrightarrow$ $x \in A$ and $x \notin B$

$\Leftrightarrow$ $(x \in A$ and $x \in A)$ and $x \notin B$

[Note this step]

$\Leftrightarrow$ $x \in A$ and $(x \in A$ and $x \notin B)$

[Associative Law]

$\Leftrightarrow$ $x \in A$ and $x \notin (A \cap B)$

$\Leftrightarrow$ $x \in A - (A \cap B)$

Hence $A - B = A - (A \cap B)$.

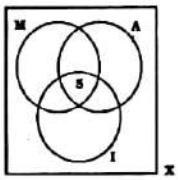
Example – 20

In a class of 200 students who appeared in a certain examination. 35 students failed in MHTCET, 40 in AIEEE, 40 in IIT, 20 failed in MHTCET and AIEEE, 17 in AIEEE and IIT, 15 in MHTCET and IIT and 5 failed in all three examinations. Find how many students

(i) Did not fail in any examination.

(ii) Failed in AIEEE or IIT.

Sol.



$n(M) = 35, n(A) = 40, n(I) = 40$

$n(M \cap A) = 20, n(A \cap I) = 17,$

$n(I \cap M) = 15, n(M \cap A \cap I) = 5$

$n(X) = 200$

$n(M \cup A \cup I) = n(M) + n(A) + n(I) -$

$n(M \cap A) - n(A \cap I) - n(M \cap I) + n(M \cap A \cap I)$

$= 35 + 40 + 40 - 20 - 17 - 15 + 5 = 68$

(i) Number of students passed in all three examination

$= 200 - 68 = 132$

(ii) Number of students failed in IIT or AIEEE

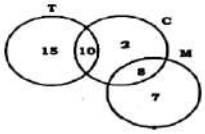
$= n(I \cup A) = n(I) + n(A) - n(I \cap A)$

$= 40 + 40 - 17 = 63$

Example – 21

In a hostel, 25 students take tea, 20 students take coffee, 15 students take milk, 10 students take both tea and coffee, 8 students take both milk and coffee. None of the them take tea and milk both and everyone takes atleast one beverage, find the number of students in the hostel.

Sol.



Let the sets, T and C and set M are the students who drink tea, coffee and milk respectively. This problem can be solved by Venn diagram.

$n(T) = 25; n(C) = 20; n(M) = 15$

$n(T \cap C) = 10; n(M \cap C) = 8$

Number of students in hostel

$= n(T \cup C \cup M)$

$\therefore n(T \cup C \cup M) = 15 + 10 + 2 + 8 + 7 = 42$

Some standard notations to represent sets :

N : the set of natural numbers

W : the set of whole numbers

Z : the set of integers

Z^+ : the set of positve integers

Z^- : the set of negative integers

Q : the set of rational numbers

I : the set of irrational numbers

R : the set of real numbers

C : the set of complex numbers

Other frequently used symbols are :

$\in$: 'belongs to'

$\notin$: 'does not belong to'

$\exists$: There exists, $\nexists$: There does not exist.

INTERVALS AS SUBSETS OF REAL NUMBERS

An interval I is a subset of R such that if $x, y \in I$ and z is any real numbers between x and y then $z \in I$.

Any real number lying between two different elements of an interval must be contained in the interval.

If $a, b \in R$ and $a < b$, then we have the following types of intervals :

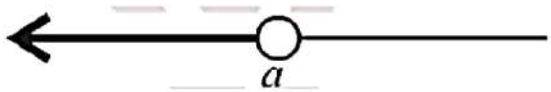
(i) The set $\{x \in R : a < x < b\}$ is called an open interval and is denoted by (a, b). On the number line it is shown as :

(ii) The set $\{x \in R : a \le x \le b\}$ is called a closed interval and is denoted by $[a, b]$. On the number line it is shown as :

(iii) The set $\{x \in R : a < x \leq b\}$ is an interval, open on left and closed on right. It is denoted by $(a, b]$. On the number line it is shown as :

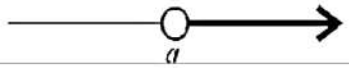
(iv) The set $\{x \in R : a \leq x < b\}$ is an interval, closed on left and open on right. It is denoted by $[a, b)$. On the number line it is shown as :

(v) The set $\{x \in R : x < a\}$ is an interval, which is dentoed by $(-\infty, a)$. It is open on both sides. On the number line it is shown as :



(vi) The set $\{x \in R : x \leq a\}$ is an interval which is denoted by $(-\infty, a]$. It is closed on the right. On the number line it is shown as :

(vii) The set $\{x \in R : x > a\}$ is an interval which is denoted by (a, ∞). It is open on the both sides. On the number line it is shown as :



(viii) The set $\{x \in R : x \geq a\}$ is an interval which is denoted by $[a, \infty)$. It is closed on left. On the number line it is shown as :

First four intervals are called finite intervals and the number $b-a$ (which is always positive) is called the length of each of these four intervals (a, b), $[a, b]$, $(a, b]$ and $[a, b)$.

The last four intervals are called infinite intervals and length of these intervals is not defined.

BY ONE MORE WAY, STUDENTS YOU CAN UNDERSTAND THE TOPIC OF

POWER SET

AKS

1.5 POWER SET

Let A = {a, b} then, Subset of A are ϕ, {a}, {b} and {a, b}.

If we consider these subsets as elements of a new set B (say) then, B = $\{\phi, \{a\}, \{b\}, \{a, b\}\}$

B is said to be the power set of A.

Notation : Power set of a set A is denoted by P(A).
and it is the set of all subsets of the given set.

Example 1.11 Write the power set of each of the following sets :

(i) $A = \{x : x \in R \text{ and } x^2 - 7 = 0\}$.

(ii) $B = \{y : y \in N \text{ and } 1 \le y \le 3\}$.

Solution :

(i) Clearly $A = \phi$ (Null set), $\therefore$ ϕ is the only subset of given set, $\therefore$ $P(A) = \{\phi\}$

(ii) The set B can be written as $\{1, 2, 3\}$

Subsets of B are ϕ, $\{1\}$, $\{2\}$, $\{3\}$, $\{1, 2\}$, $\{1, 3\}$, $\{2, 3\}$, $\{1, 2, 3\}$.

$\therefore$ $P(B) = \{\ \phi, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}\ \}$.

Example 1.12 Write each of the following sets as intervals :

(i) $\{x \in R : -1 < x \leq 2\}$ (ii) $\{x \in R : 1 \geq 2x - 3 \geq 0\}$

Solution : (i) The given set $= \{x \in R : -1 < x \leq 2\}$

Hence, Interval of the given set $= (-1, 2]$

(ii) The given set $= \{x \in R : 1 \geq 2x - 3 \geq 0\}$

$\Rightarrow \{x \in R : 4 \geq 2x \geq 3\}$, $\Rightarrow \left\{x \in R : 2 \geq x \geq \frac{3}{2}\right\}$

$\Rightarrow \left\{x \in R : \frac{3}{2} \leq x \leq 2\right\}$, Hence, Interval of the given set $= \left[\frac{3}{2}, 2\right]$

FEW MORE EXAMPLES

EXAMPLE: 1.13

Which of the following sets can be considered as a universal set ?

$\mathbf{X} = \{x : x \text{ is a real number}\}$

$\mathbf{Y} = \{y : y \text{ is a negative integer}\}$

$\mathbf{Z} = \{z : z \text{ is a natural number}\}$

Solution : As it is clear that both sets **Y** and **Z** are subset of **X**.

$\therefore$ **X** is the universal set for this problem.

EXAMPLE: 1.14

- Given that

$A = \{x : x \text{ is a even natural number less than or equal to } 10\}$

and $B = \{x : x \text{ is an odd natural number less than or equal to } 10\}$

Find (i) $A - B$ (ii) $B - A$ (iii) is $A - B = B - A$?

Solution : It is given that

$A = \{2, 4, 6, 8, 10\}, B = \{1, 3, 5, 7, 9\}$

Therefore, (i) $A - B = \{2, 4, 6, 8, 10\}$, (ii) $B - A = \{1, 3, 5, 7, 9\}$

(iii) Clearly from (i) and (ii) $A - B \neq B - A$.

EXAMPLE: 1.15

Let U be the universal set and A its subset where

$U = \{x : x \in N \text{ and } x \leq 10\}$

$A = \{y : y \text{ is a prime number less than } 10\}$

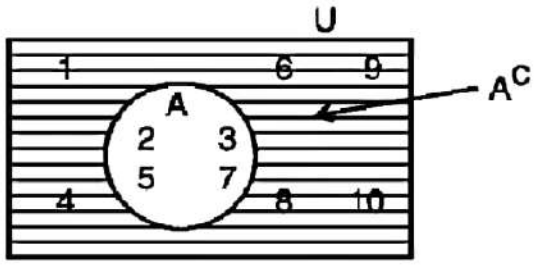
Find (i) A^c (ii) Represent A^c in Venn diagram.

Solution : It is given

$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. and $A = \{2, 3, 5, 7\}$

(i) $A^c = U - A = \{1, 4, 6, 8, 9, 10\}$

(ii)



Example 1.16 Given that

A {x : x is a king out of 52 playing cards}

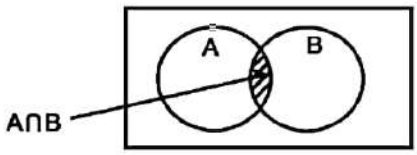
and B = { y : y is a spade out of 52 playing cards}

Find (i) $A \cap B$ (ii) Represent $A \cap B$ using Venn diagram

Solution : (i) As there are only four kings out of 52 playing cards, therefore the set A has only four elements The set B has 13 elements as there are 13 spade cards but out of these 13 spade cards there is one king also. Therefore there is one common element in A and B.

$\therefore A \cap B$ = { King of spade}.

(ii)



LET US SUM UP

- A set is a collection of well-defined distinct (different) objects.

- To represent a set in Roster form all elements are to be written but in set builder form a set is represented by the common property of its elements.

- If the elements of a set can be counted then it is called a finite set and if the elements cannot be counted, it is infinite.
- If each element of set A is an element of set B, then A is called sub set of B.
- For two sets A and B, $A - B$ is a set of those elements which are in A but not in B.
- Complement of a set A is a set of those elements which are in the universal set but not in A. i.e. $A^c = U - A$
- Intersection of two sets is a set of those elements which belong to both the sets.
- Union of two sets is a set of those elements which belong to either of the two sets.

- Any set 'A' is said to be a subset of a set 'B' if every element of A is contained in B.
- Empty set is a subset of every set.
- Every set is a subset of itself.
- The set 'A' is a proper subset of set 'B' iff $A \subseteq B$ and $A \neq B$
- The set of all subsets of a given set 'A' is called power set of A.
- Two sets A and B are equal iff $A \subseteq B$ and $B \subseteq A$
- If $n(A) = p$ then number of subsets of $A = (2)^p$

- (a, b), $[a, b]$, $(a, b]$ and $[a, b)$ are finite intervals as their length b – a is real and finite.
- Complement of a set A with respect to U is denoted by A′ and defined as $A' = \{x : x \in U \text{ and } x \notin A\}$
- $A' = U - A$
- If $A \subset U$, then $A' \subset U$

****

WRITE ALL BASICS/ EXAMPLES AS GIVEN ABOVE

&

Do

Ex.1.1 TO Ex. 1.6

WITH ALL

N.C.E.R.T EXAMPLES

from

N.C.E.R.T. MATHS BOOK

ALL WORK IS TO BE DONE IN
MATHS CLASSWORK REGISTER

FOR ANY FURTHER QUERIES/DOUBTS, FEEL FREE TO CONTACT:

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THANKS