INTERMEDIATE EXAMINATION

GROUP II

(SYLLABUS 2012)

SUGGESTED ANSWERS TO QUESTIONS

DECEMBER 2015

Paper- 9 : OPERATION MANAGEMENT AND INFORMATION SYSTEMS

Time Allowed : 3 Hours **Full Marks : 100**

This paper contains three 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 indicated. The figures in the margin on the right side indicate full marks.

1. Answer *all* questions: 2×10=20

(a) 'We can identify four simple structures for operating systems for the provision of goods or services.' List these structures.

(b) 'The principles of motion economy are divided into three groups.' List the groups.

(c) Define Contingency Allowance in Time Study.

(d) If the transit authority decided to use 40 buses having capacity of 50 seats per bus between the extended hours of 8 A.M. through 8 P.M., and the actual necessity is 25,875 seat hours, what would be the average utilization of the buses in terms of seats occupied?

(e) Define Total Productivity.

(f) 'The effectiveness of maintenance can be evaluated in terms of various indices.' Write the formula for Break-down Maintenance Index (as a percentage).

(g) Explain the term 'Executive Information System.'

(h) In addition to those who design, use, and administer a database, other persons are also associated for the success of the DBMS software and system environment. List the categories of these persons who are called the 'workers behind the scene.'

(i) 'Quality can be viewed as hinging on two major factors'. Identify the factors.

(j) Distinguish between ERP and BPR.

Answer:

1. (a) Four simple structures for operating systems:

(1) 'Make from stock, to stock, to customer',

(2) 'Make from source, to stock, to customer',

(3) 'Make from stock, direct to customer',

(4) 'Make from source, direct to customer'.

(b) The principles of motion economy are divided into three groups, viz.,

(1) Effective use of the operator

(2) Arrangement of the workplace

(3) Tools and equipment

(c) Contingency Allowance (CA) in Time Study is given for infrequent or non-repetitive activities such as obtaining special materials from stores, sharpening of tools, getting a special tool from the tool stores, and consultation with the supervisor. It is usually about 5% of normal or basic time.

(d) Over the 12-hour period, 24,000 seat-hours of capacity would be available (40 buses x 12 hours x 50 seats per bus). It is indicated that 25,875 seat-hours are needed. The utilization would be 107.8 percent (25,875/24,000 x 100).

(e) Total Productivity is the ratio of all output to a composite of all inputs. If it rises it signifies a rise in output relative to inputs, greater 'efficiency' in common parlance. It is called 'total' (as distinct from 'partial') productivity because it is not merely output per unit of labour alone, or any one input alone. It is the productivity of all 'factors' (i.e. inputs) taken together.

Total Productivity = Total Outputs/Total Inputs

(f) Break-down Maintenance index (as a percentage)

$$= \frac{\text{(Labour hour spent on break-down maintenance)}}{\text{(Labour hours spent on all forms of maintenance)}} \times 100$$

(g) An Executive Information System is an advanced model of Decision Support System, which can take care of unstructured problem situation. It aims at providing information to top executives of an organization who are involved in strategic decision making.

(h) In addition to those who design, use, and administer a database, others are associated with the design, development, and operation of the DBMS software and system environment. These persons are typically not interested in the database itself. We call them the "workers behind the scene," and they include the following categories.

- DBMS system designers and implementers
- Tool developers
- Operators and maintenance personnel

(i) Quality can be viewed as hinging on two major factors:

(a) Satisfying customer expectations regarding the attributes and performance of the product.

(b) Ensuring that the technical aspects of the product's design conform to the manufacture's standards.

(j) Enterprise Resource Planning (ERP) is an integrated computer based application used to manage internal and external resources, including tangible assets, financial resources, material and human resources. Business Process Re-engineering (BPR) means not only change but radical change within a short period. This change is achieved by complete revamp of organizational structure, business process workflow, job description, performance measurement and adoption of information technology Both are having the primary intend to optimize workflow and improve productivity. But, the chicken and egg question remained, whether an organization reengineer business process before implementing ERP or directly implement ERP and reengineer by adopting standard business process, included in the ERP package.

2. Answer *any three* questions: 16×3=48

(a) (i) Identify the factors that influence Product Design. 5

(ii) Requests for maintenance service made upon a centralised maintenance facility have been simulated for a typical 8 hour shift with arrival and service pattern as shown below: 2x4=8

Request arrival (clock) time	Repair service time
1 : 30	60 mins.
2 : 00	20 mins.
4 :15	45 mins.
4 : 30	120 mins.
5 : 30	30 mins.
7 : 00	10 mins.

The labour cost of maintenance crew is ` 40 per hour whether working or idle. The waiting time of operators and machinery that has broken-down is costed at ` 70 per hour.

(a) Find the idle time cost of the maintenance facility.

(b) Find the waiting time cost of operators and machinery (not including repair time).

(c) Find the total facility idle time and machinery waiting time cost.

(d) Assuming that for an additional cost of ` 10 per hour the maintenance centre could add another crew and decrease the repair time by one third, would the additional cost be justified?

(iii) Explain the term Process Planning. 3

Answer:

(a) (i) Factors Influencing Product Design:

(1) Customer requirements: The designers must find out the exact requirements of the customers to ensure that the products suit the convenience of customers for use. The products must be designed to be used in all kinds of conditions.

(2) Convenience of the operator or user: The industrial products such as machines and tools should be so designed that they are convenient and comfortable to operate or use.

(3) Trade off between function and form: The design should combine both performance and aesthetics or appearance with a proper balance between the two.

(4) Types of materials used: Discovery of new and better materials can improve the product design. Designers keep in touch with the latest developments taking place in the field of materials and components and make use of improved materials and components in their product designs.

(5) Work methods and equipments: Designers must keep abreast of improvements in work methods, processes and equipments and design the products to make use of the latest technology and manufacturing processes to achieve reduction in costs.

(6) Cost/Price ratio: In a competitive market, there is lot of pressure on designers to design products which are cost effective because cost and quality is inbuilt in the design. With a constraint on the upper limit on cost of producing products, the designer must ensure cost effective designs.

(7) Product quality: The product quality partly depends on quality of design and partly on quality of conformance. The quality policy of the firm provides the necessary guidelines for the designers regarding the extent to which quality should be built in the design stage itself by deciding the appropriate design specifications and tolerances.

(8) Process capability: The product design should take into consideration the quality of conformance, i.e., the degree to which quality of design is achieved in manufacturing. This depends on the process capability of the machines and equipments. However, the designer should have the knowledge of the capability of the manufacturing facilities and specify tolerances which can be achieved by the available machines and equipments.

(9) Effect on existing products: New product designs while replacing existing product designs, must take into consideration the use of standard parts and components, existing manufacturing and distribution strategies and blending of new manufacturing technology with the existing one so that the costs of implementing the changes are kept to, the minimum.

(10) Packaging: Packaging is an essential part of a product and packaging design and product design go hand in hand with equal importance.

Packaging design must take into account the objectives of packaging such as protection and promotion of the product. Attractive packaging enhances the sales appeal of products in case of consumer products (nondurable).

(ii) Calculation of machine down time:

Request Arrival time	Repair time reqd. with one crew (minutes)	Repair time begins (clock time)	Repair time ends (clock time)	M/c down time with one crew Idle time + Repair time = Total time
01:30	60	01 :30	02:30	Nil+1.0 = 1.00
02:00	20	02:30	02:50	0.5 + 0.33 = 0.83

04: 15	45	04: 15	05:00	Nil + 0.75 = 0.75
04:30	120	05:00	07:00	0.5 + 2.0 = 2.50
05:30	30	07:00	07:30	1.5 + 0.5 = 2.00
07:00	10	07:30	07:40	0.5 + 0.166 = 0.666
		Total (Hrs.) = 3.00 + 4.746 = 7.746 = 7.75 Hrs.		

(a) Calculation of the idle time cost of maintenance facility:

Total repair service time = (60 + 20 + 45 + 120 + 30 + 10) mts.

= 285 mts. = 4.75 hrs.

Total idle time of maintenance facility = 8.00 - 4.75 = 3.25 hrs.

Total idle time cost of maintenance facility = 3.25 x 40 = ` 130

(b) Calculation of waiting time of operators:

Total waiting time for repair = 3.0 hrs

Waiting time cost = 3.0 x 70 = ` 210

(c) Calculation of total facility idle time and machinery waiting time cost:

Total idle time cost of maintenance facility + Machinery waiting time cost =130+210 = ` 340

(d) Adding one more maintenance crew at a cost of ` 10 per hour decreases repair time by one third.

Increase in labour cost / shift of 8 hours = `10×8 = ` 80

Decrease in repair time = 1/3 of repair time with one crew

Saving in operator and machine time = (1/3) x 4.75 = 1.583 hrs.

Idle time cost = 1.583 × 70 = ` 110.81

Since savings in operator and machinery idle time cost is (i.e., ` 110.81) more than the increase in repair cost (i.e. ` 80), it is justified to have one more maintenance crew.

(iii) Process Planning is defined as the systematic determination of methods by which a product is to be manufactured economically and competitively. It consists of selecting the proper machines, determining the sequence of operations, specifying the inspection stages, and tools, jigs and fixtures such that the product can be manufactured as per the required specification. The detailed process planning is done at each component level. After the final design of the product has been approved and released for production, the Production Planning and Control department takes the responsibility of Process Planning and Process Design for converting the product design into a tangible product. As the process plans are firmly established, the processing time required to carry out the production operations on the equipments and machines selected are estimated. These processing times are compared with the available machine and labour capacities and also against the cost of acquiring new machines and equipments required, before a final decision is made to manufacture the product completely in house or any parts or sub assemblies must be outsourced.

(b) (i) List the techniques used for work measurement and the benefits expected to be obtained from work measurement. 2+3=5

(ii) The demand for Personal Computers was estimated as 1100 per month for 5 months. Later on the actual demand was found as 1050, 1000, 1200, 1100 and 1050 respectively. Workout Mean Absolute Deviation (MAD) and Bias. Analyze whether the forecast made was accurate. 2+2+1=5

(iii) Describe Quality Management System. 6

Answer:

(b) (i) Techniques of Work Measurement

The main techniques used to measure work are:

1. Direct Time Study.
2. Synthesis Method.
3. Analytical Estimating.
4. Pre determined Motion Time System (PMTS).
5. Work sampling or Activity Sampling or Ratio Delay Method.

Benefits of Work Measurement

1. To develop a basis for comparing alternate methods developed in method study by establishing the work content in each method of doing the job.
2. To prepare realistic work schedules by accurate assessment of human work.
3. To set standards of performances for labour utilization by establishing the labour standards for an element of work, operation or product under ordinary working condition.
4. To compare actual time taken by the worker with the allowed time (standard time) for proper control of labour.
5. To assist in labour cost estimation.
6. To provide information related to estimation of tenders, fixation of selling price and assessment of delivery schedule.

(ii) $\text{MAD} = \frac{|1100-1050|+|1100-1000|+|1100-1200|+|1100-1100|+|1100-1050|}{5}$

$= \frac{50+100+100+0+50}{5} = \frac{300}{5} = 60$ units of PC

$\text{Bias} = \frac{(1100-1050)+(1100-1000)+(1100-1200)+(1100-1100)+(1100-1050)}{5}$

= (50 + 100 - 100 + 0 + 50) = 100/5 = 20 units of PC.

In this case, MAD is 60 units whereas Bias has deviation of 20 units. Since MAD measures the overall accuracy of the forecasting method, it is found that the forecast is not based on accurate model and (the error is (60/1100) × 100 = 5.5%

(iii) Quality is not a chance occurrence. It has to be built up consciously and stage by stage through suitable processes, procedures, resources, responsibilities and an appropriate organization structure that knits all these factors together. The amalgamation of all these factors which are aimed at achieving desired quality levels consistently in what is termed as a Quality Management System (QMS). The Need for Quality Management System: Quality standards were hitherto largely specified in terms of tolerances, acceptance levels and other "specs". With the gradual transition of the basic concepts of Quality Control from inspection, to the present stage of managing for quality in all activities, it was but natural that quality standards too changed accordingly. These days the customers are equally concerned about the manner in which quality is managed in the supplier's organisation, as they are with the actual quality of the purchase product.

All organisations do have a QMS, although most often it is informal or semi-formal. The drawback with such systems is that in certain areas there is a total absence of established policies, procedures, responsibility and authority. These are termed as 'System Deficiencies'.

Even if procedures and policies exist, there is ambiguity with regard to their practice. Therefore such system fails randomly due to the prevailing confusion regarding the system or due to the absence of a few key people, who inadvertently emerge as the only ones who are aware of how the system works. A formal quality system helps remove uncertainty by formalizing the Who, Why, Where, What and How of Quality so that processes for achieving quality are established, whereby customer satisfaction can be achieved consistently irrespective of the personnel involved. A quality system standard helps to check or implement a system against standard checkpoints, which ensure that all aspects of managing quality have been looked into. It also indicates to the customers, the quality status of the supplier's organisation, which these days is becoming as important as the quality status of the product.

(c) (i) Define QFD and list the benefits of using QFD. 2+5=7

(ii) State the motivational implication of KAIZEN Technique implementation. 2

(iii) Following are the data obtained from the Bureau of Industrial Costs and Prices. Assuming linear regression and adopting the formula for coefficient of correlation, please comment whether the prices kept pace with the rising costs. 7

Note 1996 = 100

	2006	07	08	09	10	11	12	13	14
Costs per unit of output	**203**	**216**	**223**	**239**	**248**	**253**	**279**	**301**	**311**
Price of final output	**225**	**242**	**250**	**271**	**275**	**277**	**295**	**318**	**329**

Answer:

(c) (i) Definition of QFD

QFD (Quality Function Deployment) is a very systematic and organised approach of taking customer needs and demands into consideration when designing new product and services or when improving existing products and services. Another name for this approach is "customer-driven engineering" because the voice of the customer is diffused throughout the product (or service) development life cycle.

QFD is a planning tool that defines a process for developing products or services. The benefits of QFD are listed below:

1. Products definition is firmer and takes place earlier in the new product development life cycle. This minimizes engineering changes and results in better quality.

2. QFD addresses major issues and complaints expressed by customers during the early stages of product definition. Hence, the number of complaints about and dissatisfaction with new products decreases with time. This benefit is seen after several product cycles.

3. Cross-functional wall break down with QFD since the team must address issues that affect all departments.

   Sub-optimization of resources in a company is minimized and communication between departments improves.

4. Team members develop a deeper understanding of customer needs and have the customer's voice as basis for making tradeoffs, resulting in superior decisions for the organization.

5. The analytic vigor of QFD causes streamlining or elimination of many internal processes that do not add value to the new product development process.

6. Customer needs are evaluated with respect to competitive products and services. This allows identification of the internal processes that need improvement to stay competitive.

   Documentation is an essential ingredient of QFD. Hence, one of its greatest benefit is that we build product intelligence. This documentation provides the following advantages:

   - It helps new engineers come aboard faster
   - Easily accessible documentation reduces chances of repeating mistakes of the past.

7. The accumulation of knowledge decreases the need of having someone with seniority lead the project. A senior leader contributes significantly to the success of the project. Also, under a TQM environment the team will feel empowered and possess the authority generally associated with having a senior leader.

8. QFD be beneficial in understanding and identifying a market niche where customer needs are not being met. This provides opportunities for introducing niche products.

9. QFD provides an excellent framework for cross-functional deployment of quality, cost and delivery.

10. QFD allows for quick changes, which is very important for the new product development process. It is possible to revise previous decisions when new information becomes available during product development, for example, if the competition introduces a new product or a state of the art technology becomes available. Detailed documentation keeps all information visible to the QFD team at all times.

(ii) Motivational implications of KAIZEN Technique Implementation:

The KAIZEN gives freedom to the employees. It does not specify what changes are to be made or how many of them are to be made. Improvements can be in any discipline and in any field of human activity related to the productivity. These decisions are left to the individuals. This leads to:

(a) attitudinal changes among employees towards improvements of their routine work and the productivity and thereby bringing a new work culture in the organisation.

(b) introducing other productivity improvement systems.

(c) reduces resistance to change.

(d) raises the inner voice of the employees that drives them to make the improvements, rather than the orders given down through the hierarchy.

(iii) Let us call costs as X and prices as Y as shown in the following table:

X	Y	$x = X - \bar{X}$	$y = Y - \bar{Y}$	x^2	xy	y^2
203	225	- 49.55	-50.78	2455.20	2516.15	2578.61
216	242	-36.55	-33.78	1335.90	1234.66	1141.09
223	250	-29.55	-25.78	873.20	761.80	664.61
239	271	-13.55	-04.78	183.60	64.77	22.84
248	275	-04.55	-00.78	20.70	3.55	00.61
253	277	00.45	1.22	00.20	0.55	1.49
279	295	26.45	19.22	699.60	508.37	369.41
301	318	48.45	42.22	2347.40	2045.56	1782.53
311	329	58.45	53.22	3416.40	3110.71	2832.37
$\sum X = 2273$	**$\sum Y = 2482$**			$\sum_{x^2}$ = 11332.20	$\sum xy$ =10246.12	$\sum_{y^2}$ = 9393.56

$\bar{X}$ = 252.55 and $\bar{Y}$ =275.78

For a linear regression, the coefficient of correlation between the variables X and Y is given by:

$r = \frac{\sum xy}{\sqrt{\sum x^2 \ \sum y^2}}$ where, as already noted, **x = X-** $\bar{X}$ and **y = Y-** $\bar{Y}$

Accordingly, $r = \frac{10246.12}{\sqrt{11332.20 \times 9393.56}} = r = \frac{10246.12}{10317.45} = 0.99$

Therefore, there is a close correlation between costs and prices.

(d) (i) Explain the situations where replacement should be considered. 3

(ii) Bikram's Car Wash is an automatic, five-minute operation with a single bay. On a typical Saturday morning, cars arrive at a mean rate of eight per hour, with arrivals tending to follow a Poisson distribution. 6

Find (1) The average number of cars in line.

(2) The average time cars spend in line and service.

(iii) Define Human Resource Inventory, list the type of information required to be maintained and the objective for same. 1 +5+1=7

Answer:

(d) (i) Replacement is considered in the following situations:

(1) In respect of equipment/assets that deteriorate in performance over a time and may be restored in whole or in part by expending maintenance costs. Thus, the existing assets might be good technically, yet on economic considerations, it may not be worthwhile continuing with them and hence replacement may be called for. Machinery, equipment, buildings fall in this category.

(2) In respect of units that perform adequately until sudden complete failure. The length of their service until failure varies randomly over some predictable range. Car bulbs, tubes, some electronic components etc. are the items that are considered in this category.

(3) In respect of replacement of staff of an organization which diminishes gradually due to death, retirement, retrenchment and other reasons.

(ii) λ = 8 cars per hour

μ = 1 per 5 minutes, or 12 per hour

$$L_q = \frac{\lambda^2}{2\mu(\mu-\lambda)} = \frac{8^2}{2(12)(12-8)} = 0.667 \text{ car}$$

$W_S = (L_q/\lambda) + (1/\mu) = (0.667 / 8) + (1/12) = 0.167$ hour

= 10 minutes

(iii) Human Resource Inventory:

Inventory is a term which is normally used to counting of tangible objects, raw materials and finished goods, etc. In the same way, inventory of human resources can also be prepared. However, human resource inventory is not simply counting of heads that are presently available but cataloguing their present and future potentials. Since total human resources of an organization are classified as managerial and non-managerial, skills inventory is related to non- managerial personnel and management inventory is related to managerial personnel. Whatever names are used, an inventory catalogues a person's skills, qualities, and potentials. The process of preparing human resource inventory involves four steps: determination of personnel whose inventory is to be prepared, cataloguing of factual information of each individual, systematic and detailed appraisal of these individuals and detailed study of those individuals who have potential for development. Since non-managerial personnel differ from managerial personnel types of information are required for preparing their inventories.

Information requirement:

Skills Inventory: Usually, in a skills inventory, following types of information are included:

1. Employee's personal data

2. Skills—education, Job experience, training, etc.,
3. Special achievements, if any,
4. Salary and job history, and
5. Potentials of the employee.

Management Inventory: A management inventory includes following information:

1. Personal data,
2. Work history,
3. Strengths and weaknesses,
4. Career plan,
5. Promotion potentials,
6. Number and types of employees managed,
7. Total budgets managed, and
8. Any special achievements such as acquisition of degrees, papers presented, conferences attended etc.

The information mentioned above is maintained by human resource information systems. However, there should be periodic review and updation of the information.

Objective: Human resource inventory provides information about present and future personnel being available in the organization. Through this inventory, the existing and future gaps in personnel and their abilities can be identified which becomes the basis for suitable managerial actions.

3. Answer *any two* questions: 16×2=32

(a) (i) Identify the factors contributing to evaluation of proposals from software vendors. 5

(ii) Write the full form of the terms DBMS and RDBMS. Distinguish between the two terms. List two reputed commercial RDBMS. 1+3+1=5

(iii) Define Digital Signature and list the duties of Certifying Authority under the Information Technology Act, 2000. 3+3=6

(a) (i) Once the proposals are received from various software vendors for the system, it is the responsibility of the IT In-charge or the committee to select the best product relevant to the requirements / needs of the organization. In order to facilitate the process, following are the factors contributing to evaluation process of software vendors' proposals:

(1) Performance Rating of the proposed system in relation to its cost: In this approach, the vendors are provided with the sample data and the task is performed by each vendor. Subsequently representatives of the organization examine the outputs for accuracy, consistency as well as processing efficiency, and thus operational efficiency is judged.

(2) Cost Benefits of the proposed system: In this process, the cost benefit analysis is performed in relation to the performance benefits against the Total Cost of Operations.

(3) Maintainability of the proposed system: It refers to the flexibility and customization scope inbuilt in the proposed system for effective use in the organization. If the changes occurring due to the statutory requirements, it should be analysed that whether it can be incorporated in the package easily or not.

(4) Compatibility with Existing Systems: The proposed system has to be operated in integration with other existing systems in the organization so that it forms a part of the Integrated Enterprise System.

(5) Vendor Support: Support of vendors must be provided at the time of training, implementation, testing and back-up systems.

(ii) DBMS - Data Base Management System

RDBMS - Relational Data Base Management System

Distinction between the two terms:

A DBMS has to be persistent, that is it should be accessible when the program created the data ceases to exist or even the application that created the data restarted. A DBMS also has to provide some uniform methods independent of a specific application for accessing the information that is stored. RDBMS adds the additional condition that the system supports a tabular structure for the data, with enforced relationships between the tables. This excludes the databases that don't support a tabular structure or don't enforce relationships between tables.

The two commercial relational DBMS are ORACLE and Microsoft Access. (There may be others packages also.)

(iii) Digital signature means authentication of any electronic record by a subscriber by means of an electronic method or procedure.

The digital signature is created in two distinct steps. First the electronic record is converted into a message digest by using a mathematical function known as "hash function" which digitally freezes the electronic record thus ensuring the integrity of the content of the intended communication contained in the electronic record. Any tampering of the contents of the electronic record will immediately invalidate the digital signature. Secondly, the identification of the person affixing the digital signature is authenticated through the use of the private key which attaches itself to the message digest and which can be verified by anybody who has the public key corresponding to such private key. This will enable anybody to verify whether the electronic record is retained intact or has been tampered with since it was so fixed with the digital signature. It will also enable a person who has a public key to identify the originator of the message.

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 there under.
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 licence 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.

(b) (i) You are required to submit a brief report to the top management on the following Key Vendors in the ERP market. Write a few introductory lines on each vendor.

(A) SAP; (B) Oracle; (C) Infor; (D) Microsoft Dynamics. 1½×4=6

(ii) Explain the role of information system in management. 5

(iii) Explain the necessity of restricting access in DBMS. 5

Answer:

(b) (i) Some Key Vendors

(A) SAP: They are the largest ERP solution provider with more than 75,000 customers and 12 million users and holding around 30% of market share. The Flagship Solution, R/3 is unmatched for its sophistication and robustness. R/3 software gives an option of around 1000 pre-configured business processes. This solution is available in all major currencies and languages and can be hosted on several Operating Systems and Databases. As mid market option, SAP has brought out, Business All in One, a solution with industry tailored configurations. SAP offering for smaller organization is SAP Business One. SAP offers a hosted solution, namely SAP Business by Design, for organizations lacking IT resources.

(B) Oracle: Oracle is next to SAP in ERP market breadth, depth and share. It offers a comprehensive, multilingual and multi currency solution, mostly through its channel partners.. It is the first to implement internet computing model for developing and deploying its product. Oracle also took over various ERP solution providers during 2000 such as People Soft, J.D. Edwards. Retek (retail industry solution), and Siebel (customer relationship management software). It has taken up project Fusion (based on Service Oriented Architecture) to integrate various products, outcome of which is keenly awaited.

(C) Infor: Infor is of recent origin and expanded through a number of acquisitions. Its acquisition of SSA global during 2006 made it a forerunner as ERP solution provider. SSA global had two strong product lines, BPCS and BaaN. SSA also made a number of other acquisitions, such as MAPICS, Lily Software Associate and GEAC. SSA is focused on building, buying and integrating best of breed solutions.

(D) Microsoft Dynamics: Microsoft, which did not have an ERP portfolio, started by acquiring a host of ERP products like Navision, Solomon, Great Plain and Axapta. Excepting Axapta, which is strong in manufacturing and suitable for mid-market, other products are meant for smaller organizations.

Microsoft is much dependent on channel partners, not only for sales and consulting but also for add on development. Their solutions are closely integrated with their office suit.

(ii) An Information System can provide effective information for decision-making and control of some functionalities of an organization. Enterprises use information system to reduce costs, control wastes or generate revenue. Some of important implications of information system in business are as follows:

(1) Information system helps managers in effective decision-making to achieve the organizational goal.

(2) Innovative ideas for solving critical problems may come out from good Information System.

(3) Knowledge gathered through Information System may be utilized by managers in unusual situations.

(4) It helps in taking right decision at right time.

(5) Based on the well-designed information system, an organization will gain edge in the competitive environment.

(iii) Restricting Unauthorized Access in DBMS:

When multiple users share a database, it is likely that some users will not be authorized to access all information in the database. For example, financial data is often considered confidential, and hence only authorized persons are allowed to access such data. In addition, some users may be permitted only to retrieve data, whereas others are allowed both to retrieve and to update. Hence, the type of access operation – retrieval or update must also be controlled. Typically users or user groups are given account numbers protected by passwords, which they can used to gain access to the database.

A DBMS should provide a security and authorization subsystem, which the DBA uses to create accounts and to specify account restrictions. The DBMS should then enforce these restrictions automatically.

Notice that we can apply similar controls to the DBMS software. For example, only the DBA's staff may be allowed to use certain privileged software, such as the software for creating new accounts. Similarly, parametric users may be allowed to access the database only through the canned transactions developed for their use.

(c) (i) List the various types of Report Contents in Col. (3) of the following Table. 6

(1)	(2)	(3)
Level of management	**Nature of Information**	**Types of Report Contents**
Top	**Strategic information**	
Middle	**Control information**	
Operating	**Supervisory information**	

(ii) State the characteristics of an information system. 6

(iii) From the following two relations of X and Y, find X ∩ Y 4

RELATION X		
ROLL NO.	**NAME**	**RES.**
137	**A. KHANNA**	**DELHI**
491	**B.ROY**	**KOLKATA**
537	**A. DESAI**	**PATNA**
666	**D. KRISHNAN**	**KANPUR**
799	**B. RAMAN**	**KOLKATA**

RELATION Y		
ROLL NO.	**NAME**	**RES.**
137	**A. KHANNA**	**DELHI**
491	**B.ROY**	**KOLKATA**
511	**S. RANA**	**BOMBAY**
666	**D. KRISHNAN**	**KANPUR**
850	**A. SEN**	**BOMBAY**

Answer:

(c) (i) Contents of Reports based on level of management:

(1)	(2)	(3)
Level of management	Nature of Information	Types of Report Contents
Top	Strategic information	• Summary results • Comparative figures • Possible analytical presentation • Guideline for alternative options
Middle	Control information	• Actual performance summary and variance analysis • Reports on exceptions
Operating	Supervisory information	• Detailed reports • Operational results • Maintenance Report

(ii) The following are the general characteristics of an Information system :

(1) Specific objective: The information system should have some specific objective. An Information System in highly scientific research centre will have an objective to accumulate data from different activities, display of some information instantly for controlling activities and so on. In a business environment, the objective will be sharing information from different functional areas and smooth flow of information for management decision making.

(2) Structured: An information system should have a definite structure with all modules of sub-systems. The structure depends on the sub-modules, their interactions and integration requirements, operational procedure to be followed and the solution sets. The structure of the information system refers to diagrammatic representation of the system showing sub-systems, their inter-relation and the procedure to be followed to fulfill the process requirements.

(3) Components: The sub-systems are the components. The sub-systems should be distinguishable among themselves but have well-defined relation among. For example, a Sales system may be sub-systems like Invoicing,Delivery Monitoring, and Sales Proceeds Collection system. The inter-link between these systems must be well defined.

(4) Integrated : An Information System should be designed in such a fashion that proper integration among sub-systems are taken care to establish correct linkage and generate meaningful information. An information in isolation may not be that meaningful but its usage is improved if it is integrated with information of other closely related issues. For example, Sales information of a region becomes more meaningful if other information like previous period sales, sales in other regions, sales of competitive products are also combined in the information set.

(5) Life-Cycle: An Information system will have its own life-cycle. The duration of life-cycle varies from the system to system. An information system has the similar stages of life-cycle as seen in any other system. Every information system will have distinctly different phases - Initial, Growth, Maturity and Decline.

(6) Behaviour: A system has its own set of reaction and outcome depending on the environment. A well-managed business information system behaves nicely with its users by satisfying them with correct and timely information. The design of the system plays a good role in setting its behaviour pattern.

(7) Self-regulatory: An Information System which may have different sub-systems interacting with the each other in a desired fashion to be operative smoothly and in the process they regulate themselves. This is what self-regulatory nature of the system is. A payroll system involves three activities – first, maintaining attendance of employees, second, pay calculation and third pay disbursement. If the target date for pay disbursement is last date of a month, the second adjusts its start time accordingly and the first one is also regulated in such a fashion that it can provide input to the second in time.

(iii) Relation X ∩ Y

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