

N.B. : (1) Question No. 1 is compulsory.

(2) Answer any four questions out of the remaining six questions.

(3) Each question carries equal marks.

- Q.1) (a) Define and explain the stack data structure with suitable example. Give algorithms for Push, Pop, Stackempty and Stackfull functions. [10]
(b) Given the set of symbols and corresponding frequency table as below, explain the steps to find the Huffman Code

Symbol	A	B	C	D	E	F	G	H	I
Frequency	7	6	4	6	5	1	10	7	8

[10]

- Q.2) (a) What is Analysis of algorithm? Explain the Asymptotic Notations (Big O, Ω , θ) used while analyzing an algorithm. [10]

- (b) Explain heap as a data structure. Build a Max Heap by investing the following data arriving as sequential set

23, 7, 92, 6, 12 14, 40, 44, 20, 21. Show the heap after deleting 2 elements. [10]

- Q.3) (a) Explain collision resolution and its techniques in context of hashing. [10]

- (b) Write an algorithm for sorting the elements using shell sort. Show the contents of the array after it has gone through a one increment pass of the shell sort. The increment factor is $k=3$.

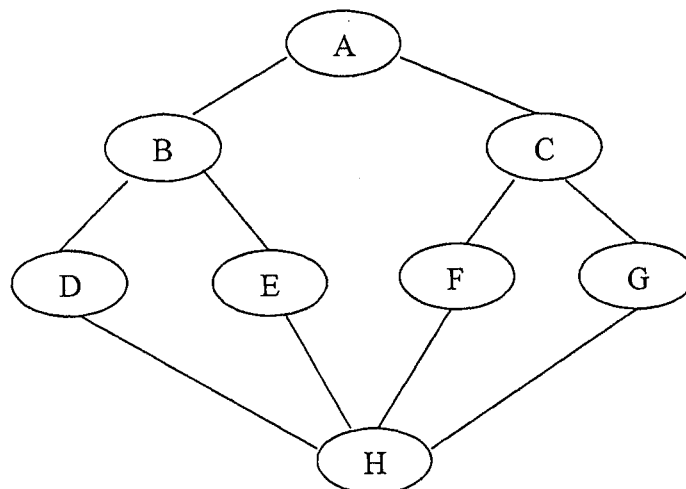
23 3 7 13 89 66 6 44 18 90 98 57 [10]

- Q.4) (a) What is a linked list? Give the data structure and write algorithms to- [10]

(i) Delete an element.

(ii) Count the number of elements.

- (b) Give DFS and BFS traversal of the graph shown below. [10]



Q.5) (a) What is a binary tree? The following binary tree has the following inorder and preorder traversal. Draw the tree and give the postorder traversal. Also write the algorithm for the same.

Inorder ABCEDEFGIH

Preorder JCBADefIGH

[10]

(b) Using modulo-division and linear probing method, store the keys given below in an array of 13 elements. How many collisions occurred and what is the density of the list after the keys are inserted.

28, 7, 846, 786, 431, 870, 612, 675, 876, 546, 34, 12

[10]

Q.6) (a) What is a height balanced tree? What are the advantages of AVL trees? Write an algorithm to Rotate AVL tree right and illustrate with the help of an example.

[10]

(b) Define M-way trees. Build a B-tree of order 4 by inserting data in the sequence given below:

92 24 6 7 11 8 22 4 5 16 19 20 78 [10]

Q.7) (a) Explain the following terms :- (any two)

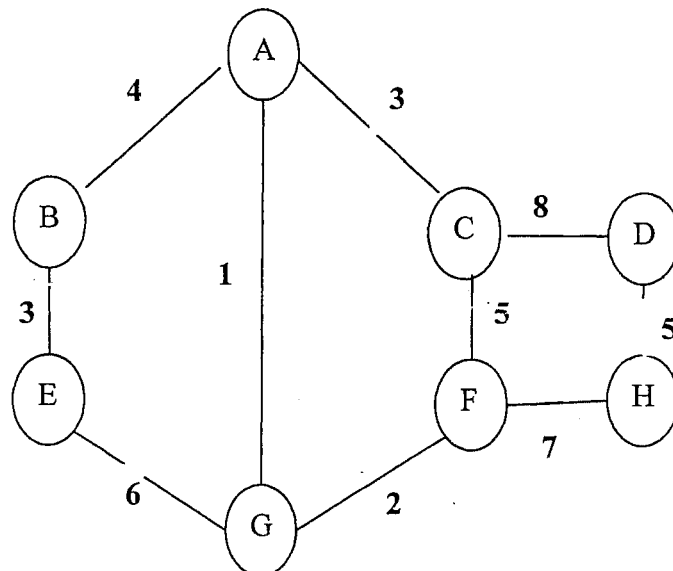
(i) Priority queue

(ii) General trees

(iii) Graph storage structures

[10]

(b) What is a minimum spanning tree? Give Kruskal's algorithm to find a minimum spanning tree. Determine the minimum spanning tree of the following graph:-



[10]

MCA (SEM - II)
Operating Systems
(Paper – II)
MAY: - 2016

QP Code : 26573

(3 hours)

Total Marks: 100

	1.	Question 1 is compulsory. It carries 20 marks.																																																																			
	2.	Attempt any four from Questions 2 to 7.																																																																			
	3.	Illustrate answers with neat sketches wherever required.																																																																			
	4.	Answers to questions should be grouped and written together .																																																																			
Q 1.	a)	A.) Consider the following process arrival times, and run time requirements: <table border="1"><thead><tr><th>Process Name</th><th>Arrival Time</th><th>Processing Time</th></tr></thead><tbody><tr><td>A</td><td>0</td><td>5</td></tr><tr><td>B</td><td>1</td><td>3</td></tr><tr><td>C</td><td>2</td><td>8</td></tr><tr><td>D</td><td>3</td><td>6</td></tr></tbody></table> For the process listed in the above table, draw a Gantt chart and Find their Average waiting time and Average turnaround time using:- 1) FCFS, 2) SJF (Preemptive and Non-Preemptive). 3) Round Robin (quantum=2)							Process Name	Arrival Time	Processing Time	A	0	5	B	1	3	C	2	8	D	3	6	12 Marks																																													
Process Name	Arrival Time	Processing Time																																																																			
A	0	5																																																																			
B	1	3																																																																			
C	2	8																																																																			
D	3	6																																																																			
	b)	Explain in brief PCB?							08 Marks																																																												
Q. 2.	a)	What are the different types of threads? Why threads are called a lights weight process?							10 Marks																																																												
	b)	What are the different threats to the security of the system?							10 Marks																																																												
Q.3.	a)	What is deadlock? Explain the methods for deadlock prevention?							10 Marks																																																												
	b)	Given the disk has 500 (0 – 499) cylinders. Suppose the disk queue contains the request for I/O to blocks on the cylinder in the following order:- 88,149,413,99,175,49,310,223,178,135 The head of the disk drive is currently at cylinder 142, previous request served was 124.What is the Total head movement for the following algorithm? (I)SSTF (II)SCAN (III)CSAN (IV)LOOK							10 Marks																																																												
Q.4.	a)	What are the external and internal Fragmentations ?Discuss the techniques to overcome fragmentations							10 Marks																																																												
	b)	Consider the following snapshot of the system:- <table border="1"><thead><tr><th>Process</th><th colspan="3">Allocation</th><th colspan="3">Max</th><th colspan="3">Available</th></tr></thead><tbody><tr><td>P0</td><td>1</td><td>1</td><td>2</td><td>4</td><td>3</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>P1</td><td>2</td><td>1</td><td>2</td><td>3</td><td>2</td><td>2</td><td></td><td></td><td></td></tr><tr><td>P2</td><td>4</td><td>0</td><td>1</td><td>9</td><td>0</td><td>2</td><td></td><td></td><td></td></tr><tr><td>P3</td><td>0</td><td>2</td><td>0</td><td>7</td><td>5</td><td>3</td><td></td><td></td><td></td></tr><tr><td>P4</td><td>1</td><td>1</td><td>2</td><td>11</td><td>2</td><td>3</td><td></td><td></td><td></td></tr></tbody></table> Using Bankers Algorithm. I) What is the contents of matrix need? II) Is the system in safe state? Give the sequence. III) Is the request from P2 arrives for (1, 0, 3), can be the request be granted immediately?							Process	Allocation			Max			Available			P0	1	1	2	4	3	3	2	1	0	P1	2	1	2	3	2	2				P2	4	0	1	9	0	2				P3	0	2	0	7	5	3				P4	1	1	2	11	2	3				10 Marks
Process	Allocation			Max			Available																																																														
P0	1	1	2	4	3	3	2	1	0																																																												
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P3	0	2	0	7	5	3																																																															
P4	1	1	2	11	2	3																																																															
Q.5.	a)	Explain the concept of Spooling and explain how it is different from buffering?							10 Marks																																																												
	b)	Explain clock hardware and software in I/O System.							10 Marks																																																												

Q.6	a)	Consider the pages are referenced in the following sequence. 1,2,3,1,2,5,1,2,3,4,5,2,4 How many page faults will occur for the following page replacement algorithm, assuming three frames? I)LRU replacement II)FIFO replacement III) Optimal replacement.	10 Marks
	b)	Discuss the different File Access Methods. plain the mechanisms of free space management.	10 Marks
Q.7.		Write short notes on any four:	20 Marks
	a)	Compiler and Assembler.	
	b)	Context Switching	
	c)	Monitors	
	d)	Semaphore	
	e)	DMA	



MCA (SEM - II)
Accounting and Financial Management
(Paper – III)
MAY: - 2016

QP Code : 26579

(3 Hours)

[Total Marks : 100]

- N.B. :** (1) Question No.1 is **compulsory**.
 (2) Attempt **any two** questions from question No.2 to No.4.
 (3) Attempt **any two** questions from question No.5 to No.7.
 (4) Answer to the questions should be **grouped** and **written** together.
 (5) **Figures** to the **right** indicate **full marks** assigned to the question.

1. (A) Explain meaning of Cash from Operating Activities. Distinguish Between Net Profit & Cash from Operating Activities. **10**
 (B) Following is the Trial Balance of Bharat Traders as on 31st March, 2016. **10**

Particulars	₹	₹
Capital A/c		1,00,000
Drawings A/c	10,000	
Furniture & Fixture	5,600	
Typewriters	2,960	
Goodwill	24,000	
Investment	4,800	
Interest on Investment		300
Bad debts Provision		1,000
Bad debts	492	
Rent	1,800	
Rates	1,280	
Salaries & Wages	12,800	
Office Expenses	2,840	
Stock on (1 st April, 2015)	52,200	
Purchases	1,62,400	
Sales		1,97,000
Returns outward		1,300
Returns inward	500	
Debtors	18,080	
Creditors		14,640
Cash Balances	14,488	
Total	3,14,240	3,14,240

Adjustments :

- (1) The stock on 31st March, 2016 was valued at ₹ 59,200/-.
 (2) Outstanding Liabilities were : Rent ₹ 600 and Office Expenses ₹ 120.

TURN OVER

2. (A) What is importance of Ledger? Explain the procedure of posting transactions to Ledger Accounts. 10
- (B) Journalize the following transactions in the Books of Ms. Laxmi. 10

2016	
April 01	Started Business with ₹20,000.
April 05	Goods worth ₹ 100 were damaged in transit.
April 07	Received a claim from Railway authorities.
April 08	Purchased goods worth ₹1,500.
April 12	Purchased a horse for ₹2,000 & Paid for carriage ₹500.
April 20	Sold goods worth ₹1,625.
April 25	Paid Interest ₹200.
April 27	Paid for office stationary ₹300.
April 28	Paid salary ₹2,500.
April 30	Paid commission ₹200.

3. (A) Explain working capital cycle in detail. 10
- (B) From the following particulars prepare a cash Book with Cash, Bank & Discount Column : 10

2016	
March 01	Cash in Hand ₹200.
01	Bank Overdraft ₹3,000.
03	Issued a cheque in favour of Raman for ₹2,500 in full settlement of ₹2,600/-
05	Received a cheque from Somnath for ₹3,250 in full settlement of ₹3,300 & deposited the cheque into Bank.
07	Received an advice from the bank stating that the bank has paid ₹250 on account of Insurance Premium.
09	Paid to petty cashier ₹100.
11	Made cash sales ₹3,500 & Cash Purchases ₹900.
15	Purchased Machinery for ₹7,000 the amount being paid by cheque.
19	Received cross cheque from Priya for ₹2,000 in full settlement of ₹2,200.
28	Paid office Expenses ₹300.
29	Paid office Rent by Cheque ₹350.

TURN OVER

4. (A) Explain the reasons for disagreement in Bank Reconciliation statement. 10
 (B) Explain Cash Budget. What is the purpose of Analyzing monthly cash Budgets. 10
5. (A) What do you mean by ratio analysis? What are the advantages of such analysis? 10
 (B) From the following Information Calculate : 10
1. Current Ratio
 2. Liquid Ratio
 3. Net Profit Ratio
 4. Debtors Turnover Ratio

Detail as on 31st December, 2015 :

Particulars	₹	₹
Sales : Cash	64,000	
Credit	6,84,000	
Total Sales	7,48,000	
Less : Cost of Sales	5,96,000	
Gross Profit		1,52,000
Less : Expenses		
Warehousing Transport	48,000	
Administration	38,000	
Selling	28,000	
Debenture Interest	4,000	
Total		1,18,000
Net Profit		<u>34,000</u>

Balance Sheet as on 31st December, 2015.

Liabilities	₹	Assets	₹
Share Capital	1,50,000	Fixed Assets (Net)	80,000
Reserves	60,000	Current Assets	
Profit & Loss Account	24,000	Stock	1,88,000
Debentures	60,000	Debtors	1,64,000
Current Liabilities	1,52,000	Cash	14,000
Total	4,46,000	Total	4,46,000

TURN OVER

6. (A) Explain in detail Fund flow statement. **10**
 (B) From the following information prepare a Cash Budget for the month of January to April, 2016. **10**

Months	Sales (₹)	Purchases (₹)	Wages	Manufacturing
2015	(Credit)	(Credit)	(₹)	Expenses (₹)
November	30,000	15,000	3,000	1,150
December	35,000	20,000	3,200	1,225
2016				
January	25,000	15,000	2,500	900
February	30,000	20,000	3,000	1,050
March	35,000	22,500	2,400	1,100
April	40,000	25,000	2,600	1,200

Additional Information :

- (1) The customers are allowed a credit period of two months.
 - (2) The creditors are allowing a credit of two months.
 - (3) Interest payable ₹ 10,000 in April.
 - (4) Opening Cash Balances - 1st January, 2016 is ₹15,000.
7. (A) Explain Accounting Cycle. Explain the steps involved in an Accounting Cycle. **10**
 (B) Explain cost accounting. State the objectives of cost accounting. **10**

- N.B. :**
- 1) Question No.1 is **compulsory**.
 - 2) Attempt any **four** questions from Question No 2 to 7.

1. (a) Discuss various colour Models used in graphics system. (10)
(b) Which of the given lines would be visible ,rejected and/or clipped (10) when Cohen Sutherland line clipping algorithm is applied in a window whose Lower left of window is (10,10) and upper right is (20,20) . Find the new co-ordinates of clipped lines if any ..
Lines : AB(12,18)-(16,12), CD(13,15)-(25,15) EF(12,4)-(25,8), GH(8,13) - (13,24) and IJ(5,25)(25,25).
2. (a) What are Projections? Explain various types of projections. (10)
(b) What are Display files? Explain with examples, how are polygons and characters represented in Display Files? (10)
3. (a) Rasterise the ellipse having $r_x = 3$ and $r_y = 6$ and center located at (15,-20). (10)
(b) What is 2D viewing transformation. Derive the window to viewport transformation equation. (10)
4. (a) Find the final transformation matrix ,when point P(x,y) is to be reflected about a line $Y = mx + c$. (10)
(b) What do you mean by hidden surface removal? Explain the Z-buffer algorithm with its advantages and disadvantages. (10)
5. (a) Construct the Bezier curve of order 3 and with 4 polygon vertices A(1,1) , B(2,3) C(4,3) and D(6,4). (10)
(b) Discuss the process of rotating an object about an arbitrary point (xp,yp). (10)
6. (a) Differentiate between halftone and Dithering techniques. (10)
(b) Give 3D transformation matrices for translation, scaling and rotation. (05)
(c) Write the procedure for 8 connected flood-fill. (05)
7. Write Short Notes on **any four** :- (20)
a) Inside-Outside tests b) Fractals c) Animation
d) Display File interpreter e) Phong shading

MCA (SEM - II)
Probability and Statistics
(Paper – V)
MAY: - 2016

QP Code : 26578

(3 Hours)

[Total Marks : 100

N. B. : (1) Question No.1 is **compulsory**.

(2) Attempt any **four** questions out of remaining **six** questions.

(3) Assume any necessary data, if required but justify the same.

(4) **Figure to the right** indicate **marks**.

(5) Use of scientific calculator is allowed.

1. (a) The age of student is normally distributed with mean of 12 years and standard deviation of 4 years. Find the probability that 5

(i) age of student is at least 20 years

(ii) Age of student is between 0 and 12 years.

[Given $p(0 \leq z \leq 2) = 0.4772$, $p(0 \leq z \leq 3) = 0.49865$]

- (b) In a frequency distribution of 100 families given below, the number of families corresponding to expenditure group 20-40 and 60-80 are missing from the table. However the median is known to be 50. Find out the missing frequencies 5

Expenditure	0-20	20-40	40-60	60-80	80-100
No of families	14	?	27	?	15

- (ii) (a) prove that $E(ax+b) = aE(x)+b$ and $V(ax+b) = a^2V(x)$ 5

- (b) The mean and standard deviation of 300 items are found to be 50 and 20 respectively. At the time of calculation two items were wrongly taken as 7 and 52 instead of 15 and 26. Find the correct mean and standard deviation. 5

2. (a) The joint probability density function of a two dimensional random variable (X,Y) is given by 10

$$f(x,y) = 2, 0 < x < 1, 0 < y < x$$

$$= 0, \text{ otherwise}$$

Find the marginal density functions of x and y. Conditional density functions of y given $X = x$ and conditional density function of x given $Y = y$

- (b) (i) Calculate Bowley's coefficient of skewness for the following distribution 5

Class	30-35	35-40	40-45	45-50	50-55	55-60
Frequency	5	10	30	35	15	5

[TURN OVER

- (ii) The following data gives the number of car accidents in the city during a random week. Test whether these accidents are uniformly distributed or not [Value of Chi square at 5% level of significance for degrees of freedom 6 is 12.595] 5

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat
No of accidents	10	17	11	13	17	14	16

3. (a) (i) if "m" things are distributed among 'a' men and 'b' women show that the probability that the number of things received by men is odd is 5

$$\frac{1}{2} \left[\frac{(b+a)^m - (b-a)^m}{(b+a)^m} \right]$$

- (ii) A binomial variable X satisfies the relation $9P(X=4) = P(X=2)$, when $n=6$ find the value of parameter P 5

- b) Ten competitors in a beauty contest are ranked by three judges in the following order 10

I judge	1	6	5	10	3	2	4	9	7	8
II judge	3	5	8	4	7	10	2	1	6	9
III judge	6	4	9	8	1	2	3	10	5	7

Use Spearman's rank correlation co-efficient to determine which pair of judges has the nearest approach to common tastes in beauty

4. (a) (i) Find the co-efficient of variation for the following data 5

X	20-40	40-60	60-80	80-100	100-120	120-140
f	7	12	16	13	13	4

- (ii) A continuous random variable has p.d.f. 5
- $$f(x) = k(2-x), \quad 0 \leq X < 2$$
- $$= kx(x-2), \quad 2 \leq X < 3$$
- $$= 0 \quad \text{otherwise.}$$

Find k.

- (b) (i) A petrol pump is supplied with petrol once a day. If its daily volume X of sale in thousands of liters is distributed by $f(x) = 5(1-x)^4$, $0 \leq x \leq 1$. What must be the capacity of the tank such that its daily supply will be exhausted in a given day shall be 0.01 5

[TURN OVER

- (ii) The ages of husband and wives in seven couple were as follows. Find the Karl Pearson's coefficient of correlation between their age 5

Age of husband	45	44	50	53	66	30	48
Age of wife	42	40	41	42	56	30	43

5. (a) (i) The life in hours (x) of a certain electronic component is a continuous random variable with pdf $f(x) = 150/x^2, x \geq 150$
 $= 0$, otherwise 5

Determine the form of the distribution function $F(x)$. Also find the probability that a component would last for more than 200 hours but less than 500 hrs

- (ii) Prove that geometric distribution is memory less 5
 (b) (i) Calculate median from the following data 5

Marks	0-20	20-40	40-60	60-80	80-100
No. of students	05	08	15	16	06

- (ii) Calculate Karl-Pearson's co-efficient of skewness from the following data 5

Marks less than	10	20	30	40	50
No of students	5	12	32	44	50

6. (a) (i) The mean weekly sales of chocolate bar in candy stores was 146.3 bars per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful? 5

[Given the table value of 't' at 5% level of significance for degrees of freedom 21 is 1.721]

- (ii) In a railway reservation office two clerks are in checking reservation forms. On an average the first clerk checks 55% of the forms while the second does the remaining. The first clerk has an error rate 0.3 and the second has an error rate of 0.2. A reservation form is selected at random and is found to have an error. What is the probability that it was checked by the first clerk? 5

[TURN OVER

(b) (i)	Marks	10-30	30-50	50-70	70-90	90-110	110-130	5
	No of students	4	10	14	12	8	6	

Calculate the modal marks for the above data

- (ii) What is the probability that four "A" s come consecutively in the arrangement of letters in the word "MAHARASHTRA" 5

7. (a) (i) For 8 observations the following results were calculated $\Sigma X=59$, $\Sigma Y=40$, $\Sigma X^2 =524$, $\Sigma Y^2=256$, $\Sigma XY=344$. Find the regression equations of X on Y and Y on X 5

- (ii) The probability distribution of a bivariate random variable (X,Y) is given below 5

Y \ X	1	2	3	Total
1	0.1	0.1	0.2	0.4
2	0.2	0.3	0.1	0.6
Total	0.3	0.4	0.3	1

Find $E(X+Y)$ and $E(XY)$

- (b) (i) The probability of occurrence of an event A is 0.7, the probability of non-occurrence of B is 0.5 and non-occurrence of at least one of A and B is 0.6. Find the probability that at least one of A and B occur. 5

- (ii) Calculate mean deviation from mean and its coefficient from the following data 5

Size of items	3-4	4-5	5-6	6-7	7-8	8-9	9-10
Frequency	3	7	22	60	85	32	8

MCA (SEM - II)
Communication and Soft Skills
(Paper – VI)
MAY: - 2016

QP Code : 26584

[Total Marks: 100

(3 Hours)

- N.B. :**
- 1) Question No.1 is **compulsory**.
 - 2) Attempt any **four** from the remaining **six** questions.
 - 3) Answers to the Questions should be grouped and written together.
 - 4) Figures to the right indicate full Marks assigned to the Questions.
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1. (a) Discuss any three **psychological** barriers to communication. How do they affect communication in a business context? (10)
(b) What is a decision? Explain a few measures that organizations can take for improving decision-making? (10)
2. (a) Explain the Advantages and Disadvantages of Written and Oral Communication. (10)
(b) What do you understand by the word 'Communication'. Explain the five elements of Communication. Elaborate with the help of example. (10)
3. (a) What are the Modern means of Communication? Explain few examples in detail. (10)
(b) Explain the objectives of Organization Design. (10)
4. (a) What are the techniques to be followed during Pre-Interview and final Interview. (10)
(b) What are the Dos and Don'ts of a good group discussion? (10)
5. (a) What are the essential elements of a presentation and give a detailed note on the structure of an effective presentation? (10)
(b) Write a letter of application with resume in response to the following advertisement dated 15th May, 2016: (10)

Applications are invited from Engineers (IT), MCA, Graduates with IT training and 1-2 years of work experience having proficiency in C++, Java, UNIX, WEB Designing. The applications should reach the Manager Personnel, Pearson IT Solutions, Mahape, Navi Mumbai within 10 days of the advertisement.
6. (a) As general Secretary of the students council draft a notice along with the agenda for a meeting of the members of the Student's council, to plan a week long Annual Tech Fest to be held at your institute. (10)
(b) Write a memo to an employee warning against his habit of browsing the internet during office hours. (10)
7. Write Short Notes on any four :- (20)
 - (a) Conflict Resolution
 - (b) Grapevine
 - (c) Emotional Quotient
 - (d) Semantic Barriers
 - (e) Elements of Perception