PAPER 9 - OPERATIONS MANAGEMENT & INFORMATION SYSTEM

The following table lists the learning objectives and the verbs that appear in the syllabus learning aims and examination questions:

	Learning objectives	Verbs used	Definition
LEVEL B	KNOWLEDGE What you are expected to know	List	Make a list of
		State	Express, fully or clearly, the details/facts
		Define	Give the exact meaning of
	COMPREHENSION What you are expected to understand	Describe	Communicate the key features of
		Distinguish	Highlight the differences between
		Explain	Make clear or intelligible/ state the meaning or purpose of
		Identity	Recognize, establish or select after consideration
		Illustrate	Use an example to describe or explain something
	APPLICATION How you are expected to apply your knowledge	Apply	Put to practical use
		Calculate	Ascertain or reckon mathematically
		Demonstrate	Prove with certainty or exhibit by practical means
		Prepare	Make or get ready for use
		Reconcile	Make or prove consistent/ compatible
		Solve	Find an answer to
		Tabulate	Arrange in a table
	ANALYSIS How you are expected to analyse the detail of what you have learned	Analyse	Examine in detail the structure of
		Categorise	Place into a defined class or division
		Compare and contrast	Show the similarities and/or differences between
		Construct	Build up or compile
		Prioritise	Place in order of priority or sequence for action
		Produce	Create or bring into existence

Paper 9 - Operations Management & Information System

Full Marks: 100   **Time allowed-3hrs**

This paper contains 3 questions. All questions are compulsory, subject to instruction provided against each question. All workings must form part of your answer. Assumptions, if any, must be clearly indicted.

Question No. 1 : Answer all questions. [20 marks]

1. **(a)** Define Quality Control.
   (b) An analyst wants to obtain a cycle time estimate that is within $\pm 5\%$ of the true value. A preliminary run of 40 cycles took 80 minutes to complete and had a calculated standard deviation of 0.3 minutes. What is the co-efficient of variation to be used for computing the sample size for the forthcoming time study?
   (c) Explain Utilization.
   (d) State the principles of Total Quality Control.
   (e) State the limitations of Preventive Maintenance.
   (f) The main shaft of an equipment has a very high reliability of 0.990. The equipment comes from Japan and has a high downtime cost associated with the failure of this shaft. This is estimated at ₹8 crores as the costs of sales lost and other relevant costs. However, this spare is quoted at ₹15 lakhs at present. Should the shaft spare be procured along with the equipment and kept or not?
   (g) Explain the terms Deterministic System and Probabilistic System.
   (h) Explain ODMG object model.
   (i) List the types of information supplied by Marketing Information System.
   (j) Explain the term Computer Network.   [10×2=20]

Answer:

(a) Quality Control may be defined as "a system that is used to maintain a desired level of quality in a product or service". It is a systematic control of various factors that affect the quality of the product. Quality Control can also be defined as that "Industrial Management technique by means of which product of uniform acceptable quality is manufactured".

(b) Standard Deviation of sample (s) = 0.3 min/cycle.

Mean of sample = $\overline{x} = \dfrac{80\,\text{min}}{40\,\text{cycle}}$ = 2 min/cycle.

Co=efficient of variation (v) = $\dfrac{s}{\overline{x}} = \dfrac{0.3}{2}$ =0.15

(c) Utilization = Actual Hours/Scheduled available hours
Utilization factor and efficiency are both assumed to develop realistic and feasible plans. Utilization is the percentage of a resource's maximum capacity, which is expected to involve in production. For example, it is not expected by an employee to work effectively for every minute in an 8 hour shift. All workers including devoted employees need breaks to attend to their personal needs.

(d) Principles of Total Quality Control (TQC)

- Top management policies- Zero defects, continuous improvement etc.
- Quality control training for everyone
- Quality at product/service design stage
- Quality materials from suppliers
- Quality control in production
- Quality control in distribution, installation and usage.

(e) Limitations of Preventive Maintenance
- More expensive in the short term and during the initial stages of introduction of preventive maintenance programme.
- Inspection of plant, equipment and machinery will have to be carefully planned and implemented and improved over a period of time.

(f) The expected cost of down time
= (Probability of failure) × (Cost when break-down occurs)
= (1 - 0.990) × (₹8 crores) = ₹8 lakhs
However, the cost of procuring the spare now is ₹15 lakh. Therefore, expected cost of downtime is less than the cost of spare, hence the spare need not be bought along with the equipment.

(g) Deterministic System: A deterministic system operates in a predictable manner wherein the interaction among the parts is known with certainty. An example is a correct computer program, which performs exactly according to a set of instructions.
Probabilistic System: The probabilistic system can be described in terms of probable behavior, but a certain degree of error is always attached to the prediction. Where a set of instructions given to a human who, for a variety of reasons, may not follow the instructions exactly as given. Forecasting is also a Probabilistic System.

(h) The ODMG object model is the data model upon which the object definition language and object query language are based. In fact the object model provides the data type, type constructors and other concepts that can be utilized in the ODL to specify object database schemas.

(i) Marketing information consists of people, equipment and procedure to gather, sort, analyze, evaluate and distribute needed, timely and accurate information to marketing decision makers.
Marketing Information system supplies three types of information
- Recurrent Information
- Monitoring Information
- Requested Information

(j) The interconnection of one or more, computers through
- The use of satellite, microwave, terrestrial line or other communication media and
- Terminals or a complex consisting of two or more interconnected computers whether or not the interconnection is continuously maintained.

Operation Management

Answer any three questions

2. (a) (i) A Hospital has to pay nurses for 40 hours a week. One nurse is assigned to one patient. The cost per hour for each of the nurses is given below:

Patient → Nurse ↓	W	X	Y
K	10	10	30
L	30	10	20
M	20	30	20

(i) Find the nurse patient combination to minimize cost to the hospital.
(ii) How much does each nurse earn per week?

Suppose that a new patient Z is admitted and that a new nurse is appointed. The new patient is charged ₹40 per hour by each of the existing nurses. The new nurse charges ₹50 per hour irrespective of the patient.

(iii) What would be your revised calculations?
(iv) Comment on the new solution. **[10]**

(ii) A company has two grades of inspectors, 1 and 2 to undertake quality control inspection. At least 3,500 pieces must be inspected in an 8 hour day. Grade 1 inspector can check 50 pieces in an hour with an accuracy of 95%. Grade 2 inspector checks 25 pieces an hour with an accuracy of 90%.

The daily wages of grade 1 inspectors are ₹6 per hours while those of grade 2 inspectors are ₹5 per hour. Any error made by an inspector cost ₹4 to the company. If there are, in all, 20 grade 1 inspectors and 25 grade 2 inspectors in the company, find the optimal assignment of inspectors that minimizes the daily6 inspection cost. Formulate the LPP. **[6]**

(b) (i) Workers come to tool store room to enquire about special tools (required by them) for accomplishing a particular project assigned to them. The average time between two arrivals is 60 seconds and the arrivals are assumed to be in Poisson distribution. The average service time (of the tool room attendant) is 40 seconds. Determine:
(a) Average queue length
(b) Average length of non-empty queues
(c) Average number of workers in system including the worker being attended. **[6]**

(ii) Draw the network for the following activities and find critical path and total duration of project:

Activity	Duration (days)	Activity	Duration (days)
1-2	34	2-5	37
1-3	27	2-6	18
1-4	41	3-5	10
2-3	38	3-6	16
2-4	85	4-5	19

[10]

(c) (i) Following is the profit matrix based on four factories and three sales depots of a company:

	Sales depots			
	S1	S2	S3	Availability
Factory 1	6	6	1	10
Factory 2	-2	-2	-4	190
Factory 3	3	2	2	50
Factory 4	8	5	3	100
Demand	80	120	150	

Find the initial solution by Vogel's Approximation method to maximize the profit. Is the initial solution feasible? [12]

(ii) **State Juran's 10 Steps for Quality Improvement.** [4]

(d) (i) **A car manufacturing company manufactures 80 cars per day. The sale of cars depends upon the demand which has the following distribution.**

Sale of cars	77	78	79	80	81	82
Probability	0.10	0.15	0.20	0.35	0.15	0.05

The production cost and sale price of each car are ₹4 lakhs and ₹5 lakhs respectively. Any unsold car is to be disposed of at a loss of ₹2 lakhs. There is penalty of ₹1 lakh per car, if the demand is not met. Using the following random numbers, estimate the total profit/loss for the next 10 days:

09	98	64	98	94	01	78	10	15	19

If the company decides to produce 79 cars per day, what will be its impact on profitability? [12]

(ii) **Explain the terms Little JIT and Big JIT.** [4]

Answer:

(a) (i) (i) and (ii)

Row operations

Patient →	W	X	Y
Nurse ↓			
K	00	00	20
L	20	00	10
M	00	10	00

Columns operation is not required as there is zero in each column.

Minimum number of lines.

Patient →	W	X	Y
Nurse ↓			
K	00	00	20
L	20	00	10
M	00	10	00

As the minimum number of lines are equal to order of matrix, optimal assignment should be made.

Optimal Assignment

Patient →	W	X	Y
Nurse ↓			
K	00	00	20
L	20	00	10
M	00	10	00

Assignment:	Cost		Earnings of nurses	
Nurse K → Patient W	Patient W ₹10 × 40 = ₹400		Nurse K ₹10 × 40 = ₹400	
Nurse L → Patient X	Patient X ₹10 × 40 = ₹400		Nurse L ₹ 10 × 40 = ₹400	
Nurse M → Patient Y	Patient Y ₹20 × 40 = ₹800		Nurse M ₹ 20 × 40 = ₹800	
	Total	₹1600	Total	₹1600

(iii) New Scenario

Patient →	W	X	Y	Z
Nurse ↓				
K	10	10	30	40
L	30	10	20	40
M	20	30	20	40
New Nurse	50	50	50	50

Row reduction

Patient →	W	X	Y	Z
Nurse ↓				
K	00	00	20	30
L	20	00	10	30
M	00	10	00	20
New Nurse	00	00	00	00

As there is zero in each column, column reduction is not required.
Minimum number of lines:

Patient →	W	X	Y	Z
Nurse ↓				
K	00	00	20	30
L	20	00	10	30
M	00	10	00	20
New Nurse	00	00	00	00

As the minimum number of lines are equal to order of matrix, optimal assignment should be made.

Patient →	W	X	Y	Z
Nurse ↓				
K	00	00	20	30
L	20	00	10	30
M	00	10	00	20
New Nurse	00	00	00	00

Assignment:	Cost	Earnings of nurses
Nurse K → Patient W	Patient W ₹10 × 40 = ₹400	Nurse K ₹10 × 40 = ₹400
Nurse L → Patient X	Patient X ₹10 × 40 = ₹400	Nurse L ₹ 10 × 40 = ₹400
Nurse M → Patient Y	Patient Y ₹20 × 40 = ₹800	Nurse M ₹ 20 × 40 = ₹800
New → Patient Z	Patient Z ₹ 50 × 40 = ₹2,000	New ₹50 × 40 = ₹2,000
	Total ₹3600	Total ₹3600

(iv) The new nurse's charge for the existing patients amounts to ₹40 per hour which is higher than those of existing nurses. Hence, new nurse won't be assigned to existing patient's. As there is no change in the assignments of existing nurses and existing patients, we may not redo the problem. We simply assign new nurse to the new patient.

(ii) Let x_1 and x_2 be the number of grade 1 and 2 inspectors respectively to be assigned by the company for daily inspection.

Now the company has to incur two types of costs, wages paid to the inspectors and the cost of their inspection errors. The inspection costs of grade 1 inspector per hour is : (₹6 +₹4 × 0.05 × 50)= ₹16

Similarly, cost of grade 2 inspector per hour is : (₹5 +₹4 × 0.10 × 25) = ₹15

The above inspection problem can now be formulated in an approximate mathematical form as follows:

Minimize daily inspection cost $Z= 8(16 x_1 + 15 x_2)= 128 x_1 + 120 x_2$

Subject to constraints:

$(50 × 8 x_1) + (25 × 8 x_2) ≥ 3500$ (Inspection pieces)

$\quad\quad\quad x_1 ≤ 20$ (grade 1 inspectors)

$\quad\quad\quad x_2 ≤ 25$ (grade 2 inspectors)

$\quad x_1 ≥ 0, \quad x_2 ≥ 0$

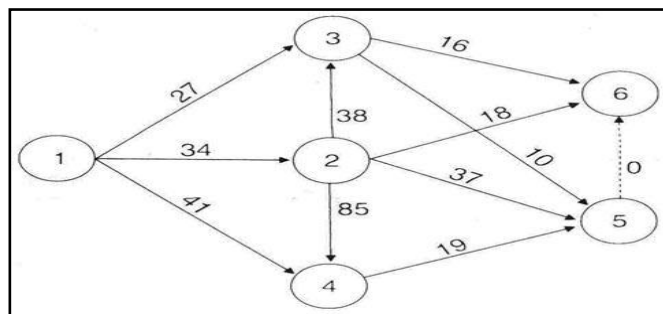**(b) (i)** $λ=1/60$ per second=1 per minute

$μ=1/40$ per second=1.5 per minute

(a) Average queue length: $L_q = \dfrac{λ}{μ} × \dfrac{λ}{μ-λ} = \dfrac{1}{1.5} × \dfrac{1}{1.5-1} = \dfrac{1}{0.75} = \dfrac{4}{3}$ workers

(b) Average length of non-empty queues: $L_n = \dfrac{μ}{μ-λ} = \dfrac{1.5}{1.5-1} = 3$ workers

(c) Average number of workers in the system: $L_s = \dfrac{λ}{μ-λ} = \dfrac{1}{1.5-1} = 2$ workers

(ii)

Paths	Duration	Paths	Duration
1-2-3-5-6	34+38+10+0=82	1-2-4-5-6	34+85+19+0=138 (Critical Path)
1-2-3-6	34+38+16=88	1-3-6	37+16=43
1-2-5-6	34+37+0=71	1-3-5-6	27+10+0=37
1-2-6	34+18=52	1-4-5-6	41+19+0=60

(c) (i)

	Sales depots			
	S1	S2	S3	Availability
Factory 1	6	6	1	10
Factory 2	-2	-2	-4	190
Factory 3	3	2	2	50
Factory 4	8	5	3	100
Demand	80	120	150	350

Opportunity Loss matrix

	S1	S2	S3	Availability	D_1	D_2	D_3	D_4
F 1	2	2 [10]	7	10	0	5	-	-
F 2	10	10 [90]	12 [100]	190	0	2	2	2
F 3	5	6	6 [50]	50	1	0	0	0
F 4	0 [80]	3 [20]	5	100	3	2	2	-
Demand	80	120	150	350				
D_1	2	1	1					
D_2	-	1	1					
D_3	-	3	1					
D_4	-	4	6					

Initial solution:

From	F1	F2	F2	F3	F4	F4
To	S2	S2	S3	S3	S1	S2
Units	10	90	100	50	80	20
Feasibility test	m + n-1 = 6		No. of allocations = 6		The solution is **feasible**	

(ii) Juran's 10 steps for quality improvement are:
   (a) Build awareness for the need and opportunity for improvement.
   (b) Set goals for improvement.
   (c) Organise people to reach the goals.
   (d) Provide training throughout the organization.
   (e) Carryout projects to solve problems.
   (f)   Report progress.
   (g) Give recognition.
   (h) Communicate results.

(i)   Keep score.

(j) Maintain momentum by making annual improvement part of the regular system and processes of the company.

(d) (i)   Profitability Distribution (Demand)

Demand	Probability	Cum. Prob.	Range	Range for simulation
77	0.10	0.10	0 - 0.10	0 - 0.09
78	0.15	0.25	0.10 - 0.25	0.10 - 0.24
79	0.20	0.45	0.25 - 0.45	0.25 - 0.44
80	0.35	0.80	0.45 – 0.80	0.45 – 0.79
81	0.15	0.95	0.80 – 0.95	0.80 – 0.94
82	0.05	1.00	0.95 – 1.00	0.95 – 0.99

Production 80 cars per day

Day	Demand	Regular Sale (I)	Sale of unsold cars (II)	Cost (III)	Penalty (IV)	Profit/Loss (I+II-III-IV)
1	77	₹385L	₹6L	₹320L	-	₹71L
2	82	₹400L	-	₹320L	₹2L	₹78L
3	80	₹400L	-	₹320L	-	₹80L
4	82	₹400L	-	₹320L	₹2L	₹78L
5	81	₹400L	-	₹320L	₹1L	₹79L
6	77	₹385L	₹6L	₹320L	-	₹71L
7	80	₹400L	-	₹320L	-	₹80L
8	78	₹390L	₹4L	₹320L	-	₹74L
9	78	₹390L	₹4L	₹320L	-	₹74L
10	78	₹390L	₹4L	₹320L	-	₹74L
Total						₹759L

Production 79 cars per day

Day	Demand	Regular Sale (I)	Sale of unsold cars (II)	Cost (III)	Penalty (IV)	Profit/Loss (I+II-III-IV)
1	77	₹385L	₹4L	₹316L	-	₹73L
2	82	₹395L	-	₹316L	₹3L	₹76L
3	80	₹395L	-	₹316L	₹1L	₹78L
4	82	₹395L	-	₹316L	₹3L	₹76L
5	81	₹395L	-	₹316L	₹2L	₹77L
6	77	₹385L	₹4L	₹316L	-	₹73L
7	80	₹395L	-	₹316L	₹1L	₹78L
8	78	₹390L	₹2L	₹316L	-	₹76L
9	78	₹390L	₹2L	₹316L	-	₹76L
10	78	₹390L	₹2L	₹316L	-	₹76L
Total						₹759L

There is no change in profit if production changes from 80 units/day to 79 units/day.

(ii) Little JIT is a form of production scheduling and inventory management whereby products are produced only to meet actual demand, and materials for each stage of production are received or produced "just-in-time" for use in the next stage of production or for delivery to a customer. This limited definition of JIT has been called Little JIT.

Big JIT encompasses the full range of organizational and operational improvements practiced by many Japanese companies (i.e. the entire way products are designed, work is organized and responsibilities are assigned) and is called Japanese production or lean production. Big JIT is the philosophy of operations management that seeks to eliminate waste in all aspects of a firm's production activities, human relations, vendor relations, technology and the management of materials and inventories.

Information System

Answer any two questions.

3. (a) (i) Explain the major areas of computer-based applications. [5]
(ii) Describe the main quality criteria of a business information system. [6]
(iii) "Debugging consists of four steps" – List the steps. [3]
(iv) State the function of query compiler. [2]

(b) (i) From the following two relations find the Intersection operator and Difference operator.

Relation A

REGN_NO	NAME	OCCUPATION
AB 03	J	SERVICE
AB 04	K	STUDENT
AB 05	S	STUDENT
AB 09	D	SERVICE
AB 11	P	STUDENT

Relation B

REGN_NO	NAME	OCCUPATION
AB 04	K	STUDENT
AB 05	S	STUDENT
AB 11	P	STUDENT
AB 15	G	STUDENT
AB 16	R	STUDENT

[5]
(ii) Describe the effects of using computer for MIS. [6]
(iii) State the key functionalities of Accounts Payable Module. [5]

(c) (i) Describe the duties of Certifying Authority. [5]
(ii) List the main goals of E-commerce. [4]
(iii) Describe the term "Secure System". [3]
(iv) Define Executive Information System and list the special features of an EIS. [4]

Answer:

(a) (i) Major areas of computer-based applications are finance and accounting, marketing and sales, manufacturing, inventory/stock management, human resource management etc.

(a) Finance and Accounting: It helps forecasting revenues. It determines the procurement of funds and its optimum utilization and also managing other financial

resources. The areas in Finance and accounting are:-General Ledger, cash management, accounts receivable/payable, fund management etc.

(b) Marketing and Sales: The marketing system facilitates the chances of order procurement by marketing the products of the company, creating new customers and advertising the products. The objective of this system is to maximize sale and ensure customer satisfaction.

(c) Production or Manufacturing: The system generates production schedules and schedules of material requirements. It monitors the product quality, control the waste and try to utilize its full capacity for producing goods and services.

(d) Inventory/Stores Management: The system is used to regulate the maximum and minimum level of stocks, identification of important items in terms of stock value (ABC analysis), identification most moving items and also non moving items.

(e) Human Resource Management: Less disputes, right utilization of manpower and quiet environment in this functional area ensure smooth conducting of business. HRM maintain the database of employee qualifications, experience and helps the management in allocating the people at right place.

(ii) Main quality criteria of a business information system are reliability of information, timeliness and correctness of reports. These depend on technology in use, manpower, ethical standard maintained and security of the system. To ensure good quality, system requirements must be properly understood and system infrastructure must be developed.

Reliability of Information: Internet has flooded the information. Today business managers are burdened with analysis of huge volume of information. The exact of relevant information only can lead to sensible use of information. The role of Business Analyst will be of paramount importance with the growth of technological evolutions. There is a saying in computer information system – Garbage In Garbage Out (GIGO). The correctness or quality of reports depends on quality of information. Source of correct data, flow of data and procedure of authorization has to be established.

Processing Time: Processing time is an important factor for information system. Information is generated for control in different business parameters in the operation and decision making. Naturally, the time associated with dissemination of information is very important. Information not in time becomes useless.

Matching Management Requirements: The information system should be well planned to fulfill the requirement of the management i.e. the owner of the system in terms of time, quality and frequency. At the time of designing the system the reports, contents, formats etc. are taken care to exactly fulfill the requirements of users of different levels.

Technology: Technology refers to:
- Configuration of computer in terms of capability, security etc
- Software in use
- Communication system - network efficiency
- Type of processing - batch, real-time or on-line

Human Resources: The employees need new orientation in the knowledge of computer products, technological change taking place, expertise to handle these and managerial complexity evolving out of these. They are to develop the skill to develop appropriate IT infrastructure, use effective methods to store and access data and navigate them to

properly use them. Quality of human resources is the most important component in an Information System organization.

Ethical standard: Ethical issues relating to employees, customer, supplier etc must be properly dealt with to maintain the right kind of image of the organization. Ethical standard must be maintained in dealing with the information being handled in an organization.

Security: The security of information system must be taken care properly. Here, security means security of information and assets. In an processing environment under network, the system is more vulnerable by unauthorized access, leakage of sensitive information and sabotage. Loss of assets due to fire, theft, natural disaster must be protected.

(iii) Debugging is the form of testing activity which refers to correcting programming language syntax and diagnostic errors so that the program compiles cleanly and thus in this process, errors are found and then they are corrected.

Debugging consisting of following four steps.
(a) Inputting the source program to the compiler.
(b) Letting the compiler find errors in the program.
(c) Correcting lines of code that are erroneous.
(d) Resubmitting the corrected source program as input to the compiler.

(v) The query compiler handles high-level queries that are entered interactively. It parses, analyzes and compiles or interprets a query by creating database access code, and then generates calls to the run-time processor for executing the code.

(b) (i) The Intersection operator is denoted by A∩B and will be a relation as shown below:

Relation A∩B

REGN_NO	NAME	OCCUPATION
AB 04	K	STUDENT
AB 05	S	STUDENT
AB 11	P	STUDENT

The Difference operator is denoted by A-B and will be a relation as shown below:

Relation A-B

REGN_NO	NAME	OCCUPATION
AB 03	J	SERVICE
AB 09	D	SERVICE

(ii) The effects of applying computer technology to Information System are as discussed below:
(a) Increase in speed of processing and retrieval of data: Computer with its fast computational capability and systematic storage of information with random access facility has emerged as an answer to the problems faced in modern days management.
(b) Expansion in the scope of use of information system: System experts in business organizations developed the areas and functions, where computerized MIS could be used to improve the working of the concern. These types of applications are not feasible under the manual system.

(c) Scope of analysis widened: The use of computer can provide multiple type of information accurately and which makes the decision fast.

(d) Complexity of system design and operation increased: The computer manufacturers have developed some important programs software to help the users, which are self explanatory and require minimum system experts.

(e) Integrates the working of different information subsystem: There are number of subsystems like production, material, marketing, finance, engineering and personnel which are integrated only due to applying computer technology to MIS.

(f) Increases the effectiveness of information systems: Before the existence of computer technology, it was difficult to provide the relevant information to business executives in time even after incurring huge expenses. The use of computer technology has overcome this problem, by providing timely, accurate and desired information for the purpose of decision-making.

(g) More comprehensive information: The use of computer for MIS enabled system expert to provide more comprehensive information to executives on business matters.

(iii) Accounts Payable Module (AP) - This module provides the functionality to enter, monitor, maintain and process for payment of invoices and credit notes, that the organization received from its vendors. The key functionality of this module is as follows:

1. Immediate registration of incoming invoices
2. Tracking & authorization of incoming invoices
3. Entry of order-based and sundry invoices
4. Automatic matching of invoices with receipts
5. Separate procedure for approval of invoices that exceeded the user tolerances
6. Self-Billing Invoices this is suitable for JIT environment where receipt of goods automatically
7. generates approved invoices in the system which is paid through remittances and supplier need not send any invoice.
8. Accounts Classification for reconciliation

(c) (i) Duties of Certifying Authority:

1. According to Section 30 of the Information Technology Act, 2000, Certifying Authority shall follow certain procedures in respect of Digital Signatures as given below:
   - Make use of hardware, software and procedures that are secure from intrusion and misuse.
   - Provide a reasonable level of reliability in its services, which are reasonably suited to the performance of intended functions.
   - Adhere to security procedures to ensure that the secrecy and privacy of the digital signatures are assured and
   - Observe such other standards, as specified by the regulation.
2. Every Certifying Authority shall ensure that every person employed by him complies with the provisions of the Act, or rules, regulations or orders made thereunder.
3. A Certifying Authority must display its licence at a conspicuous place of the premises in which it carries on its business. A Certifying Authority whose licence is suspended or revoked shall immediately surrender the license to the Controller.
4. Every Certifying Authority shall display its Digital Signature Certificate, which contains the public key corresponding to the private key used by that Certifying Authority and other relevant facts.

(ii) Main Goals of E-commerce:

It helps in achieving following goals
(i)   Reach new markets.
(ii) Create new products or services.
(iii) Build customer loyalty.
(iv) Enrich human capital.
(v) Make the best use of existing and emerging technologies.
(vi) Achieve market leadership and competitive advantage.

(iii) "Secure system" means computer hardware, software and procedure that
- Are reasonably secure from unauthorized access and misuse.
- Provide a reasonable level of reliability and correct operation.
- Are reasonably suited to performing the intended function and
- Adhere to generally accepted security procedures.

(iv) An Executive Information System (EIS) is special type MIS meant for top management of an organization.
According to CIMA
An Executive Information System (EIS) is a set of procedure designed to allow senior managers to gather and evaluate information relating to the organization and its environment.

Following are the special features of an EIS:
- It a specially designed tool to feed executives information need.
- It is an easy - to - use and screen based software.
- It provides the executives the facilities of on-line analysis tools like time series analysis, regression analysis etc.
- It is not limited to internal data only. Access to external sources of data is also provided.
- It provides the facilities to connect to internet.
- Information is presented in summary format.
- It is a comprehensive Information System and work in conjunction with DSS.