Vidhyahouse Coaching Institute

पंचरत्न विद्या by सप्तऋषि

A Scintillating Bunch of Papers
to Donn the Crown of Victory

The Last

Brahmastra

For 12th Boards

Academic Year 2022-23

#Parikshana

VH Coaching Institute

LBH #LEARN_BY_HEART

1) Accounts Part-1 Mcqs from Textbook ☐
2) Accounts Part-2 Mcqs from Textbook ☐
3) Statistics Part-1 Mcqs from Textbook ☐
4) Statistics Part-2 Mcqs from Textbook ☐
5) OC's Textbook Mcqs ☐
6) OC's Textbook 1 sentence answers ☐
7) Eco's Textbook Mcqs ☐
8) Eco's Textbook 1 sentence answers ☐
9) SP's Textbook Mcqs ☐
10) SP's Textbook 1 sentence answers ☐
11) Eco's notes, which will be prepared in class ☐
12) OC's notes, which will be prepared in class ☐
13) SP's notes, which will be prepared in class ☐
14) English chapters, poems, Supplementaries Summaries ☐
15) Gujarati chapters, poems, Supplementaries Summaries ☐
16) Hindi chapters, poems, Supplementaries Summaries ☐

11) Notes ahead of this booklet ☐

Happy Learning

Questions to Revise at any cost :-

- A/c [Part-1] Chapter-1 :-

Ill-5 Q3- Pg-30 & 31
All Questions

- A/c [Part-1] Chapter-2 :- [8/22] - to solve

Ill-7, 3, 9 Q-9, 11, 13, 17, 18

- A/c [Part-1] Chapter-3 :- [4/10] to solve

Ill-9 Q-9, 10, 11

- A/c [Part-1] Chapter 4 :-

Ill-10 Q 14

- A/c [Part-1] Chapter-5 :-

Q3- 1, 3, 6, 9, 12, 13 Ill-17
Q4- 4, 8, 13
Q9, 10, 13, 16, 17, 18, 19, 20, 14*

- A/c [Part-1] Chapter-6 :-

Q3- 1, 7, 10, 13
Q6, Q8, Q9, Q10, Q12,
Q14, Q15

A/c [Part-1] Chapter-7 :-

Pg-311 Completely

• A/c [Part-2] [Chapter-1]:-

Ill-10, 13, 15, 19 — Q7, Q10, Q12, Q15, Q16, Q17, Q19, Q20

• A/c [Part-2] Chapter-2:-

Ill-23 — Q6, Q9, Q10, Q12, Q13, Q14, Q17, Q21, Q23, Q25, Q26, Q29

• A/c. [Part-2] Chapter-3:-

Q9, Q10

• A/c [Part-2] Chapter-4:-

All Questions that were asked in Test of this chapter in classes

• A/c [Part-2] Chapter-5:-

All Questions from textbook need to be solved, Coz of revision point of view. No 2 Questions are same, so solve all of them

• A/c [Part-2] Chapter-6:-

Ill-5, 7, 11, 12, 13 — Q16, Q17, Q19, Q20

ACCOUNTANCY

Notes for Class 12th

(Useful for Section-A & B)

Q1.When interest on capital and interest on drawing is to be accounted in partnership firm?

-Only if it is mentioned in the partnership deed.

Q2.What is the interest rate that is charged on partner's loan, if not given in question?

-6% interest rate

Q3.How many types of capital accounts are there?

-2 types-Fixed capital account method & Fluctuating capital account method.

Q4.When current account is to be prepared?

-When capital account is prepared by fixed capital account method

Q5.On which balances interest on capital is charged?

-On the opening balance of capital account

Q6.What is profit and loss appropriation account?

-To distribute profit among partners, p&l appropriation account is prepared. It is a part of profit and loss account.

Q7.What is 'N' for calculating interest on drawings?

-If drawing is done in beginning of every month-78/12, if drawing is done at the end of each month-66/12

Q8.Current account balance is shown on which side of balance sheet?

-Debit balance is shown on Asset side, Credit balance is shown on liabilities side.

Q9.What is the minimum and maximum number of partners in firm

-Minimum no. of partners is 2 & maximum number of partners is 100 as per companies act. Maximum no. is 50 as per companies rules.

Q10.What is partnership?

-Partnership is the relation between the persons who have agreed to share the profit of the firm carried on by all on any one of them. Each person individually is called partner and together called as a firm.

Q11.What is partnership deed?

-A written agreement between the partners is called partnership deed. It can be written or oral.

Q12.What is goodwill?

-Goodwill is an intangible asset which shows the reputation of the firm in the market.

Q13. What is super profit?

-The excess of average profit over the expected profit is called super profit.

Q14.What is weighted average profit?

-Average profit after assigning weight to profit of different years.

Q15.What is capitalised profit?

-Capitalised profit means capitalised value of average profit on the basis of expected rate of return.

Q16.What is reconstruction of the partnership firm?

-Change in partnership due to many reasons is called reconstruction of partnership firm.

Q17.State two rights of new partner?

-Right on firm's assets

-To get share in profit

Q18.**IMP** – What is revaluation account?

-An account which is prepared at the time of reconstruction of the firm to record the accounting effect of increase or decrease in the assets/liabilities of the firm. This account is also known as **profit and loss adjustment account.**

Q19.What is gain ratio?

-Gain ratio=New share – old share, when share of some partner increases, that increased share is called gain ratio.

Q20.What is sacrifice ratio?

-Sacrifice ratio=Old share – new share, when share of some partners decreases, that decreased share is called sacrifice ratio

Q21.Why new partner is admitted?

-To bring additional capital and to bring managerial efficiency a new partner is admitted. New partner is always admitted with the consent pf all existing partners.

Q22.What are the modes of retirement of partner?

-Voluntary retirement or retirement as per Indian partnership act.

Q23.How the balance payable to retiring partner is to be paid?

-1) in cash 2)Convert it in business loan 3)in instalments 4)by annuity system

Q24. What are the modes of dissolution of partnership?

-Normal dissolution/ dissolution wit out court interference

-Dissolution by court

Q25.What is dissolution of firm?

-Business of the firm is closed down and with that its legal existence also ends, called as dissolution of firm.

Q26.What is voluntary dissolution?

-When all partners agree to dissolve the partnership firm, they can dissolve it any time, called as voluntary dissolution.

Q27.Which Company prohibits any invitation to general public to subscribe any securities of the company?

-private company

Q28.No. of members in companies?

-Public company- minimum-7 members & maximum no limit

-Private company-minimum-2 members & maximum 200 members

Q29. Which shares carry more risks?

-Equity shares

Q30.How many types of shares are there?

-2 types- Equity shares and preference shares

Q31.What is share and share capital?

-Capital which can be divided into transferable small denominations is called share. Through IPO when capital amount is collected it is called as share capital.

Q32.How much money to be called on shares at the time of application?

-As per companies act, at least 5% of face value of share is to be called

-As per SEBI, at least 25% of issue price of share is to be called

Q34.Methods through which the shares can be issued?

-At par, At premium

Q35.Give any 1 use of securities premium? Learn all uses pg-20

-To write off preliminary expenses of the company.

Q36.What is share forfeiture?

-When shares are cancelled because of non-payment of the amount called on shares is called as share forfeiture.

Q37.What is the other name of capital employed?

-Net assets

Q38.What is the other name of efficiency ratios?

-Activity ratios

Q39.Full forms of IPO and FPO

-IPO-Initial public offer & FPO-Follow on public offer

Q40.What is debenture?

-When companies raise money from public by issuing securities instead of borrowing loan from the bank, that security is called as debenture.

Q41.Unused balance of share forfeiture is transferred to which account?

-Capital reserve Account

Q42.Minimum Subscription that the company should receive at the time of issue of debentures?

-90%

Q43.Discount given on issue of debentures is debited to which account?

-Discount on debentures A/c

Q44.Premium called on issue of debentures is credited to which account?

-Securities Premium Reserve A/c

Q45.Who is debenture holder?

-Person who has bought the securities issued by the company for the purpose of raising the money is called as debenture holder.

Q46.Types of debentures?

-As per Security-Secured and unsecured debentures

-As per redemption-Redeemable and irredeemable debentures

-As per convertibility-Convertible and non-convertible debentures

Q47.What Is comparative statement?

-Comparative statements include comparative balance sheet and comparative profit and loss account. The comparison of two years data is carried out to know the growth of business.

Q48.What is common size statement?

-The balance sheet and profit & loss account of current year is compared with the previous year's balance sheet and p&l account. Taking sales as 100%, all expenses and incomes are ascertained in the proportion of sales.

Q49.What is horizontal analysis?

-Comparison of financial statements of different years is horizontal analysis. It is done for long term plan and to know the current trend. This is also called as time series analysis.

Q50.What is ratio?

-The relationship between two or more accounting figures expressed mathematically called as ratio.

Q51.What is indicated by liquidity ratios?

-It shows the ability of the business to pay its short term liabilities.

Q52.At the time of finding trade receivables, should BDR(bad debt reserve) be deducted?

-No, BDR not to be deducted

Q53.What is cash flow?

-It means receipt & payment of cash and cash equivalent.

Q54.What is cash & cash equivalent?

-Cash on hand, bank balance, highly liquid short term investments, quickly saleable investments, government securities.

Q55,What is operating activities and its examples?

-It means main activities of business to earn income. E.g.Salary, wages, payments to creditors, receipt from debtors, sales distribution expenses, advertisement expenses, etc.

Q56. What is financing activities and its examples?

-Activities due to which size of owners capital and borrowed capital is changed. E.g.issue of equity share or preference share, issue of dividend, loan from bank, equity or preference share dividend, etc.

Q57. What is investing activities and its examples?

-It means sale & purchase of long-term investments and other investments in which cash and cash equivalents aren't included. E.g.Purchase or sale of assets, interest received on investments, dividend received on investments, loan given, etc.

Q58.What is cash flow statement?

-It provides information about generation of cashflows from various activities like operating, investing and financing. It is expressed as cash inflow or cash outflow.

Q59. what is pro rata allotment of shares?

- ahead of these notes

- If out of forfeited shares, only some of the shares are re-issued, then only proportionate portion which is left after re-issue, is to be transferred to Capital Reserve A/c

- Debentures can be issued at par, premium or discount, but they are to be redeemed only at par or premium.

- Premium on debenture's redemption is to be seen from the face value of debentures ie: issued at 90 or 100 or 110
if redemption is @ 10% premium, then it is always 100 × 10% = 10₹
(90 (at disc.)), (110 (at premium)) is irrelevant
↳ Recorded as "Loss on issue of debentures A/c" Dr side
" premium on redemption of debentures A/c" Cr side } along with entry of allotment

∴ premium is ₹10 & not ₹20 or ₹0

- whether mentioned or not, "Discount on issue of debentures" is always to be recorded with the entry of allotment

- DRI to be done on 30-4-20XX of previous year of Redemption
@ 15% of face value of debentures & to be cancelled on day of Redemption
DRR to be made on same day of Redemption @ 25% (if out of Capital
@ 100% (if out of profits)
& to be transferred to General Reserve after paying amount to debentureholders.

* DRI made → DRI Break → DRR Make → Repay to deb. holders → DRR to GR

- Bought own debentures & then cancelled → it will be either:
Loss on sale of debentures or profit on sale of debentures

- In Co.'s final A/c, if Sales is not given, then only Balance sheet will be prepared.

Final A/c → Key points

1. Taxation for provision to be transferred under Current liability
2. PAT to be transfered under Reserves & Surplus
3. Closing stock double entry (if in adjustment) otherwise single entry under Current assets
4. Changes in stock = op. stock - closing stock
5. Purchase, Cost of material consumed, Cost of goods sold to be treated equally

- **Analysis of F.S.:** → Key points
  1. No matter how the Question is given, always solve by writing | 31-3-16 | 31-3-17 | this way.
     i.e. - old year first & Current year last.
  2. **Comparative:** - [31-3-17] figures − [31-3-16] figures
  3. **Comman Size:** - P&L → Compare Everything by taking figure of Revenue/sales in denominator
     B/S → Compare Everything by taking figure of total of B/S in denominator

- **Cashflow:** - Key points
  1. Patent decrease → written off → part of operating activity (Note:- If mentioned about selling, then only investing activity)
  2. Patent Increase → investing activity (Cash outflow)
  3. Goodwill decrease → written off → part of operating activity
  4. Goodwill Increase → investing activity (Cash outflow)
  5. Taxation provision of Previous year to be paid in Current year from operating Cashflow

* Non-cash Expenses: Depreciation
- amortization
- Goodwill written off
- Taxation provision of C.Y.
- proposed dividend of C.Y.
- Transfer to General Reserve

Doosre = Investing & Financing

* Add in operating Cashflow :- Doosron Ke Expenses & Losses
:- DIAL

Dec	Asset
Inc	Liability

* Minus from operating Cashflow :- Doosron Ki Income & profits
:- Inc Asset
Dec Liability

* Net profit of C.Y. / profit of C.Y. - profit of P.Y.
Add :- Doosron Ke Expenses & losses (&) Non-Cash Expenses
Less :- Doosron Ki Income & profits
Add :- DIAL
Less :- IDAL
Less :- Tax of P.Y.
Cashflow from operating

- Ratios :-
- In Debtors/Creditors Turnover Ratio, if in calculation of payment/collection period, not asked specifically → then find all 3 payment/collection period i.e. in Days, months, weeks.

* Things which will be distributed among partner & which will not be :- (Admission / Retirement)

To be shared	Not to be shared
- Workmen compensation Reserve/fund (if left after settling claim) [Cr. side]	- Worker profit sharing fund
- Investment fluctuation reserve/fund (if left after adjusting investment decrease) [Cr. side]	- provident fund
- General Reserve [Cr. side]	- workmen saving A/c
- Profit & Loss A/c (Asset) [Dr. side]	
- Profit & Loss A/c (Liability) [Cr. side]	
- old Goodwill - Advertisement Campaign Exp. - Research & Development Exp. } [Dr. side]	
- Reserve fund - Contingency Reserve - Capital Reserve } [Cr. side]	

* Premium for Goodwill:- (Admission)

- If new partner's goodwill given & firm's new goodwill also given, then check whether there is any deficiency in the premium he bring or not.
- What New partner brings = firm's new Goodwill x New share of New partner
- what old partner gives = firm's new Goodwill x his gaining share (if he gains)
- Above Both amounts will be received by sacrificing partner.
- Premium for Goodwill will be distributed in sacrificing Ratio (and not sacrificing share)

* Goodwill in Retirement:-

- what Retiring partner get = firm's new goodwill x his share of P&L
- what Continuing partner get = firm's new goodwill x his sacrificing share (if he sacrifices)
- Above Both amounts will be paid by gaining partners.
- Goodwill payable by Continuing partners will be paid in Gaining Ratio (and not gaining share)
- When new Ratio, Gaining share, gaining ratio of Continuing partners is not given, then their old ratio will be their new ratio & gaining ratio as well

Q1. What is pro-rata allotment of shares?
Ans. When shares are allotted against the share application, in face or in some proportion or no share allotted then it is known as prorate allotment of share
In this situation, excess amount received at the time of application will be credited to share allotment A/c and if amount is still in excess, then it will be credited to share calls and then remaining amount is returned to applicant.

Q2. Write a short note on calls-in-arrears.
Ans. When company makes calls for allotment money or call money and if some shareholder fails to pay such money on due date, such unpaid amount is known as 'calls in arrears' amount. There are two methods to deal with accounting effect of calls in arrears.

(i) Without opening calls in arrears account: When company calls for instalment amount on any call, then the actual amount received from the shareholders is debited to bank account and is credited to relevant call account. When unpaid amount is received from shareholder in future, the bank account is debited and the relevant call account is credited.

(ii) By opening calls in arrears account: Under this method, 'calls in arrears' account is opened. Any amount received from shareholders against any call is debited to bank account and amount which is not received from shareholders is debited to calls in arrears account.

On a latter date when the arrears amount on call is received, bank account is debited and calls in arrears account is credited. So, at the end calls in arrears account is closed.

Q3. What is meant by calls-in-advance? State the provisions of it under Companies Act.
Ans. If there is provision in the Articles of Association, a company can receive in advance a part or whole of the uncalled amount. Since the uncalled amount is received by company in advance from shareholders, the same is credited to 'calls-in-advance' account. Calls-in-advance is not share capital of the company, hence dividend can not be given on it.
It is compulsory to pay interest on calls-in-advance amount, uptil it is settled against the call is due for payment. On pre-decided rate specified in articles of the company. If articles of the company is silent on this matter, interest is payable 12% p.a. (maximum).
The interest on calls-in-advance is payable compulsorily even if there is no profit.

Q4. The amount of securities premium reserve may be used only for the following purposes:
(1) In writting off the preliminary expenses of the company.
(2) For writting off the expenses, commission or discount allowed on issue of shares or debentures of the company
(3) For issuing fully paid bonus shares to the shareholders of the company.
(4) For providing the premium payable on redemption of redeemable preference share
(5) For buy back of its own shares.

(Notes) → Class 12th

- Commission to Partner :-

  - after deduction = Commission = Net profit × $\frac{\%\text{ of Commission}}{100 + \%\text{ of Commis}}$

  - Before deduction = Commission = Net profit × $\frac{\%\text{ of Commission}}{100}$

- Methods to find Goodwill :-

1. Average profit = Steps :-
   1. find average profit = $\frac{\text{Total profit}}{\text{no. of years}}$
   2. Goodwill = Average profit × no. of purchase years

2. Weighted average profit = Steps :-
   1. Give weights to all years
   2. find weighted profit = profit × weight
   3. find Total weight = Σw
   4. find weighted average profit = ~~weighted prof~~ = $\frac{\text{weighted profit}}{\text{Total weight}}$
   5. Goodwill = weighted average profit × no. of years of purchase

if profit is increasing Continuously

3. Super profit Method = Steps :-
   1. find capital Employed = Total asset - liabilities
   2. Expected rate of return (given in Question)
   3. find Expected profit = $\frac{\text{Capital Employed} \times \text{Rate of return}}{100}$
   4. find Average profit or weighted average profit
   5. find super profit = 4th - 3rd (Avg profit - Expected profit

find average profit, but if profits are rising then find weighted average profit

4. Capitalization of profit method : [Steps] :-

1. find Capital Employed : Total assets - Total liabilities
2. Expected Rate of return (given in Question)
3. find average profit or weighted average profit
4. find Capitalised profit = $\frac{\text{Average profit}}{\text{Expected rate of return}} \times 100$
5. Goodwill = Capitalised profit - Capital Employed

5. Super profit Capitalization method :- [Steps] :-

1. find Capital Employed
2. Expected rate of return (EROR)
3. find Expected profit = Capital Employed x EROR
4. find Average profit or weighted average profit
5. find Super profit = Average profit - Expected profit
6. Goodwill = $\frac{\text{Super profit}}{\text{EROR}} \times 100$

- When new partners share is given & sacrifice not given :-
  - find Remaining share : Total share - share of new partner
  (Total share is always 1)

- 'Ratios' -

Profitability ratios (%)	liquidity ratios (:ratio)	Solvency ratios (x : 1)	(Activity ratio) [Days, week, months] Efficiency ratios [Times]
(1) Gross profit ratio	(1) Current ratio	(1) Debt to Equity ratio	(1) Stock Turnover ratio
(2) operating ratio	(2) liquidity ratio	(2) Total assets to debt ratio	(2) Working Capital turnover
(3) operating profit ratio		(3) proprietary ratio	(3) Debtors Turnover
(4) Net profit ratio		(4) Interest Coverage ratio	(4) Creditors Turnover

• Statistics [Part-1] Chapter-1 :- Approx- 29/76 - to solve

- III.6
- III.10
- III.18
- III.21

- Ex-1.1-Q2
- Ex-1.2- Q1 & Q2
- Ex-1.3- Q5

- Sec-C -Q7 to Q14
- Sec-D- Q12 to Q14
- Sec-E- Q6 & Q7
- Sec F- Q1, Q2, Q3, Q5, Q6, Q7, Q8, Q10

• Statistics [Part-1] Chapter-2 :- Approx- 33/83 - to solve

- III-14
- III-23, 24
- III-26
- III-28, 29
- III-30, 31
- III-3 & 4 *

- Ex 2.2- Q2, Q4, Q5, Q7, Q9, Q11, Q12, Q15
- Ex 2.3- Q2, Q4, Q5, Q7, Q8

- Sec-C -Q11 & Q12
- Sec-D- Q10, Q12, Q13
- Sec-F- Q6, Q8, Q9, Q10, Q12

• Statistics [Part-1] Chapter-3 :- Approx- 36/65 - to solve

- III-5
- III-8, 9, 11, 12
- III-14
- III-15 to 21

- Ex 3.1- Q2, Q4
- Ex 3.2- Q2, Q3, Q4 Q6, Q7, Q9

- Sec-B- Q10
- Sec-C- Q2, Q5, Q6, Q7 & Q8, Q9
- Sec-D- 10, 13
- Sec-E- Q3, Q5
- Sec-F- Q2, Q3, Q4, Q7

• Statistics [Part-1] Chapter-4 :- Approx- 15/36 - to solve

- III-1 *
- III-5, 6, 7

- Ex-4.2- Q2, Q4
- Ex-4.3- Q3, Q4

- Sec-B- Q10
- Sec-D- Q10
- Sec-E- Q3, Q5
- Sec-F- Q1, Q2, Q5

113/260 → 43% Part-1

• Statistics - [Part-2] Chapter-1 :- Approx - 70/132 - to solve

- Ill- 9, 10
- Ill- 14, 16
- Ill- 18, 20
- Ill- 22, 23, 24
- Ill- 26
- Ill- 28, 31
- Ill- 33, 35

- Ex- 1.1- Q 2, Q4, Q6, Q7, Q8, Q10, Q12, Q13, Q14, Q15
- Ex 1.2- Q1, Q4, Q7, Q8, Q13, Q15, Q16, Q18
- Ex 1.3- Q1, Q7, Q8 Q9, Q10, Q11, Q12
- Ex 1.4- Q3, Q4, Q5, Q6, Q7, Q9, Q10, Q12, Q14, Q15
- Ex 1.5- Q1, Q2

Sec-B- Q17, Q18, 20, Q22, Q27, Q28

Sec-C- Q12 to Q23

Sec-D- Q1, Q4

• Statistics - [Part-2] Chapter-2 :- Approx - 37/55 - to solve

- Ill- 4, 5, 6
- Ill- 8, 9, 10
- Ill- 12, 13, 15
- Ill- 16, 19, 20
- Ill- 21, 22

- Ex- 2.1- Q2, Q3, Q4, Q7, Q9
- Ex- 2.2- Q1, Q4, Q5

Sec-B- 7

Sec-C- Q2, Q3, Q4, Q8, Q9, Q10

Sec-D- Q2, Q1, Q7, Q8

Sec-E- Q1, Q4, Q5, Q7

• Statistics - [Part-2] Chapter-3 :- Approx - 37/65 - to solve

- Ill- 2, 3, 4
- Ill- 7, 8, 9
- Ill- 11, 13
- Ill- 14
- Ill- 18
- Ill- 19 to 22

Sec-B- 10, 11, 14, 15, 17

Sec-C- Q7, Q10, Q11, Q8

Sec-D- Q5, Q10 to Q14

Sec-E- Q2, Q3, Q4 to Q9

• Statistics - [Part-2] Chapter-4 :- [Approx - 53 / 105] - to solve

Ill- 6, 9
Ill- 16, 17, 18
Ill- 20, 23, 24
Ill- 27

- Ex-4.1
  1- Q2, Q4
  2- Q1, Q2, Q3
  3- Q3, Q4
  4- ⌐
  5- ⌐
  6- ⌐

- Ex-4.2
  1- Q3, Q5
  2- ⌐
  3- ⌐

- Sec-B- 4, 7, 8, 9, 12, 13, 14
- Sec-C- 7, 8
- Sec-D- Q2, Q6, Q9, Q10, Q11, Q12, Q13, Q15, Q16, Q17
- Sec-E- I- X
  II- Q3, Q4
  III- All 10

• Statistics- [Part-2] Chapter-5 :- [Approx - 42 / 93] - to solve

- Ill- 2, 4, 6
- Ill- 8, 10
- Ill- 16, 17, 18
- Ill- 22
- Ill- 27, 28
- Ill- 30, 31
- Ill- 35

Ex-5.1- 1, 3, 5, 6, 7

- Sec-B- 12
- Sec-C- 11, 16, 18, 19, 20
- Sec-D- 4, 5, 6, 8, 10, 11, 12, 14, 15, 17, 19
- Sec-E- 6, 7, 8, 11
- Sec-F- 1, 5

239 / 450

Part-2
53%

STATISTICS
Notes for Class 12th
(Useful for Section-A & B)

Q1. Define Independent events.

-A & B are any 2 events of a finite sample space U. Probability of occurrence of event A does not affect the probability of occurrence of event B. P(A/B)=P(A) and P(B/A)=P(B) are mutually independent events.

Q2.Random Experiment- Experiments occurred under identical conditions and we know all possible outcomes but which outcome will appear is not predictable.

Q3. Equi-probable events- When chances of occurrence of two events A & B are equal and every event is equally important.

Q4. Impossible event- Event which never occurs, denoted by [..] or Ø.

Q5. Define Bernouli Trials.

-Suppose dichotomous random experiment has two outcomes, success & failure. If the experiment is repeated n times under identical conditions and the probability is between 0 and 1 of getting success at each trial is constant, then such trial is called bernouli trials.

Q6. Define discrete random variable.

-A random variable X which is capable of taking any real value of set R to its subset is called a discrete random variable.

Q6. Define continuous random variable.

-A random variable X which is capable of assuming any value of the interval, which is a set of R of real numbers or its subset is called continuous random variable.

Q7. What is shape of probability curve?

-Completely bell shaped

Q8. What is probability density function?

-A function for obtaining probability that a continuous random variable assumes value between specified intervals is called probability density function of that variable.

Q9. What is the skewness of normal curve/normal distribution?

-Zero skewness

Q10. For which value of standard normal variable, the standard normal curve is symmetric on both sides?

-Z=0

Q11.What is the probability that a continuous random variable takes definite value?

-The probability that a continuous random variable takes definite value is 0.

Q12. True/false-'standard score is independent of unit of measurement'

-True

Q13.Which value of normal variable divides the area of normal curve in 2 equal parts?

-X=μ of normal variable divides the area of normal curve in 2 equal parts.

Q14. Define probability density function of continuous random variable.

-A function for obtaining probability that a continuous random variable assumes value between specified intervals is called probability density function of continuous random variable

Q15.Define standard normal variable.

-If a random variable X is a normal variate with mean=μ and standard deviation=σ, then random variable $z=(X-\mu)/\sigma$, is called standard normal variable.

Q16.Define neighbourhood.

-In a€R, any open interval containing 'a' is called a neighbourhood of 'a'.

Q17.Define δ neighbourhood of a.

-If a€R and δ is a non-negative real number then the open interval (a-δ,a+δ) is called δ neighbourhood of a.

Q18.What is interval?

-A set of real numbers between any two real numbers is an interval.

Q19.Explain the meaning of x→a.

-If the value of variable x is brought very closer to a number 'a' by increasing or decreasing its value then it can be said that x tends to a, denoted by x→a.

Q20. Explain the meaning of x→0.

-If by decreasing the positive value of a variable x or by increasing negative value of the variable x, the value of x is brought very close to '0', then it can be said that x tends to 0, denoted by x→0.

Q21. What is differentiation?

-The process of obtaining a derivative of a function is called differentiation.

Q22.What is marginal revenue?

-The change in revenue due to small change in demand is called marginal revenue.

Q23.What is marginal cost?

-The change in cost due to small change in production is called marginal revenue.

Q24.Define index number.

-The % change in the value of a variable associated with any item for the current period compared to its value in a base period is called an index number. Denoted by I=p1/p0 *100

Q25.How many methods are there for selecting base year?

-2 methods- Fixed base and chain base

Q26.How many methods are there to assign explicit weights?

-2 methods-Method of total expenditure and Method of family budget.

Q27.how many types of weight are there?

-2 types-Implicit weight and Explicit weight.

Q28.What is implicit weight?

-It's an indirect method of assigning weight. Weight is given according the number of varieties of different items.

Q29.What is an explicit weight?

-It's a direct method of assigning weight. Weights are expressed numerically in proportion to their importance.

Q30.Which method is more suitable for comparing price at different times?

-Relative method

Q31.What is base year?

-When the changes in the price of an item are compared with price of the same item in the fixed period, that period as called base year.

Q32.Index number to find dearness allowance?

-Cost of living index number.

Q33.Which average is more popular for construction of index number?

-Weighted average.

Q34.What is correlation?

-Simultaneous change in the value of 2 variables and have direct-or-indirect cause-effect relation between them.

Q35.What is positive correlation?

-The change in value of 2 correlated variables is in same direction. ,eg- age & LIC premium

Q36. What is negative correlation?

- The change in value of 2 correlated variables is in opposite direction. ,eg- Stable income & Rate of inflation

Q37.What is correlation coefficient?

-The numerical measure showing strength of linear correlation between 2 variables is called correlation coefficient.

Q38.Methods to find linear correlation?

-3 methods-Scatter diagram (when only type of correlation to be found), karl pearson (best method to find 'r', Spearman's rank (for finding 'r' between qualitative variable, developed by Charles Spearman)

Q39.Other names of karl pearson method?

-Pearson correlation coefficient, product moment coefficient.

Q40.Methods of fitting regression line?

-2 methods-Method of Scatter diagram, Method of least square (best method to find 'b'=$\tilde{Y}$=a+bx)

Q41 Define linear regression.

-If the relation between 2 variables x and y determine by an appropriate mathematical function is expressed by a straight line, called linear regression.

Q42.Define regression coefficient.

-The 'b' in $\tilde{Y}$=a+bx is regression coefficient. 'b' shows the increase/decrease in the value of x, shown by b_{yx}

Q43.What is a and b in $\tilde{Y}$=a+bx.

-'b'=regression coefficient=slop of regression line

-a=intercept of regression line=constant.

Q44.What is a time series?

-If the data collected to study the matters of business and industrial interest is based on time called time series.

Q45. What is meant by analysis of time series?

-The method of drawing inferences on different characteristics of time series by analysing such date.

Q46. What is cyclical component?

-In a time series during more than one year regular fluctuations takes place, called as cyclical component.

Q47. What is irregular component?

-if price is suddenly changed due to any reason, called as irregular component.

Q48.Advantages and disadvantages of moving average method.

Advantages	Disadvantages
• Short term fluctuations effect if removed • Easy calculation • Easy to understand	• If period as not correct then trend values also not correct. • Can not be found for beginning and end years • Not a proper equation for forecasting.

Q49.Advantages and disadvantages of Least square method.

Advantages	Disadvantages
• Mathematically more conceptual • More accurate then graphical method • Find trend for all years • Easy to obtain trend by using equation	• More calculative • More difficult than graphical method. • If there is no linear trend, this method of no use • Reliability is less if the data is not used properly

Q50.What is estimating method.

-linear trend of time series based on mathematical method is an estimating method

Q1.What is mean by price relative? (Exe. que.)
Ans. The ratio of change in value of variable quantity at two points of time is known as price relative.

Q2.What is mean by chain base index number?
Ans. For to construct index number of current year preceding year is taken as base year is called chain base index number.

Q3. "Oil price index number is 500" whether this statement is true or false?
Ans. This statement is false. "Oil price index number is 500."

Q4.State the charactristics of an index number.
Ans.- It is independent of units of measurement
-It compares the situation prevailing at two different points of time by means of ratio.
-Index number is relative measure expressing % change
-It is an average measure.

Q5. What is mean by Quantity Index number.
Ans. The relative percentage change in quantity of each item at two different points of time is called quantity index number.

Q6. Why Fisher's index number is called an ideal index number?
Ans. Following are the reasons for ideal index number-
-In the costruction of index number takes into account the price and quantities of both, the base year as well as the current year.
-Index number satisfies both, the reversal test and factor reversal test.
-It is defined as the geometric mean which is considered to be the best average for the index number.
-It is not biased because it balances the drawbacks of laspeyre's and paasche's index number.

Q7. What can be said about the correlation between the annual import of crude oil and the number of marriages during the same time period?
Ans. Spurious correlation

Q8. If the value of n(n-1) is six times the value of Ed^2 then what is the value of r? (Exe. que.)
Ans. The value of r = 0.

Q9. What will be the sign of r if the value of the covariance is negative ?
Ans. The sign correlation coefficient r is negative.

Q10. Define Scatter Diagram
Ans. Taking the values of variable x along the x axis and the corresponding values of variable y along the y axis with appropriate scale and plotting sample values (x_1, Y2), (X2 Y2), (X3, Y3) (Y) by respective points on the graph paper, a diagram obtained is known as scatter diagram.

Q11. What is spurious correlation ?
Ans. When between two variables there is not cause and effect relationship even though correlation coefficient r value is nearer to 1. E.g.May be correlation coefficient of variables marks of the students in statistic and height of the students is nearer to 1, but in relaity there is not any cause and effect relation among two variables. So, such relationship is called spurious correlation.

Q12. State the Linear Regression model.
Ans. If dependent variable y is represented as a linear func- tion of independent variable x by some linear equation, then that linear equation is known as linear regression. Model it is also known as regreesion line.
y=a + Bx+u
Where
y = Dependent variable a = Constant
x = Independent variable B = Constant
u = distrurbence variable

Q13. What is an error in context with a regression line?
Ans. The difference between the observed value y and the etimated veluey, of dependent variable y is known as error. denoted by: 'e', $e=y-\hat{y}$

Q14. The regression coefficient is independent of which transformation ?
Ans. The regression coefficient is independent of changes of origin.

Q15. The regression coeefficient is not independent of which transformation ?
Ans. The regression coeffi. is independent of changes of origin but not of change of scale.

Q16. What is the value of error if a sample point is on
the fitted line?
Ans. If all points in a scatter diagram are one line only then error will be zero.

Q17. What is the notation to show the cyclical component of the time series?
Ans. Cyclical fluctuation is denoted by Ct

Q18. Explain the meaning of moving average.
Ans. The average of short term fluctuations should be considered of time series is called moving average method.

Q19. Describe the graphical method to measaure trend.
Ans. Suppose (y, t 1, 2,... n) is a time series and n terms of the series are y_1, Y_2 y respectively. Taking the time t on X-axis and the term y, of the time series on Y axis, the point (1, y), 2, y2) (n, y) are plotted on the graph paper. Than points are joined by line segments. The graph so obtain is called the graph of the time series.

Q20. Define conditional probability.
Ans. Suppose U is a finite sample space and A and B are any two events in it. The probability of occurrence of event B under the condition that A occurs is called the conditional probability.

$P(B/A) = \frac{P(A \cap B)}{P(A)}$

$P(A/B) = \frac{P(A \cap B)}{P(B)}$

Q21. Interpret P(A/B) and P(B/A).
Ans. P(A/B): Under the condition event B has occurred if event A will occure then that event A is called the conditional event. It is denoted by the symbol of A/B.
(ii) P(B/A): Under the condition event A has occurred if event B occur then that event B is called the conditional event. It is denoted by the symbol of B/A.

Q22. Equi-probable Events: If there is no apparent reason to believe that out of one or more events of a random experiment, any one event is more or less likely to occure than other events, then those events are called equiprobable events.

Q23. Probability (Mathematical definition) : Suppose is a sample space of a random experiment and the total number of exhaustive, mutually exclusive and equi-probable elementary outcomes of it are n. If m ($0 \le m \le n$) outcomes out of n outcomes are favourable to the occurrence of an event A the, the probability of the event A is defined as m If we denote the probability of event A by the symbol P(A) =m/n

Q24. State the assumptions of mathematical definition of probability.
Ans. The assumptions of the mathematical definition are as follows:
- The number of outcomes in the sample space of the random experiment is finite.
- The number of outcomes in the sample space of the random experiment is known.
- The outcomes in the sample space of the random experiment are equi-probable.

Q25. State the law of multiplication of probability for two events A and B. Write the law multiplication of probability if these two events are independent.
Ans.: If event A and B are in sample space U then,
P(A B) = P(B/A) · P(A) OR
P(A B) = P(A/B) · P(B)
If events A and B are independent event then
P(A B) = P(A) · P(B)

Q26. Define discrete random variable.
Ans.: A random variable X, which is capable of taking any real value of set R or its subset is called a discrete random variable.

Q27. State the relation between the probability of success and failure in Bernoulli trials.
Ans. : In Bernoulli trials success and failure are mutually exclusive and exhaustive events.
Therefore p + q = 1 and q = 1-p

Q28. State the relation between mean and variance of binomial distribution.
Ans. In binomial distribution value of mean is alwaysgreater than its variance.
Hence, np> npq OR npq < np.

Q29. How is normal curve drawn?
Ans: A curve drawn by considering different values of normal random variable X and its respective values of probability density function f(x) is called normal curve and it is completely bell shaped.

Q30. Find f'(x) for the function f'(x)=50
Ans.: Constant number is always '0'. So, if function f(x)= 50, then f'(x) = 0.

Q31. What are the stationary point of a function? Ans. The points where maximum of minimum values occure are known as stationary points. The necessary condition to obtain a stationary value is f'(x) = dy/dx = 0.

Q32. Define derivative?
Ans.: Let f: A. R and a A, where A is an open interval of R. If $\lim_{h \to 0} \frac{f(a+h)-f(a)}{h}$ exists, then this limit of a function f is called derivative at x=a. It is denoted by f'(a). Thus, $f'(a) = \lim_{h \to 0} \frac{f(a+h)-f(a)}{h}$

Q33. Explain marginal cost and give its formula.
Ans. The change in cost due to small change in production is called marginal cost. Marginal cost can be obtained by taking the derivative cost function with respect to x. Thus, when the production is x then Marginal cost =dc/dx

Q34. Define elasticity of demand.
Ans. The ratio of percentage change in the demand of a commodity due to percentage change in the Price is called elasticity of demand. i.e. Elasticity of demand =Percentage Change in Demand / Percentage Change in Price

Q35. What is the maximum value of function?
Ans.: If h is a small positive number and if f(a) > f(a+h) and also f(a) > f(a-h) then f(x) is said to be maximum at x= a. Maximum value do not mean largest value of funtion. The function is maximum of x = a. only means that the value of function is maximum in a small interval around x=a.

Statistics - Part-1

- Price relative = $\frac{P_1}{P_0}$

C.Y. = Current Year
P.Y. = Previous Year

- Index number = $\frac{P_1}{P_0} \times 100$

- Chain base to fixed base = $\frac{(\text{Chain base Index no. of C.Y.}) \times \text{Fixed base Index no. of P.Y.}}{100}$

- Fixed base to Chain base = $\frac{\text{Fixed base Index no. of C.Y.}}{\text{Fixed base Index no. of P.Y.}} \times 100$

- I_L (Las peyre's Index no.) = $\frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100$ → 1000
- I_P (Paasche's ——) = $\frac{\Sigma p_1 q_1}{\Sigma p_0 q_1} \times 100$ → 1101

} To learn

- I_F (Fisher's ——) = $\sqrt{I_L \times I_P} \;/\; \sqrt{\frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times \frac{\Sigma p_1 q_1}{\Sigma p_0 q_1}} \times 100$

- Cost of living Index no.
  - Total Expenditure Method
    - If q_0 (Base year quantity given) : $I = \frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100$ [I_L]
    - If q_1 (C.Y. quantity given) : $I = \frac{\Sigma p_1 q_1}{\Sigma p_0 q_1} \times 100$ [I_P]
  - Family Budget Method : $I = \frac{\Sigma I w}{\Sigma w}$ / $I = \frac{p_1}{p_0} \times 100$ / $w = p_0 q_0$

- Purchasing power of Money = $\frac{1}{\text{Cost of living Index no.}} \times 100$

- Real wage = $\frac{\text{Wage}}{\text{Cost of living Index no.}} \times 100$ / Real Income = $\frac{\text{Income}}{\text{Cost of living Index no.}} \times 100$

- Rate of Inflation = $\frac{(\text{Wholesale Index no. of C.Y.}) - (\text{Wholesale Index no. of P.Y.})}{\text{wholesale Index no. of P.Y.}} \times 100$

- General Index no. = $\frac{\Sigma\left(\frac{p_1}{p_0}\right)}{} \times 100$ / $\frac{\Sigma I w}{\Sigma w}$

- For Chain Base :-
  - If Base year not given = 1st Column take as 100
  - If Base year given of year (not in table) = 1st Column = jo diya hai vahi same
    [agar aisa base year diya hai, jo table me nahin hai)

- Value of r (correlation - coefficient) always between -1 to 1.
  r is free from unit
- $r(x,y) = r(y,x)$
- $u = \frac{x-A}{c_x}$ | $v = \frac{y-B}{c_y}$
- $r(-x,y) = -r(x,y)$
- $r(x,-y) = -r(x,y)$
- $r(-x,-y) = r(x,y)$

$$\boxed{\text{Imp} = r(u,v) = r(x,y) = r}$$

$r = 1$: perfect positive correlation
$r = -1$: " negative "
$r = 0$: no linear correlation

↑ PROPERTIES of CORRELATION COEFFICIENT ↑

- Formulas of r :-
  - when $\bar{x}$ & $\bar{y}$ are in points (5.43 / 2.90 ... etc) & x or y are small, then

$$r = \frac{n\Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{n\Sigma x^2 - (\Sigma x)^2} \times \sqrt{n\Sigma y^2 - (\Sigma y)^2}}$$

($\bar{x}$ & $\bar{y}$ are in fraction)

  - when x or y are very large, then

$$r = \frac{n\Sigma uv - (\Sigma u)(\Sigma v)}{\sqrt{n\Sigma u^2 - (\Sigma u)^2} \times \sqrt{n\Sigma v^2 - (\Sigma v)^2}}$$

, u & v already told

  - when $\bar{x}$ & $\bar{y}$ are not in points & x or y are not much large, then

$$r = \frac{\Sigma(x-\bar{x})(y-\bar{y})}{\sqrt{\Sigma(x-\bar{x})^2} \times \sqrt{\Sigma(y-\bar{y})^2}}$$

($\bar{x}$ & $\bar{y}$ are integers)

- Short sum formulas :-
  - $r = \frac{Cov(x,y)}{\sigma_x \cdot \sigma_y}$ | $r = \frac{\Sigma(x-\bar{x})(y-\bar{y})}{n \cdot \sigma_x \cdot \sigma_y}$
  - $r = \frac{\Sigma xy - n\bar{x}\bar{y}}{n \cdot \sigma_x \cdot \sigma_y}$

$\therefore \sigma_x = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n}}$

$\therefore \sigma_y = \sqrt{\frac{\Sigma(y-\bar{y})^2}{n}}$

$\therefore Cov(x,y) = \frac{\Sigma(x-\bar{x})(y-\bar{y})}{n}$

$\boxed{Cov(x,y) = Cov(u,v)}$

• Rank Correlation. -

- when no values are repeated :- $r = 1 - \frac{6\Sigma d^2}{n(n^2-1)}$ ∴ $d = R_x - R_y$

- when values are repeated :- $r = \frac{1-6[\Sigma d^2 + CF]}{n(n^2-1)}$ ∴ $CF = \frac{\Sigma(m^3-m)}{12}$

∴ m = no. of times value is repeated

- $b = b_{yx}$ = regression coefficient
- $\hat{y} = a + bx$ = regression line
- $a = \bar{y} - b\bar{x}$
- $b = \frac{\Sigma(x-\bar{x})(y-\bar{y})}{\Sigma(x-\bar{x})^2}$
- $b = \frac{n\Sigma xy - (\Sigma x)(\Sigma y)}{n\Sigma x^2 - (\Sigma x)^2}$
- $b = \frac{n\Sigma uv - (\Sigma u)(\Sigma v)}{n\Sigma u^2 - (\Sigma u)^2}$
- $b = \frac{n\Sigma uv - (\Sigma u)(\Sigma v)}{n\Sigma u^2 - (\Sigma u)^2} \times \frac{c_y}{c_x}$, when values are very big & $\begin{cases} u = \frac{x-A}{c_x} \\ v = \frac{y-B}{c_y} \end{cases}$
- $b = r \cdot \frac{\sigma_y}{\sigma_x}$ / $b = \frac{Cov(x,y)}{\sigma^2 x}$ } short sums

* Imp = Error = $e = y - \hat{y}$

b is also free from unit

∴ when $\bar{x}$ & $\bar{y}$ are not in points & values are also not big; means $\bar{x}$ & $\bar{y}$ are integers

∴ when $\bar{x}$ & $\bar{y}$ are in points & values are small, means $\bar{x}$ & $\bar{y}$ are in fraction.

∴ when values are very big & $\begin{cases} u = x - A \\ v = y - B \end{cases}$

- R^2 = Coefficient of determination = $r^2 = [r(x,y)]^2$

$R^2 = (\text{all formulas of } r)^2$

- $b_{yx} = b_{vu} \times \frac{c_y}{c_x}$
- $b_{vu} = b_{yx} \times \frac{c_x}{c_y}$

→ short cut method to find 'b'

• Extras :-

- $u = 10(x - 4.5)$ & $cx = \frac{1}{10}$
- $v = \frac{y-10}{50}$, $cy = 50$
- $u = 5(x-40)$, $cx = \frac{1}{5}$
- $u = \frac{x-40}{5}$, $cx = 5$

- $b = \frac{n\Sigma ty - (\Sigma t)(\Sigma y)}{n\Sigma t^2 - (\Sigma t)^2}$
- $a = \bar{y} - b\bar{t}$
- $\hat{y} = a + bt$ = linear equation for trend
- Methods of determining trend :- Graphical method
  :- least Square method ~~(Best Method)~~
  :- Moving average method
    - 3 year moving average
    - 4 year moving average
    - 5 year moving average
- If told to [fit a linear trend]
  ↳ find $\hat{y} = a + bt$ for every year

- Long-term Component or Trend = T_t
- Seasonal Component = S_t
- Cyclical Component = C_t
- Random / Irregular Component = R_t

} Components of time Series

- $Y_t = T_t + S_t + C_t + R_t$ (additive model of time Series)

Statistics- Part-2

- Coin Tossed 2 times = 4 outcomes [HH, TT, HT, TH]
- Coin tossed 3 times = 8 outcomes [HHH, TTT, THH.....]
- $P(A-B) = P(A) - P(A \cap B)$
- $P(B-A) = P(B) - P(A \cap B)$
- $P(A' \cap B') = 1 - P(A \cup B)$
- $P(A' \cup B') = 1 - P(A \cap B)$
- Normally,

→ If waala Niche :-

$$P(B/A) = \frac{P(A \cap B)}{P(A)}$$

$$P(A/B) = \frac{P(A \cap B)}{P(B)}$$

} Conditional probability

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

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

- for Mutually exclusive events

$$P(A \cup B) = P(A) + P(B)$$

$$P(A \cup B \cup C) = P(A) + P(B) + P(C)$$

- for Mutually exclusive & exhaustive events

$$P(A \cup B) = P(A) + P(B) = 1$$

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) = 1$$

- law of Multiplication of probability [for Independent Events A & B]

$$P(A \cap B) = P(A) \times P(B)$$

$$P(A' \cap B') = P(A') \times P(B')$$

$$P(A' \cap B) = P(A') \times P(B)$$

$$P(A \cap B') = P(A) \times P(B')$$

Q1- Define an event.

→ Any subset of sample space of a random Experiment is called an event which is shown by $A_1, A_2, A_3 \ldots\ldots$

- $P(A/B)$ = Occurence of event A under the condition that event B will occur.

- Statistical definition of probability :-

$$P(A) = \lim_{n \to \infty} \frac{m}{n}$$

- probability distribution :- Prepare table of

X				
P(x)				

Mean = $\mu = E(X) = \Sigma(x \cdot px)$

Variance = $V(X) = E(X^2) - (E(X))^2$

$\downarrow$

$\Sigma[x^2 \cdot p(x)] - (\mu)^2$

$P(A) + P(B) + P(C) \ldots\ldots = 1$

→ Mean & variance by discrete (discrete) variable

- Binomial distribution :-
  - Success = p
  - failure = q { Jo pooch hai, vahi diya hai to p }
  - $p + q = 1$ / $p = 1 - q$ / $q = 1 - p$
  - Mean = np
  - Variance = npq / Standard deviation = $\sqrt{npq}$
  - Symmetrical binomial distribution = $\boxed{p = 0.5}$ & $\boxed{q = 0.5}$
  - $P(x) = {}^{n}C_{x} \, p^{x} \cdot q^{n-x}$
  - If $p = \frac{1}{2}$ = Symmetric Skewness
    If $p < \frac{1}{2}$ = positive Skewness
    If $p > \frac{1}{2}$ = negative Skewness

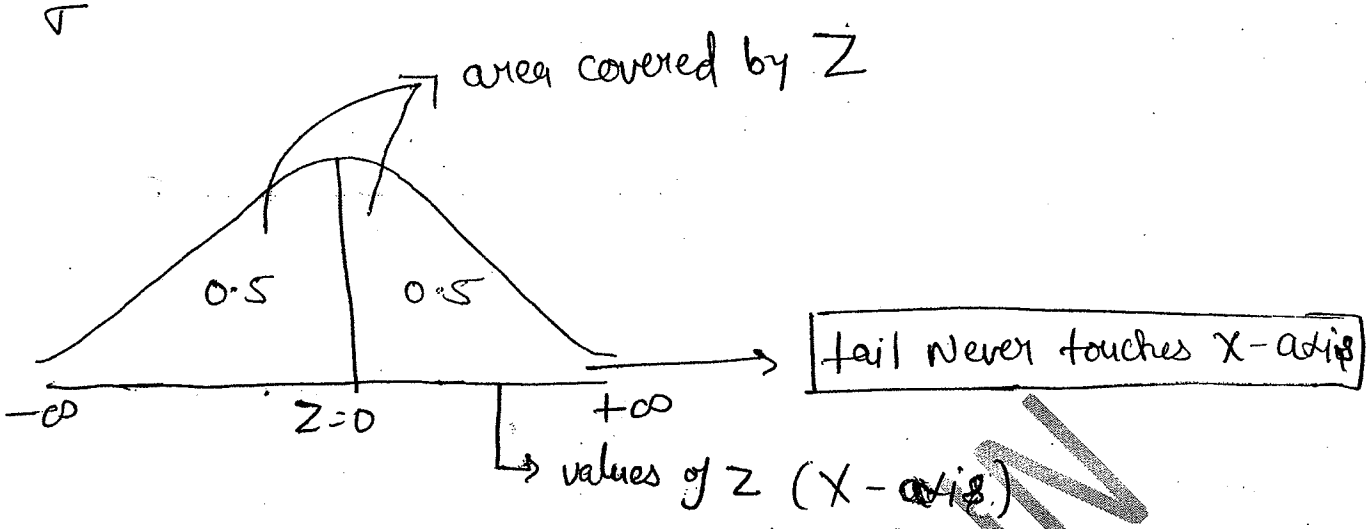
- $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$, π & e are Constents

  $\pi = 3.1416$

  $e = 2.7183$

→ Probability density function of a normal random Variable

- $Z = \frac{X - \mu}{\sigma}$ → Standard Normal Variable.



- Normal distribution Properties:-
  - $\mu = Mo = M$ [Mean = Median = Mode]
  - $Q_3 - M = M - Q_1$
  - $Q_2 = \frac{Q_3 + Q_1}{2}$ | $M = \frac{Q_3 + Q_1}{2}$ Because $M = Median = Q_2$
  - $Q_1 = \mu - 0.675\sigma$
    $Q_3 = \mu + 0.675\sigma$
  - Quartile deviation = $\frac{2}{3}\sigma$
  - Mean deviation = $\frac{4}{5}\sigma$

[$\frac{2}{3}$ $\frac{4}{5}$] → To learn

- Certain limits & areas to remember:-
  - 0.6826 or 68.26% → $(\mu - \sigma)$ & $(\mu + \sigma)$
  - 0.9545 or 95.45% → $(\mu - 2\sigma)$ & $(\mu + 2\sigma)$
  - 0.9973 or 99.73% → $(\mu - 3\sigma)$ & $(\mu + 3\sigma)$
  - 0.95 or 95% → $(\mu - 1.96\sigma)$ & $(\mu + 1.96\sigma)$
  - 0.99 or 99% → $(\mu - 2.575\sigma)$ & $(\mu + 2.575\sigma)$

- **Forms of Limit:-**
  - Modulus form = $|x-a|<\delta$
  - neighbourhood form = $N(a,\delta)$
  - Interval form = $(a-\delta), (a+\delta)$

  $3.\delta < x < 4.\delta$ (examples)
  $\downarrow$ $(a-\delta)$ $\quad$ $\downarrow$ $(a+\delta)$

- δ is neighbourhood of a.
  e.g. 0.001 is neighbourhood of 3, so $\boxed{a=3}$ & $\boxed{\delta=0.001}$

- Punctured δ neighbourhood of a; denoted by $N^*(a,\delta)$
  $N^*(a,\delta) = N(a,\delta) - \{a\}$

- $\lim_{x\to a} \frac{x^n-a^n}{x-a} = \frac{x^m-a^m}{x-a} = na^{n-1}$

- $\lim_{x\to a} [f(x) \pm g(x)] = l \pm m$

- $\lim_{x\to a} [f(x) \times g(x)] = l \times m \rightarrow$ [Multiplication working rule]

- $\lim_{x\to a} \left[\frac{f(x)}{g(x)}\right] = \frac{l}{m} \rightarrow$ [Division working rule]

- Standard form of limit of polynomial.
  $\lim_{x\to b} f(x) = a_0 + a_1 b + a_2 b^2 + \cdots a_n b^n$

- **Intervals:-** $a \in R$, $b \in R$ & $a<b$, set of all real numbers between a & b .....
  - Closed Interval - including a & b. $[a,b] \rightarrow \{x \mid a \le x \le b\}$
  - open Interval - not including & &b. $(a,b) \rightarrow \{x \mid a < x < b\}$
  - Closed open Interval - including a but not including b. $[a,b) \rightarrow \{x \mid a \le x < b\}$
  - Open-Closed Interval - not including a but including b. $(a,b] \rightarrow \{x \mid a < x \le b\}$

- Derivation = $f'(a) = \frac{dy}{dx}$
- $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ → Definition method of derivation
- If 'y' given, then $\frac{dy}{dx}$ / If $f(x)$ given, the $f'(x)$
- 1st order derivation = $f'(x) = \frac{dy}{dx}$ — (1)
- 2nd order derivation = $f''(x) = \frac{d^2y}{dx^2}$ — (2)
- find (1) & (2) by $\boxed{n a^{n-1} \,/\, n x^{n-1}}$
- Multiplication rule of differentiation = $\frac{dy}{dx} = v \cdot \frac{du}{dx} + u \cdot \frac{dv}{dx}$
- Division rule of differentiation = $\frac{dy}{dx} = \frac{v \cdot \frac{du}{dx} - u \cdot \frac{dv}{dx}}{v^2}$
- Chain Rule = $\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$

* If $3x = 3$, $5x = 5$, $8x = 8$, $x = 1$ | $3 = 0$, $5 = 0$, $8 = 0$ ⋮ } differentiations

[x with 1 power = only number with x
only number alone = then 0]

- Increasing / Decreasing function :-
  - find $\frac{dy}{dx}$
  - put value of x in $\frac{dy}{dx}$
  - answer in minus (−) → decreasing $f'(x) < 0$ / answer in plus (+) → increasing $f'(x) > 0$
- Minimum / Maximum values :-
  - answer in minus (−) → Maximum value $f'(x) = 0$ & $f''(x) < 0$ / answer in plus (+) → minimum value $f'(x) = 0$ & $f''(x) > 0$

- Marginal revenue = $\frac{dR}{dx}$
- Marginal Cost = $\frac{dC}{dx}$
- Elasticity of demand = $\frac{-p}{x} \times \frac{dx}{dp}$ / $-\frac{\text{percentage change in demand}}{\text{percentage change in price}}$
- Conditions!-
  - Minimising production Cost function = $\frac{dC}{dx} = 0$ & $\frac{d^2C}{dx^2} > 0$
  - Maximizing Revenue function = $\frac{dR}{dx} = 0$ & $\frac{d^2R}{dx^2} < 0$
  - Maximizing profit function = $\frac{dP}{dx} = 0$ & $\frac{d^2P}{dx^2} < 0$