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JULY, 2017 ISSUE

FOUNDATION

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CMA STUDENTS' E - bulletin

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THE INSTITUTE OF COST ACCOUNTANTS OF INDIA
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Behind every successful business decision, there is always a CMA

Message from the President

Dear Students,
Greetings,

"Education is not preparation for life; education is life itself"- John Dewey
Hope you all have enjoyed the Global Summit 2017. You must admit that it was a great occasion of your Institute where the Hon'ble President of India with the Hon'ble Governor of W.B. and Hon'ble Union Minister of State for Finance and Corporate Affairs, has attended to encourage all of us. I am sure that no words can fully describe all the feelings you had on the day.

As I believe that life is like a camera; focus on what's important, capture the good times, develop from the negatives and if things don't work out take another shot, hence, my suggestion to all of you that-never give up because great things take time; and you really can do whatever you want. Start believing that ***'I do it because I can, I can because I want to, I want because you said I could not'.*** Difficult roads often lead to beautiful destinations. Enjoy life today. Yesterday is gone and tomorrow may never come & in your life you should never sacrifice three things; your family, your heart or your dignity.

Your first examination under syllabus 2016 is already over. Hope you did well and have started counting days for getting good news. If it is not as per the expectation then my suggestion is ***'Do not give up, the beginning is always the hardest'.***

E-bulletin helps you in your preparation and I have received information from many of you and I am sure that you must capture good things out of it. My sincere thanks go to all the eminent academicians who are constantly giving input for it. I must appreciate the effort of Directorate of Studies for timely running the issues.

'No amount of guilt can change the past and no amount of worrying can change the future'. Be Strong and Keep Moving.....

Best wishes to all of you,

CMA Manas Kumar Thakur
President
The Institute of Cost Accountants of India

Be a CMA, be a Proud Indian

Message from the Chairman

Education is not filling the mind with a lot of facts. Perfecting the instrument and getting complete mastery of my own mind is the ideal of education-Swami Vivekananda

Dear Students,

I am sure that you must agree with me that only book-learning is not education. TThe perfect blending of knowledge and practical exposure can make you truly educated and you have to grow inside out. Education plays its continuous role in all spheres of life. When we are not making an effort to learn, our mind is always processing new information or trying to analyze the similarities as well as the tiny nuances within the context which makes the topic stand out or seem different. Education, if looked at beyond its conventional boundaries, forms the very essence of all our actions.

I feel that your journey with the Institute has started with a positive note and you should accomplish your study and reach your target in a desired way. Receiving a good education helps empower you, thus making you strong enough to look after yourself in any given situation. It keeps you aware of your given surrounding as well as the rules and regulations of the society you're living in. We are trying to impart you to the best possible manner and your duty is to learn at best.

Directorate of Studies are issuing this E-bulletin and I am sure that you are trying to utilise the opportunity at best. I am receiving positive feed-back from the students and requesting you further to enrich yourself by going through the Mock Test Papers / MTPs and to read carefully your study materials as well.

I am happy to know that you are very much delighted to see the august presence of the dignitaries in the Global Summit-2017 in Kolkata.

Education is not the learning of facts but the training of the mind to think-Albert Einstein

Wishing you a very bright career ahead,

CMA Pappa Rao Sunkara,
Chairman,
Training & Education Facilities (T& EF) Committee

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KNOWLEDGE UPDATE

In this section of e-bulletin we shall have a series of discussion on each of these chapters to provide a meaningful assistance to the students in preparing themselves for the examination at the short end and equip them with sufficient knowledge to deal with real life complications at the long end.

PAPER: 1, PART- I

FUNDAMENTALS OF ECONOMICS & MANAGEMENT (FEM) - ECONOMICS

CMA Sucharita Chakraborty
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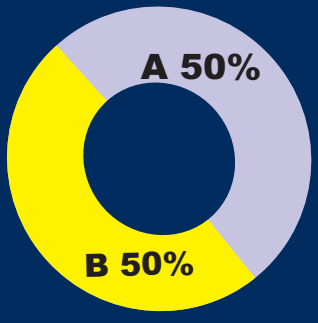
Your Preparation Quick Takes

Syllabus Structure

A Fundamentals of Economics **50%**
B Fundamentals of Management **50%**



Learning Objectives:

Actual cost is defined as the cost or expenditure which a firm incurs for producing or acquiring a good or service. Eg Cost of raw materials, Wage Bill etc. Here we discuss different types of cost other than actual cost with examples which are relevant for decision making purpose.
Since you are on the way of crossing the bridge of CMA, you need to understand these concepts.

Opportunity Cost

The basic economic problem is the issue of scarcity. Because resources are scarce but wants are unlimited, people must make choices. " Opportunity cost is a key concept in economics, and has been described as expressing "the basic relationship between scarcity and choice."

Opportunity cost refers to a benefit that a person could have received, but gave up, to take another course of action

Every time you make a choice, there is a certain value you place on that choice. You might not know it or think about it, but every choice has a value to you. When you choose one thing over another, you're saying to yourself, I value this more than another choice I had. **The opportunity cost** of a choice is what you gave up to get it. If you have two choices - either an apple or an orange - and you choose the apple, then your opportunity cost is the orange you could have chosen but didn't. You gave up the opportunity to take the orange in order to choose the apple. In this way, opportunity cost is the value of the opportunity lost.

Opportunity cost is the profit lost when one alternative is selected over another. For example, you have Rs 1,000,000 and choose to invest it in a product line that will generate a return of 9%. If you could have spent the money on a different investment that would have generated a return of 12%, then the 3% difference between the two alternatives is the foregone opportunity cost of this decision.

Some Other Important Concepts

Sunk Cost
A **sunk cost** is a **cost** that has already been incurred and cannot be recovered. **Sunk costs** are irrelevant for decisions, because they cannot be changed.

Example
The **depreciation** is a **sunk cost**. Also, remember that the equipment has no resale value or alternative use, so the equipment and the **depreciation** expense associated with it are irrelevant to the decision.

Differential Cost

Differential cost is the difference between the **cost** of two alternative decisions, or of a change in output levels. The concept is used when there are multiple possible options to pursue, and a choice must be made to select one option and drop the others.

Example

Assume that managers have to decide whether to close a store that is not meeting its sales quota or keep it open even if sales have not hit the breakeven point for several months. On one hand, closing the store will eliminate all other costs, but lease of Rs 10,000 per month will continue for the next six months. On the other hand, keeping the store open until the lease expires will result in a monthly net loss of Rs 6,000. The differential cost here is Rs 4,000 which is computed by subtracting Rs 6,000 from Rs 10,000.

Incremental Cost
Incremental costs are addition to costs resulting from a change in the nature of level of business activity. As the costs can be avoided by not bringing any variation in the activity in the activity, they are also called as "Avoidable Costs" or "Escapable Costs". More ever incremental costs resulting from a contemplated change is the Future, they are also called as "Differential Costs"
Example: Change in distribution channels adding or deleting a product in the product line.

Implicit Cost
Implicit costs are a part of opportunity cost. They are the theoretical costs ie., they are not recognised by the accounting system and are not recorded in the books of accounts but are very important in certain decisions. They are also called as the earnings of those employed resources which belong to the owner himself. Implicit costs are also called as "Imputed costs".

Examples: Rent on idle land, depreciation on dully depreciated property still in use, interest on equity capital etc.

Direct Cost
Direct costs are those which have direct relationship with a unit of operation like manufacturing a product, organizing a process or an activity etc. In other words, direct costs are

those which are directly and definitely identifiable. The nature of the direct costs are related with a particular product/process, they vary with variations in them. Therefore all direct costs are variable in nature. It is also called as "Traceable Costs"

Examples: In operating railway services, the costs of wagons, coaches and engines are direct costs.

Indirect Costs

Indirect costs are those which cannot be easily and definitely identifiable in relation to a plant, a product, a process or a department. Like the direct costs indirect costs, do not vary ie., they may or may not be variable in nature. However, the nature of indirect costs depend upon the costing under consideration. Indirect costs are both the fixed and the variable type as they may or may not vary as a result of the proposed changes in the production process etc. Indirect costs are also called as Non-traceable costs.

Example: The cost of factory building, the track of a railway system etc., are fixed indirect costs and the costs of machinery, labour etc.

PAPER: 1, PART- II

FUNDAMENTALS OF ECONOMICS & MANAGEMENT (FEM) - MANAGEMENT

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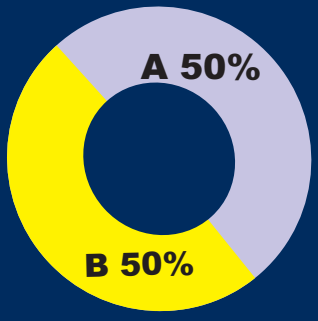
Your Preparation Quick Takes

Syllabus Structure

A Fundamentals of Economics **50%**
B Fundamentals of Management **50%**



Learning Objectives:

- Students will demonstrate their knowledge of business and management principles
- Students will reveal effective written and oral communication
- Students will exhibit an awareness of the global environment in which businesses operate
- Students will display the ability to recognize when change is needed, adapt to change as it occurs, and lead change

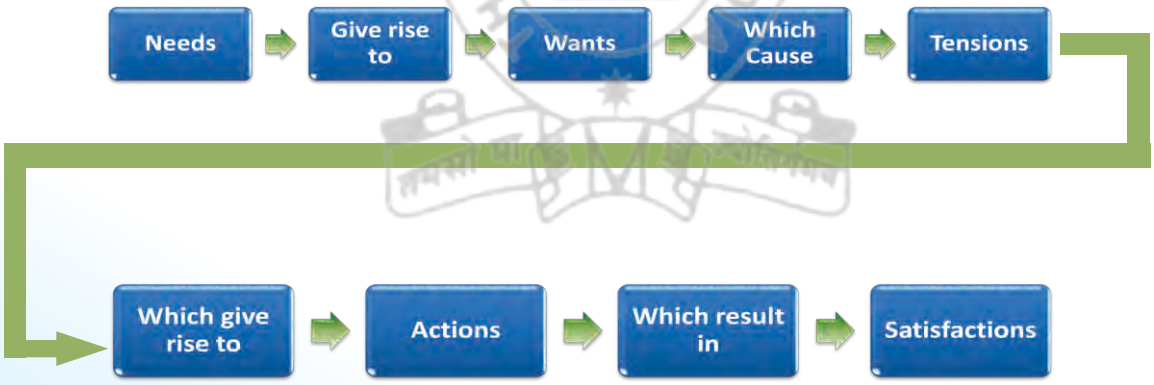
MANAGEMENT

It takes only a moment's thought to realize that at any given time, an individual's motives may be quite complex and often conflicting.

Difference between Motivation & Satisfaction:

Motivation refers to the drive and effort to satisfy a want or goal. Satisfaction refers to the contentment experienced when a want is satisfied. From a management point of view, then, a person might have high job satisfaction but a low level of motivation for the job, or the reverse might be true. The various leading theories of motivation and motivators seldom make reference to the carrot and stick. This metaphor relates to the use of rewards and penalties in order to induce desired behaviour. It comes from the old story that to make a donkey move, one must put a carrot in front of him or jab him with a stick from behind.

The Need-Want-Satisfaction Chain:



From the above diagram, it is possible to look at motivation as involving a chain reaction- needs give rise to wants or goals sought, which cause tensions or unfulfilled desires and which give rise to actions toward achieving goals and finally which result in satisfaction. In real world, need-want-satisfaction chain does not always operate as simply as portrayed. Needs to cause behaviour, but needs also may result from behaviour. Satisfying one need may lead to a desire to satisfy more needs. Behaviour is often what people do and not why they do it.

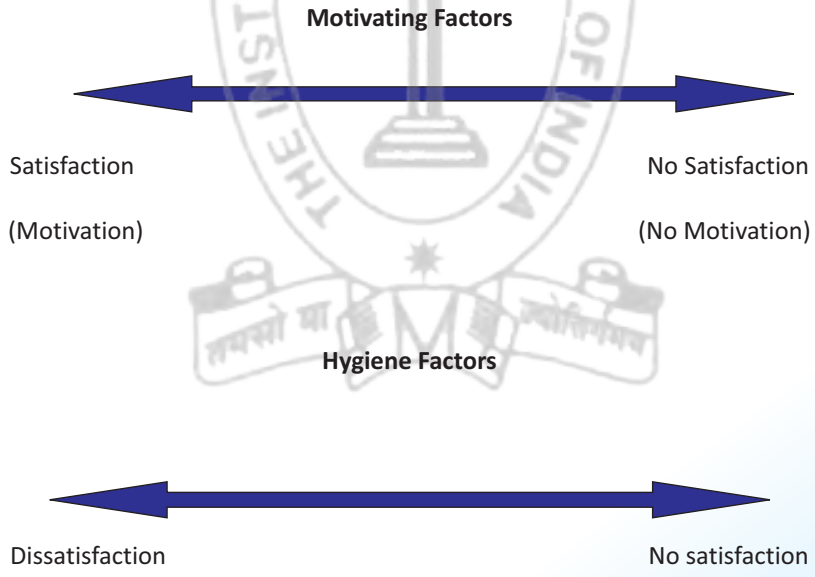
In the late fifties, Frederick Herzberg and his associates conducted interviews of 200 engineers and accountants in the Pittsburgh area of the United States. These persons were asked to relate elements of their jobs which made them happy or unhappy. An analysis of their answers re-veiled that feelings of unhappiness or dissatisfaction were related to the environment in which people were working. On the contrary, feelings of happiness or satisfaction were related to their jobs.

According to Herzberg, maintenance or hygiene factors are necessary to maintain a reason- able level of satisfaction among employees. These factors do not provide satisfaction to the employees but their absence will dissatisfy them. Therefore, these factors are called dis-satisfiers. These are not intrinsic parts of a job but they are related to conditions under which a job is performed. They are environmental factors (extrinsic to the job) and are given in the following table:

Maintenance Factors	Motivating Factors
Company Policy and Administration Technical Supervision Inter-personal relationship with peers Inter-personal relationship with Supervisors Inter-personal relationship with Subordinates Salary Job Security Working condition status	Achievement Recognition Advancement Opportunity for growth Responsibility Work itself

On the other hand, motivational factors are intrinsic parts of the job. Any increase in these factors will satisfy the employees and help to improve performance. But a decrease in these factors will not cause dissatisfaction.

Traditionally, job satisfaction and dissatisfaction were viewed as opposite ends of a single continuum. Herzberg's findings indicate that dissatisfaction is not simply the opposite of satisfaction or motivation. Satisfaction and dissatisfaction are independent rather than opposite ends of the same continuum.



PAPER: 2

FUNDAMENTALS OF ACCOUNTING (FOA)

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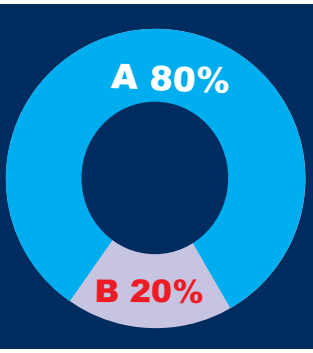
Your Preparation Quick Takes

Syllabus Structure

A Fundamentals of Financial Accounting **80%**

B Fundamental of Accounting **20%**



Learning Objectives:
In order to internalize the concepts of subjects like accountancy one has to have an understanding of the learning objectives of the chapters. Try to go through the Statement of Objects and Reasons issued for every topics as it would give you a background to your study.

PREPARATION OF FINAL ACCOUNTS UNDER SINGLE ENTRY SYSTEM

SECTION: A UNIT: 4 (c)

1. INTRODUCTION

Single entry system is considered as a no system at all. Experts believe unlike double entry system it has no scientific basis. Questions may arise – "why should this to be learnt"? It is true that like double entry system it has no such scientific system. However it is also true that arithmetically through a simple statement business logics can be explained and profit can be ascertained by comparing the opening capital and closing capital under single entry system. The traditional concept of profit is closing capital minus opening capital. For example if a peddler starts his day with Rs. 1000 and finds Rs. 1200 in his hand at the end of the day he considers Rs. 200 as his net earnings for the day. However this ignores the financial happenings during the day. During the day he may take lunch and spent Rs. 50. In that case his earning increases by Rs.50 because even if spending Rs.50 for personal consumption he is left with Rs.200. so his actual earnings become Rs.250. On the other hand he may bring Rs. 100 from home during afternoon for his business which will reduce his net earnings by Rs. 100.

Thus the formula for ascertaining profit is modified as (closing capital +drawings – opening capital-further introduction of capital). From the above example profit = 1200+50-1000-100 = 150/-. Small traders, grocery shop owners may maintain such type of accounts which may not follow the true spirit of double entry system and it may not be possible to record all transactions. This results in incomplete recording of the transactions in the books. This is the reason it is called "final accounts from incomplete records".

2. PREPARATION OF FINAL ACCOUNTS

Under this system two statements are prepared – a. Statement of profit and loss and b. Statement of affairs.

Step 1. Prepare statement of affairs at the beginning as well as at the year end to find out the opening and closing capital respectively.

Step 2. Prepare statement of profit and loss to ascertain the trading profit.

Step 3. Prepare statement of affairs as at the year end to show the financial position of the business.

3. ILLUSTRATIONS

A. *Mr . Raman starts a business with Rs.30000 cash as her capital on January 1 2016. At the close of the year the financial position of her business was as follows :*

Creditors 20000, cash at bank 15000, debtors 25000, stock 20000, plant 40000.

During the year , Mr Raman drew Rs. 1000 every month. On July 1 2016 , he introduced further capital amounting to Rs. 15000.

You are required to ascertain profit or loss made by her during the year. Following adjustments are required to be made :

Plant to be depreciated at 10 % and reserve of 2 ½ % is to be raised against debtors.

Statement of profit and loss for the year ended 31.12.2016

Particulars	amount	particulars	amount
Capital (closing)	80000	Cash at bank	15000
- Balancing figure		debtors	25000
Creditors	20000	stock	20000
		plant	40000
	100000		100000
Opening capital	30000	Closing capital	80000
Further introduction of capital	15000	Drawings (1000x12)	12000
Trading profit	47000		
	92000		92000
		Trading profit	47000
Depreciation(40000x10%)	4000		
Reserve for bad debt(25000x2.5%)	625		
Net profit	42375		
	47000		47000

Statement of Affairs for the year ended 31.12.2016

Particulars	amount	Particulars	amount
Capital	30000	Cash at bank	15000
Further capital	15000	Debtors(25000-625)	24375
Drawings	(12000)	stock	20000
Net profit	42375	Plant(40000-4000)	36000
Creditors	20000		
	95375		95375

B. The following information is available from Sachin who maintains books of accounts on single entry system.

Particulars	01.04.2016	31.03.2017
Cash and bank	20000	21000
Sundry debtors	17000	25000
Stock	40000	60000
Furniture	29000	29000
Creditors	32000	22000
10 % loan from Mrs. Sachin	30000	30000

Sachin withdrew Rs.5000 from the business every month for meeting his household expenses. During the year he sold investments held by him privately for Rs. 35000 and invested the amount in his business. At the end of the year 2015-16, it was found that full years interest t on loan from Mrs. Sachin had not been paid. Depreciation @ 10% p.a was to be provided on furniture for the full year. Shop assistant was to be given a share of 5% on the profits ascertained before charging such share. Calculate profit earned during the year ended 31.03.2016 by Sachin.

Statement of profit and loss for the year ended 31.03.2017

Particulars	amount	amount	Particulars	amount	amount
Capital (opening & closing)	44000	83000	Cash at bank	20000	21000
- Balancing figure			debtors	17000	25000
Creditors	32000	22000	stock	40000	60000
Loan from Mrs Sachin	30000	30000	furniture	29000	29000
	106000	135000		106000	135000
Opening capital		44000	Closing capital		83000
Further introduction of capital		35000	Drawings (5000x12)		60000
Trading profit		64000			
		143000			143000
			Trading profit		64000
Depreciation (29000x10%)		2900			
Interest on loan (30000x10%)		3000			
Net profit		58100			

		64000			64000
Commission to shop assistant			Net profit		58100
(58100x 5%)		2905			
Net profit		55195			
		58100			58100

Statement of Affairs for the year ended 31.03.2017

Particulars	amount	Particulars	amount
Capital	44000	Cash at bank	21000
Further capital	35000	Debtors	25000
Drawings	(60000)	Stock	60000
Net profit	55195	Furniture(29000-2900)	26100
Creditors	22000		
Interst on loan	3000		
Commission to assistant	2905		
Loan from Mrs Sachin	30000		
	132100		132100

Keep practicing from the past year question papers and refer the books as listed below for more illustrations.

With best wishes

PAPER: 3

FUNDAMENTALS OF LAWS AND ETHICS (FLE)

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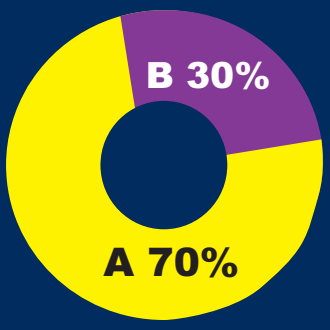
Your Preparation Quick Takes

Syllabus Structure

A Fundamentals of Commercial Laws **70%**
B Fundamentals of Ethics **30%**



Learning Objectives:

- Read the Study Material minutely.
- For details or if you don't understand Study Material or the section is important to identify the topic, then refer to Bare Act, otherwise reference to Bare Act is not necessary. For Company Law, book by Avtar Singh is recommended. For other laws Institute Study Material is sufficient.
- The words used in any of the texts as mentioned above should be understood by immediate reference to the Dictionary.
- The main points coming out in any of the provisions should be either underlined or written in separate copy which has to be repeated again and again.
- Theoretical knowledge should be adequate and clear before solving practical problems.
- Don't write wrong English. It changes the meaning and therefore answer may be wrong even when the student's conception is clear. Also don't make spelling mistakes.

INDIAN CONTRACT ACT

An agreement is unlawful if the court finds it and regards it to be opposed to public policy. If the terms of the contract are unreasonable and opposed to public policy then it cannot be enforced on the fact that other conditions of a valid contract are present. The term 'public policy' is not defined or coded in law. This doctrine of public policy is governed by judiciary and it is only invoked when harm to the public is clear and loud. The following agreements are declared to be against public policy' –

a) Trading with enemy – all contracts made with enemies is illegal unless made with the permission of the government. When a war breaks out the citizens of the countries become alien enemies to each other. And any agreement made with alien enemies is opposed to public policy and is void.

b) Agreement against stifling prosecution – stifling of prosecution refers to the drop of any public prosecution against nay person. It is the fundamental law that anybody who has committed any crime has to be punished by law and any agreement to protect such person from law and punishment against money is opposed to public policy and is void. X with the notice that Y has committed a crime obtains a promise from Y to get Rs.1000 in consideration for not exposing Y, is a case of stifling with prosecution and is opposed to public policy and hence void.

c) Contracts in nature of champerty and maintenance - maintenance refers to the act of promoting or financing a prosecution by a third party has no interest in the proceeding. In order to avoid contemptuous litigation and harassment of any of the party, maintenance is against the public policy. Champerty on the other hand refers to the agreement wherein one party is to assist another in recovery of a property and in return the former would receive a share in the proceeds of action. In order to avoid speculative litigation, champerty is treated as against public welfare. As per the Indian law champerty and maintenance are not always illegal and that courts will refuse to enforce such agreements only when they are not made with bonafide objective to assist the person in getting his claim who is unable to carry on the litigation himself. Thus as per the Indian Law if the suit is found to be reasonable and it is filed with a bonafide object of assisting a person in making his claim which is believed to be just and if the parties agree on a fair and reasonable share of profit, then maintenance and champerty are not against public policy.

d) Agreements for the sale of public offices and titles – it is also known as trafficking of the public policy. Since trafficking by way of sale in public offices or titles interfere in selection of the best qualified person, it is unlawful and against public policy. In a famous case *Parkinson vs. College of Ambulance Ltd*, the secretary of the college promised Col. Parkinson that if he made a large donation to the college he would secure a knighthood for him. It was held that such an agreement was against public policy and thus void. E.g. an agreement to provide money to an MP or a minister to influence his opinion or judgment, an agreement to procure a public title, an agreement to get a seat in any institute against extra money, an agreement for procuring votes against money are agreements against public policy as they are sale of public offices.

e) Agreements in restraint of parental rights – The father and mother of a minor child are the natural guardians and they cannot be alienated from their right. Their right of

guardians cannot be bartered away and hence any agreement purporting to do so is against public policy and hence void. In a *case Giddu Narayanish vs. Mrs. Anne Besant*, the father of 2 minor sons agreed to transfer his guardianship in favor of Mrs. Anne Besant, and subsequently filed a suit for the recovery of the boys stating that he was the rightful guardian. It has held he had the right to revoke his authority and get back his children.

f) Agreements in restraint of marriage – the law observes that marriage is the right of every individual and any restraint of marriage of a person except a minor is void (section 26). In India a total or partial restraint of marriage is against public policy and hence void.

g) Marriage brokerage – a marriage brokerage is one in which either of the parties to a marriage or their parents or any third party receives a sum of money in consideration of a marriage. Accordingly dowry is marriage brokerage and is against public policy, hence void.

h) Agreement interfering in the course of justice – an agreement to interfere in the outcome of a case by way of influencing the judge or officers thru use of kind or cash is against public policy and hence void.

i) Contracts tending to create monopolies - in the case of The *District Board of Jhelum vs. Harichand*, a local body granted a monopoly to A to sell vegetables to a particular locality. It has held that such agreements are against public policy and hence void.

j) Agreement in restraint of personal liberty – if any agreement takes away the freedom of a person to speak, express of behave in his own will then such agreement is against public policy as it impinges on the personal right of the individual, hence void. 3

Supplement your readings with the study material and books and case studies for a deeper understanding of the subject.

PAPER: 4

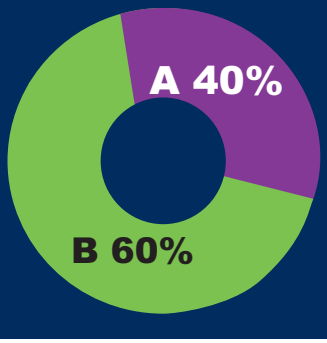
FUNDAMENTALS OF BUSINESS MATHEMATICS AND STATISTICS (FBMS)

Dr. Lakshmi Kanta Roy
Guest Lecturer
Vidyasagar Mahavidyalaya

Your Preparation Quick Takes

Syllabus Structure

A Fundamentals of Business Mathematics **40%**
B Fundamentals of Business Statistic **60%**



Learning Objectives:

- appreciate the usefulness, power and beauty of mathematics
- enjoy mathematics and develop patience and persistence when solving problems
- understand and be able to use the language, symbols and notation of mathematics
- develop mathematical curiosity and use inductive and deductive reasoning when solving problems
- become confident in using mathematics to analyse and solve problems both in professional and in real-life situations

Ratio & Proportion

1.1 **INRTODUCTION:**

It is often required to compare between two quantities of same kind in our practical life. Such as price of two quantities, weight of two materials, height of two individuals etc. But it is to be remembered that this type of comparison is possible if and only if they are expressed in the same unit. In this comparison it is understood that how many times one quantity is greater or lesser than the other quantity. This type of comparison is termed as Ratio. Therefore the Ratio can be defined in the following way:

1.2 **DEFINITION:**

Ratio is a comparative number which specify how many times one quantity is greater or lesser than the same other quantity when they are expressed in the same unit and compared between themselves.

EXAMPLE:

(i) The ratio of the price of 1Kg sugar (say Rs. 40) and that of 1Kg Rice (say Rs. 35) = 40:35 = 8:7

(ii) Ratio of 60 Kg and 45 Kg = 60:45=4:3

NOTE:

(i) The ratio of x and y = x : y, Here x and y are the terms of the ratio.
The term x is called Antecedent and y is called Consequent.

(ii) The ratio is a pure number.

(iii) The ratio can be expressed as fraction.
EXAMPLE : The ratio of Rs. 35 and Rs. 15 = 35:15

$$= \frac{35}{15} = \frac{7}{3} = 7:3$$

(iv) If the quantities are not in the same unit, then the units are to be converted to the same unit to obtain the ratio.

EXAMPLE: Find the ratio of 5m and 75 cm

SOLUTION: To find the ratio of 5m and 75 cm it is required to convert either metre to centimetre or centimetre to metre.

∴ The ratio of 5m and 75 cm = 500:75 = 20:3

(v) Let A:B = 7:5. Then it does not empty that that A = 7 and B = 5. It implies that A = 7k and B = 5k when K ($\neq$ 0) is the constant of proportionality.

1.3 **PROPERTIES OF RATIO:**

(i) The value of the ratio remains unaltered if the terms of the ratio are multiplied by the same number.

EXAMPLE: If the terms of the ratio 3:7 are multiplied by 4, the ratio becomes 12:28 $\Rightarrow$ 3:7

(ii) The value of the ratio remains unaltered if the time of the ratio are divided by the same number

EXAMPLE: If the terms of the ratio 21:35 are divided by 7, then the ratio becomes 3:5

1.4 **EQUAL RATIO AND RATIO OF INEQUALITY:**

(i) If X = Y, then the ratio x:y is timed as Equal Ratio

EXAMPLE: 9:9, 13:13 etc are the Equal Ratio.

(ii) If x > y, then the ratio x : y is termed as the ratio of greater Inequality.

EXAMPLE: 17:9, 29:19 etc are the Ratios of Greater Inequality.

(iii) If x < y, then the ratio x : y is termed as the Ratio of Lesser Inequality.

EXAMPLE: 13:18, 28:37 etc are the Ratios of Lesser Inequality.

1.5 **DIFFERENT TYPES OF RATIOS:**

(i) **INVERSE RATIO OR RECIPROCAL RATIO:**

The Inverse ratio of x : y is y : x and conversely the same of y : x is x : y. The product of the ratio and its inverse ratio is $(x : y) \times (y : x) = \frac{x}{y} \times \frac{y}{x} = 1$

(ii) Let x, y and z are three quantities of the same kind. The ratio of x and y is x : y and that of y and z is y : z. Then the continued ratio of x , y and z is x : y : z. Similarly the continued ratio of the x : y, y : z and z : w is x : y : z: w. Hence the continued ratio can be defined as the relation between the magnitudes of the two or more ratios.

EXAMPLE:

(i) The Continued ratio of 7 : 9, 9 : 13 is 7 : 9 : 13

(ii) The continued ratio of 5 : 8 and 13 : 17 is 65 : 104 : 136

Since the ratio $13:17 = 13 \times \frac{8}{13} : 17 \times \frac{8}{13}$

$$= 8 : \frac{136}{13}$$

∴ The continued ratio of 5:8 and 13:17

i.e, $5 : 8$ and $8 : \frac{136}{13}$

is $5 : 8 : \frac{136}{13} \Rightarrow 65 : 104 : 136$

NOTE: The continued ratio x : y : z= m:n:p can be written as $\frac{x}{m} = \frac{y}{n} = \frac{z}{p}$

(iii) **COMPOUND RATIO:**

The compound ratio of x : y and z : w is x × z : y × w i.e, xz : yw. Similarly the compound ratio of u : v, x : y and z : w is vxz : vyw. Therefore the Compound ratio of the given ratios can be defined as the ratio of the product of the antecedents of the given Ratios and that of consequents of the same.

EXAMPLE:

Let the ratios are 3 : 4, 5 : 7 and 9 : 11. Then the product of the antecedents is 3 × 5 × 9 = 135 and that of the consequents is 4 × 7 × 11 = 308

Hence the Compound ratio of 3 : 4, 5 : 7 and 9 : 11 is 135 : 308.

NOTE: The compound ratio of two ratios x : y and y : z is xy : yz $\Rightarrow \frac{xy}{yx}$ = 1. Here the two ratios are reciprocal to each other. Hence it is implied that compound ratio of two reciprocal ratios is unity.

(iv) **DUPLICATE RATIO:**

The Compound ratio of two equal ratios is known as Duplicate ratio i.e, the compound ratio of two equal ratios x : y and x : y is x . x : y . y $\Rightarrow$ $x^2:y^2$ is the Duplicate ratio.

EXAMPLE: The Duplicate ratio of two equal ratios 7 : 8 and 7 : 8 is 7 × 7 : 8.8 i.e, 49 : 64.

(v) **SUB-DUPLICATE RATIO:**

$\sqrt{x}:\sqrt{y}$ is the Sub- Duplicate ratio of X : Y

EXAMPLE: The Sub- duplicate ratio of 9 : 16 is $\sqrt{9}:\sqrt{16}$ i.e, 3:4.

(vi) **TRIPLICATE RATIO:**

The Compound ratio of three equal ratios is called Triplicate ratio i.e., the compound ratio of three equal ratios x : y, x : y and x : y is x . x . x : y .y . y $\Rightarrow$ $x^3:y^3$ is the Triplicate ratio.

EXAMPLE: The Triplicate ratio of three equal ratio 3 : 5, 3 : 5 and 3 : 5 is 3 × 3 × 3 : 5 × 5 × 5

i.e, 27 : 125 $\Rightarrow$ $3^3:5^3$.

(vii) **SUB-TRIPLICATE RATIO:**

$\sqrt[3]{x}:\sqrt[3]{y}$ is the sub - Triplicate Ratio of x : y.

EXAMPLE: The Sub – Triplicate ratio of 64 : 216 is $\sqrt[3]{64}:\sqrt[3]{216} \Rightarrow (64)^{\frac{1}{3}}:(216)^{\frac{1}{3}}$ i.e, 4 : 6

2.1 **PROPORTION:**

If the two ratios x : y and z : w are related as x : y = z : w, then if implies that two ratios are in proportion and the quantities x, y, z and W are said to be Proportional. Here the quantities X and W are. Called Extremes and the quantities y and z are called Means. The quantity w is called the Fourth Proportional of x, y, z.

NOTE: Sometime the proportion x : y = z : w is written as x : y : : z : w.

2.2 The quantities X, Y, Z are termed as continued proportional if and only if ($\Leftrightarrow$) x : y = y : z.

i.e., $\frac{x}{y}=\frac{y}{z} \Rightarrow y^2=xz$. Here Y is called the Mean Proportional of x and z and z is called the Third Proportional of x and y.

EXAMPLE: 4, 8, 16 are continued Proportional since $(8)^2 = 4 \times 16$ i.e., 64

NOTE:

(i) If u, v, p, q, x, y, ... are continued proportional then it is implied that u : v = v : p = p : q = q : x = x : y = ... and vice-versa.

(ii) If x : y = p : q, then it does not imply x = p and y = q, but it implies x = kp and y = kq where k is the constant of proportionality ($\neq$ 0)

2.3 **IMPORTANT LAWS OF PROPORTION:**

(i) **INVERTENDO:**

IF x : y = p : q then y : x = q : p

Proof : Given that x : y = p :q

$$\Rightarrow \frac{x}{y} = \frac{p}{q}$$

$$\Rightarrow \frac{1}{\frac{x}{y}} = \frac{1}{\frac{p}{q}} \Rightarrow \frac{y}{x} = \frac{q}{p} \Rightarrow y:x = q:p$$

(ii) **ALTERNENDO:**

If x : y = p : q, the x : p = y : q

Proof : Given that x : y = p : q $\Rightarrow \frac{x}{y} = \frac{p}{q}$

$$\Rightarrow \frac{x}{p} = \frac{y}{q} \Rightarrow x : p = y : q$$

(iii) **COMPONENDO:**

If x : y = p : q, then (x +y) : y = (p + q) : q

Proof: Given that x : y = p : q $\Rightarrow \frac{x}{y} = \frac{p}{q}$

$$\Rightarrow \frac{x}{y} + 1 \quad \frac{p}{q} + 1 \qquad \Rightarrow \frac{x+y}{y} = \frac{p+q}{q}$$

$$\Rightarrow (x + y) : y = (p + q) : q$$

ILLUSTRATIVE EXAMPLES:

1. Two numbers are in the ratio 2: 3. If 9 is added to each they will be in the ratio 3: 4. Find the numbers.

Solution: Let the two numbers are x and y.

$\therefore$ According to the problem $\frac{x}{y} = \frac{2}{3}$.....(1)

and $\frac{x+9}{y+9} = \frac{3}{4}$.....(2)

From (1) : $x = \frac{2}{3}y$

From (2) : 4x + 36 = 3y + 27

$\Rightarrow 4.\ \frac{2}{3}y + 36 = 3y + 27\ [\because x = \frac{2}{3}y]$

$\Rightarrow \frac{8y}{3} - 3y = 27 - 36$

$\Rightarrow -\frac{y}{3} = -9$

$\Rightarrow y = 27$

$\therefore x = \frac{2}{3}y = \frac{2}{3}.27 = 18$

Hence the required two numbers are 18 and 27

2. What numbers be added to each of the numbers 3,5,7,10 in order to get four numbers in proportion.?

Solution: Let the number to be added is x.

Then $3 + x$, $5 + x$, $7 + x$ and $10 + x$ are proportional

$\therefore \frac{3+x}{5+x} = \frac{7+x}{10+x}$

$\Rightarrow 30 + 13x + x^2 = 35 + 12x + x^2$

$\Rightarrow x = 35 - 30 = 5$

$\therefore$ The required number is 5

3. If a : b = c : d = 2.5 : 1.5, What are the values ab: bc and a + c : b + d?

SOLUTION: Given that a: b = c : d = 2.5 : 1.5

$\therefore \frac{a}{b} = \frac{c}{d} = \frac{2.5}{1.5}$.....(1)

From (1) $ad = bc \Rightarrow \frac{ad}{bc} = 1$

$\therefore$ ad : bc = 1

Again from (1) $\frac{a}{b} = \frac{c}{d} \therefore \frac{a}{b} = \frac{c}{d} = \frac{a+c}{b+d}$

$\therefore \frac{a+c}{b+d} = \frac{a}{b} = \frac{c}{d} = \frac{2.5}{1.5}$

$\Rightarrow \frac{a+c}{b+d} = \frac{2.5}{1.5} = \frac{25}{15} = \frac{5}{3}$

i.e., a + c : b + d = 5 : 3

4. If a, b, c, d, e are in continued proportion, then prove that $a : e = a^4 : b^4$

SOLUTION: Since a, b, c, d, e are in continued proportion

$\therefore \frac{a}{b} = \frac{b}{c} = \frac{c}{d} = \frac{d}{e} = k\ (say) \neq 0$.....(1)

From (1), We have a = bk, b = ck, c = dk. and d = ek

$\therefore a = bk = ck.k = dk.k.k = ek.k.k.k = ek^4$

$b = ck = dk.k = ek.K.k = ek^3$

$c = dk = ek.K = ek^2$

Now $a : e = \frac{a}{e} = \frac{ek^4}{e} = k^4$.....(2)

and $a^4 : b^4 = \frac{a^4}{b^4} = \frac{(ek^4)^4}{(ek^3)^4} = \frac{e^4.k^{16}}{e^4.k^{12}} = K^4$.....(3)

From (2) and (4) we get $\frac{a}{e} = \frac{a^4}{b^4}$

i.e., $a : e = a^4 : b^4$ Proved.

5. If $\frac{\sqrt{a} - \sqrt{b}}{\sqrt{a} + \sqrt{b}} = \frac{1}{2}$, prove that $\frac{a^2 + ab + b^2}{a^2 - ab + b^2} = \frac{91}{73}$

SOLUTION : Given that $\frac{\sqrt{a} - \sqrt{b}}{\sqrt{a} + \sqrt{b}} = \frac{1}{2}$

i.e., $\frac{\sqrt{a} + \sqrt{b}}{\sqrt{a} - \sqrt{b}} = \frac{2}{1}$ [By Invertendo]

i.e., $\frac{\sqrt{a} + \sqrt{b} + \sqrt{a} - \sqrt{b}}{\sqrt{a} + \sqrt{b} - \sqrt{a} + \sqrt{b}} = \frac{2+1}{2-1}$ [By Componendo and Dividendo]

$\Rightarrow \frac{2\sqrt{a}}{2\sqrt{b}} = \frac{3}{1}$

$\Rightarrow \frac{a}{b} = \frac{9}{1}$

$\Rightarrow a = 9b$

Now $\frac{a^2 + ab + b^2}{a^2 - ab + b^2} = \frac{(9b)^2 + 9b.b + b^2}{(9b)^2 - 9b.b + b^2} = \frac{81b^2 + 9b^2 + b^2}{81b^2 - 9b^2 + b^2}$

$= \frac{91b^2}{73b^2} = \frac{91}{73}$ Proved

6. If $\frac{a}{4} = \frac{b}{5} = \frac{c}{9}$, prove that $\frac{a+b+c}{c} = 2$

SOLUTION: Given that $\frac{a}{4} = \frac{b}{5} = \frac{c}{9}$

Let $\frac{a}{4} = \frac{b}{5} = \frac{c}{9} = k \neq 0$

$\therefore a = 4k, b = 5k$ and $c = 9k$..... (1)

Now $\frac{a+b+c}{c} = \frac{4k + 5k + 9k}{9k}$ [By (i)]

$= \frac{18k}{9k} = 2$ Proved

7. If a: b = c : d, show that (xa + yb) : (aα − bβ) : : (xc + yd) : (cα - dβ)

SOLUTION: Given that a: b = c : d

i.e., $\frac{a}{b} = \frac{c}{d}$

Let $\frac{a}{b} = \frac{c}{d} = k$ (say) $\neq 0$

$\therefore$ a = bk and c = dk

Now, (xa + yb) : (a$\propto$ - bβ) = $\frac{ax+yb}{a\alpha - b\beta} = \frac{x.bk+yb}{bk.\alpha - b\beta}$ [$\because a = bk$]

= $\frac{b\ (xy+y)}{b\ (\alpha k - \beta)} = \frac{xk+y}{\alpha k - \beta}$.....(1)

Again, (xc + yd) : (c$\propto$ - dβ) = $\frac{xc+yd}{c\alpha - d\beta} = \frac{x.dk+yd}{dk.\alpha - d\beta}$ [$\because c = dk$)

= $\frac{d(kx+y)}{d\ (kx-\beta)} = \frac{xk+y}{\alpha k - \beta}$.....(2)

There fore from (1) and (2) we have

(ax + yb) : (a$\propto$ - bβ) :: (xc + yd) : (c$\propto$ - dβ)

8. Which is the greatest in the following ratios 5: 6, 3 : 4, 4 : 5 and 6 : 7 ?

SOLUTION: To compare the ratios among themselves, it is required to convert the consequents of the ratios to the same number.

The given ratios are 5: 6, 3 : 4 4 : 5 and 6: 7

The consequents of the rations are 6, 4 ,5, 7 and their L .C. M. is 420

Now,

$5:6 = \frac{5}{6} = \frac{5\times 70}{6\times 70} = \frac{350}{420} = 350:420$

$3:4 = \frac{3}{4} = \frac{3\times 105}{4\times 105} = \frac{315}{420} = 315:420$

$4:5 = \frac{4}{5} = \frac{4\times 84}{5\times 84} = \frac{336}{420} = 336:420$

$6:7 = \frac{6}{7} = \frac{6\times 60}{7\times 60} = \frac{360}{420} = 360:420$

Hence it appears that 6 : 7 is the greatest ratios in the given ratios.

Dear Students,

We are very much delighted to receive responses from all of you; for whom our effort is!
We have noted your queries and your requests will definitely be carried out. Further, requesting you to go through the current edition of the bulletin. All the areas will be covered gradually. Expecting your responses further to serve you better as we believe that there is no end of excellence! One of the mails received is acknowledged below.

Absolutely great learning from the e-bulletin provided by all of you!! Concepts became very clear after solving e- bulletin! The kind of questions contained by this bulletin is can be solved by the students acquainted with basic knowledge!! I hope that this service of providing bulletin to the students is great, it must continued in future!! Thanks

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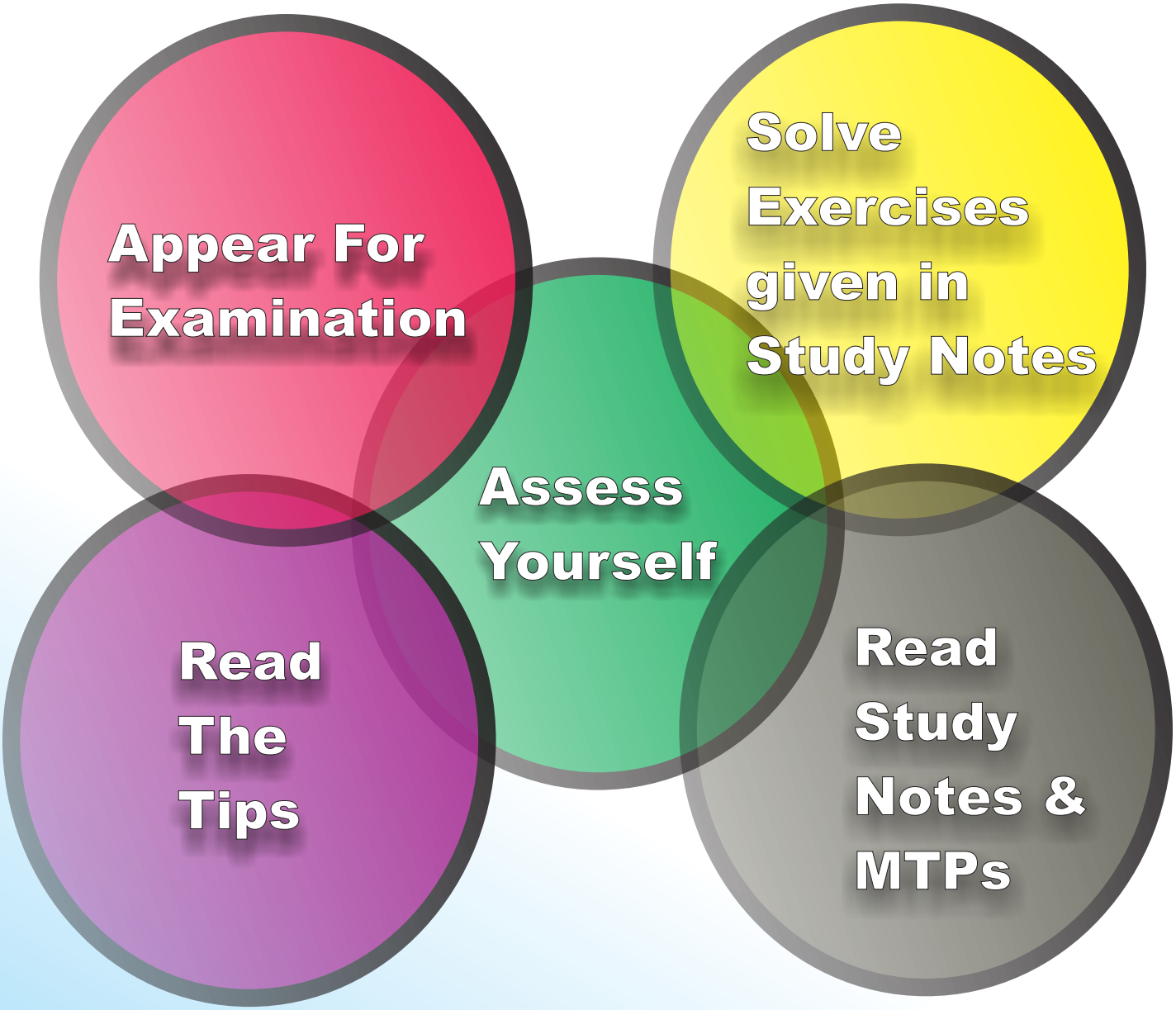

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Message from the Directorate of Studies

Dear Students,

For the smooth and flawless preparation. Directorate of studies have provided meaningful tips which will help you to gain sufficient knowledge about each subject.

"Tips" are given in this E-bulletin by the knowledge experts for the smooth encouragement in you preparation. We are sure that all students will definitely be benefitted by those tips and that will help them to brush up their knowledge and also to swim across.

Take the course seriously from the very beginning but don't be panicky. Please try to follow the general guidelines, mentioned below; which may help you in your preparation.

Essentials for Preparation:

- Conceptual understanding & Overall understanding of the subject both should be clear.
- Candidates are advised to go through the study material provided by the Institute in an analytical manner.
- Student should improve basic understanding of the subject with focus on concepts.
- Students Should improve basic understanding of the subject with focus on core concepts.
- The Candidates are expected to give to the point answer, which is a basic pre-requisite for any professional examination.
- To strengthen the answers candidates are advised to give answer precisely and in a structured manner.
- In-depth knowledge about specific terms required.
- Write question numbers correctly and prominently.
- Proper time management is also important while answering.

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