

# Answer to PTP\_Final\_Syllabus 2012\_Jun2014\_Set 1

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## Paper – 17 - Strategic Performance Management

**Wherever necessary, suitable assumptions should be made and indicated in answer by the candidates.**

**Working Notes should form part of the answer.**

### Section –A

**[Question 1 and 2 are compulsory and answer any 3 from the rest]**

**1 Read the following case study and answer the following questions:**

The Royal Bank of Canada (RBC) is one of Canada's largest banks as measured by assets and market capitalization, and is among the largest 20 banks globally by market capitalization. RBC provides personal and commercial banking, wealth management services, insurance, corporate, investment banking and transaction processing services on a global basis. The bank currently employs some 74,000 full- and part-time employees who serve more than 15 million personal, businesses, public sector and institutional clients through offices in Canada, the US and 56 other countries. RBC holds strong market positions in the following business segments: Canadian Banking, Wealth Management, International Banking, Capital Markets and Insurance. RBC has long been regarded as a leading pioneer and best-practice exemplar in CRM.

RBC's business philosophy focuses on always earning the right to be its clients' first choice. In the competitive world of financial services, RBC knew that it needed to have a vision and methodology to drive its customer first mission and meet the ever-changing business needs of its customers. When it was looking at methods for improving customer experience, RBC focused on making it easier for clients to get rapid and predictable responses to their inquiries and requests.

This initiative focused on increasing the productivity and improving the efficiency of RBC's inquiry management processes. Client requests arrive in RBC's service centers through multiple channels, including phone, branch, fax, e-mail and mail. Within RBC's Canadian Operations, requests are sent in from staff in eight different geographic regions to 14 different service fulfillment groups. Each group uses different systems and processes to manage its work, which raises the question of 'which operations team do I need to contact to help resolve this issue and how do I best engage them for a quick turnaround?' With such a complex web of fulfillment options, customer service representatives were challenged to find the right path for specific client inquiries, how to accurately set client expectations on response times, and provide updates on existing requests.

A key business issue for RBC was that its large, diverse customer support staff, distributed over diverse geographies, had to address the high service experience demands of its customers. This needed to be achieved while reducing operational costs, increasing organizational transparency and complying with regulatory mandates

Management is using the CRM system tools. RBC identified Smart BPM as the key technology to deliver an end-to-end rebuild of their client inquiry and problem resolution process, creating a single system across channels and lines of business. Smart BPM would serve as the backbone for their 'new client action and request tool' (CART).

This was delivered so successfully that when the system was first rolled out there was no need for any formalized end-user training. The field service staffs were able to click on the 'create a new client request' button and successfully drive the process through to resolution. Additionally, it helped to determine that many cases were requests that could

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be resolved right at the point of contact and also avoided doubling effort. Once requests were captured into, the system, the process automation capabilities of the Smart BPM start it's servicing. This involved:

- automatically looking up supporting customer information to enrich the request with required data to help resolve it;
- automatically determining the correct support group, location and even individual for routing and presentation;
- automatically generating supporting forms and correspondence as well as receiving inbound materials supplied by the customer or other support groups.

### Required:

**(a) Define the Customer Relationship Management.**

**(b) What are the steps taken by the Bank to face the challenge?**

**(c) If you are appointed as a CEO of this Bank, would you agree to the implementation of the systems?**

**(d) Mention the objectives of using the CRM applications.**

**[5+5+3+2]**

### Solution:

(a) There are as many definitions for CRM and opinions, at its more formal definition. CRM is a business strategy comprised of process, organizational and technical change whereby a company seeks to better manage its enterprise around its customer behaviors. It entails acquiring and deploying knowledge about customers and using this information across the various customers touch points to increase revenue and achieve cost reduction through operational efficiencies.

CRM is often thought of as a business strategy that enables businesses to:

- Understand the customer
- Retain customers through better customer experience
- Attract new customer
- Win new clients and contracts
- Increase profitably
- Decrease customer management costs

CRM is an integrated approach to identifying, acquiring and retaining customers. By enabling organizations to manage and coordinate customer interactions across multiple channels, departments, lines of business and geographies, CRM helps organizations maximize the value of every customer interaction and drive superior corporate performance.

(b) RBC identified Smart BPM as the key technology to deliver an end-to-end rebuild of their client inquiry and problem resolution process, creating a single system across channels and lines of business. Smart BPM would serve as the backbone for their 'new client action and request tool' (CART).

This was delivered so successfully that when the system was first rolled out there was no need for any formalized end-user training. The field service staffs were able to click on the 'create a new client request' button and successfully drive the process through to resolution. Additionally, it helped to determine that many cases were requests that could be resolved right at the point of contact and also avoided doubling effort. Once requests were captured into, the system, the process automation capabilities of the Smart BPM servicing backbone drove higher rates of straight-through-processing. Once requests were captured into, the system, the process automation capabilities of the Smart BPM start it's servicing.

This involved:

- automatically looking up supporting customer information to enrich the request with required data to help resolve it;
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- automatically generating supporting forms and correspondence as well as receiving inbound materials supplied by the customer or other support groups.
- (c) As a C.E.O, I agree with the changes. Before, Customer request are processing in manual and began prone to error. It gives following benefits:  
significant reduction in time to resolution of basic inquiries; predictable, accurate and consistent client service commitments at point of service and reduction in user training time, With the automated processes in place, the support staffs were able to focus their time, on just the steps that required their skills and judgment, not the menial tasks that added little value to the process. As a result, reduction in total elapsed time to resolve core processes, reduce headcount in the support organization.
- (d) Objectives for using CRM applications
- (i) To support the customer services
  - (ii) To increase the effectiveness of direct sales force.
  - (iii) To support of business to business activities.
  - (iv) To support of business to consumer activities.
  - (v) To manage the call center.
  - (vi) To operate the In- bound call centre.
  - (vii) To operate the Out - bound call centre.

### 2 Read the following case study and answer the following questions:

Doordarshan was launched in 1959 and was controlled by the Information and Broadcasting ministry of the Central government. It was a monopoly and had a captive audience with 90% reach, and an audience of about 480 million people by the early 1990s. However, as part of the government's liberalization program, private channels were allowed to operate. In 1984, cable TV entered India. By the early 1990s, there were numerous private TV stations in India competing with Doordarshan. Despite its advantage in reach (Doordarshan could reach more than double the number of homes in comparison to cable TV) and its number 1 position in overall audience, Doordarshan started to lose viewers. Especially significant were the large losses among viewers with the highest purchasing power.

Star News – the first private independent channel – was launched in 1998. It provided in-depth analysis of the government. As a result, many sophisticated viewers switched to the body to oversee commissioning of viewers. The audience that was left to Doordarshan was mainly people in rural areas with much lower purchasing power. Consequently, advertisers started to prefer private channels over Doordarshan, and advertising revenue started to drop (Sbhadra and Dutta, 2002).

In addition to having more capable competitors, Doordarshan was also plagued by internal problems. Policies of Doordarshan did not change to reflect the reality of its environment. The advertising rates it charged were almost twice as high as those of the highest rated private channels, despite falling advertisement revenues and the loss of most of its affluent audience. Further, Doordarshan, which had operated in a seller's market, did not even have a marketing department that could market its advertising slots. Instead, Doordarshan's 56 different producers sold commercial time separately to advertisers for different half-hour slots. Most advertisers preferred a coordinated package deal that covered slots the entire week. With increased competition and poor policies, advertisement revenue dropped.

There were other internal problems ranging from allegations of bribery and corruption to inefficiency. There were allegations that the members of the Central Commissioning unit (the body that oversaw the commissioning of programs) took bribes from producers to air their programs. In 1998, two Doordarshan officials were arrested for taking bribes from a producer. Internal mismanagement resulted in delays and an inability to pay and collect from private parties. Over 50 companies owed ₹ 18.2 million (\$ 381,871.00) to

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Doordarshan in 2001. Although there were 20,000 employees, over 50% of Doordarshan's programs were outsourced to private parties (Subhadra and Dutta, 2002).

In November, 1997, Prasar Bharati was created as a statutory autonomous body, and was envisaged to be the public service broadcaster of the country. The objectives for this organization include: the promotion of unity and integrity of the country; the fostering of communal harmony; the safeguarding of the citizens' right to be informed freely; the payment of special attention to the fields of education, agriculture, rural development, and public health; the production of appropriate programmes to meet the special needs of youth and women; the propagation of goals of social justice, and of issues concerning the rights of the working classes; and the protection of the interests of children, the aged, and the handicapped. The corporation has not been asked to raise funds to become a self-financing organization (Gill, 2001).

In 2002, K.S. Sharma, a 1968 batch Indian Administrative Services officer, was appointed as the CEO of Prasar Bharti. On December 28, 2002, Sharma declared, "Today, revenue generation is our top priority." Sharma had been the Director General of Doordarshan from 1996 to 1998, at a time when Doordarshan was suffering rapid erosion in its market to the private channels. In his new role, he rejected the notion that Doordarshan is losing prime audience that is of interest to the marketers. He stated, "First of all, 50% of the households do not have cable. And these are by and large the people, FMCG (Fast moving consumer goods) manufacturers will look at." He continued, "I have had a lot of exposure in rural areas, and we keep in touch with them on a regular basis. Purchasing power that exists in rural areas needs to be seen to be believed. People have their own personal dish antennas, vehicles and what not. Rural life has transformed."

The effects of new resolve soon became evident in the negotiations for television rights for broadcasting cricket matches. In the late 1990s, Doordarshan used to pay rights fee of ₹ 30 million per one-day match, and spent another ₹ 20 million per match as the production cost. It thereafter sought advertising bids from the market, and often secured just ₹ 40 million in revenues. As a result, Doordarshan had to simply absorb this loss as a public broadcaster. Overall, Doordarshan averaged only ₹ 0.57 million in profits per match, and had never earned more than ₹ 6 million in any match. In 2002 International Cricket Committee (ICC) Championship, Doordarshan sought a profit-sharing agreement from the ICC marketing company. While its previous attempts to seek profit-sharing had been turned down, Doordarshan contended that its advertising revenues were accelerating, and given its extensive territorial reach, it needed a 30% profit share. Eventually, it struck a 20% profit-sharing deal, with a guaranteed minimum profitability of ₹ 10 million per match. The guaranteed minimum profitability increased to ₹ 20 million if the final match involved India, as actually happened.

Sharma also sought to leverage the synergies between public radio and public television. In a major deal signed in 2002, Reliance Infocomm—the major telecom operator in India—was offered a cross-bonus option, with 10% of their ad budget on Doordarshan as bonus on radio, and 10% of their ad budget on radio as bonus on Doordarshan. Reliance Infocomm agreed to spend ₹ 15 million on Doordarshan and ₹ 5 million on Radio ads in the first year.

Sharma believes that Doordarshan's programming is par excellence. He observed, "As far as our programmes are concerned, we are no less than anybody else. Our programmes can be watched by families sitting together." He continued, "Our weakest point is that people are not aware of our programming. But we are working on it now. We have already made barter deals with newspapers—for instance, Indian Express. We would get ₹ 50 million worth print space in Express, while they would be given air time worth that much money. We have also tied up with Outlook. Soon we would be seen on hoardings as well—in Mumbai to begin with. We are in talks with Mumbai Municipal Corporation for another barter deal. So gradually, it is happening."

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Sharma recognized that most people don't watch Doordarshan. He noted, "people have this impression of DD being a fuddy duddy channel because pictures on the screen look very hazy. Most customers do not like to put an antenna, and prefer to watch Doordarshan through their cable operator. Though the law says that the cable operators must transmit our channels without interruption, cable operators are not showing our signals properly. Moreover, even if a customer has an antenna in their house, they still sometimes do not get the picture clearly because their neighbour has cable and a cut or a nip in it impacts the terrestrial transmission." Sharma lobbied with the government for introducing Conditional Access System (CAS) that would allow Doordarshan to directly transmit the programming to the homes through set-top boxes.

In 2004, after CAS was approved by the Parliament, Doordarshan launched its ₹ 5 billion Direct To Home (DTH) venture. Originally, Prasar Bharti had envisaged DTH service for inaccessible areas, with a basic bouquet of 30 TV channels, including 17 Doordarshan channels, besides 10 radio channels. However, the reduced costs allowed Prasar Bharti to carry 50 instead of 30 TV channels with the money given to it. It received requests from more than 40 free-to-air private television channels to come on its DTH platform, including channels like Zee News, Star News, BBC, and CNN, on its DTH network. Sharma noted that, "In the first phase, we'll have only free-to-air DTH service. But we are open to the idea of a separate DTH bouquet of paid channels. The current decision of the Union Cabinet is not in favour of a paid DTH platform. However, later in the second phase, we may, with government approval, go in for a separate paid DTH platform."

While several private firms were also introducing DTH services, the prospects for Prasar Bharti seemed bright, because it was the only free-to-air DTH service available in the country. Sharma observed, "There are no monthly charges for our service. The subscriber has to invest only about ₹ 2500-₹ 3500 for the dish and the set-top box. That is why we are getting such a good response from the viewers. And, the free-to-air private channels are very keen to join our platform."

Nevertheless, the financial position of Prasar Bharti remains precarious. Sharma clarified that "The financial crisis is acute to the extent we are unable to take the benefit beyond what is happening today." He elaborated, "If you wish Prasar Bharti to expand and to venture into new areas, then the crisis is very large. If it is just housekeeping at the current level, then the crisis is of a medium range. So, it is a question of how much more new activity we want for Prasar Bharti. In each case, we'll need more funds. How will the funds come? We can raise some resources ourselves. For the last few years, we have been doing so. But the government has many other constraints. Hence, they are not giving as much as they would perhaps like to. At least they are not giving as much as we would want them to. The best thing is to tighten your belts— improve efficiency and cut costs. We are doing that also."

Sharma noted that it has not been possible to implement many of Doordarshan's new initiatives due to inadequacy of funds. "Take the case of our initiative to take Doordarshan to the UK and the USA that has received a setback. Then, despite the fact that DD News has taken off well, regional Doordarshan news units are crying for funds to improve their working. We need resources to get news quickly.... Of course, we cannot compare ourselves" with NHK, whose news team has got five exclusive helicopters. This makes a qualitative difference in what you can do.... We need funds for digitizing our entire chain of operations. Also, each state, each language group deserves a satellite channel. We want to launch the channels in the North-east but we do not have funds. And the other thing is that in the past, most of these channels had started without any funds. How long will they survive? Except for the DD News channel, which got Cabinet approval for ₹ 1270 million, all other regional channels, and niche channels like DD Sports and DD Bharti, began without funds. We need funds to strengthen them."

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Given this, Sharma wondered if there is anything else he could do to improve revenue generation, besides having a road map that stated, "Improve the content, improve the content and improve the content."

**Required:**

- (a) List out the problems faced by Doordarshan.**
- (b) What is the best option, in your view, for Doordarshan?**
- (c) Why do you think that the proposed alternative is the best?**
- (d) What is your view about the formation of Prasar Bharati?**

[2+5+4+4]

**Solution:**

**(a)** List out problems faced by Doordarshan

- (i) Strict rules of channel make programmes less creative
- (ii) Shows are not popular amongst cable.
- (iii) No presence on internet to provide broadcasted programmes
- (iv) Poor quality of programs in terms of creativity and execution

**(b)** For several years Doordarshan was the only broadcaster of television programmes in India. After the opening of the sector to the private entrepreneur (cable and satellite channels), the market has witnessed major changes. The number of channels has increased and also the quality of programmes, backed by technology, has improved. In terms of quality of programmers, opportunity to advertise, outreach activities, the broadcasting has become a popular business. Broadcasters too have realized the great business potential in the market. But for this, policies need to be rationalized and be opened to the scope of innovativeness not only in term of quality of programmes. This would not come by simply going to more areas or by allowing bureaucratic set up to continue in the organization.

Strategically the DD needs to undergo a policy overhaul. DD, out of three options, namely privatization, public service broadcaster or a middle path, can choose the third one, i.e. a combination of both. The whole privatization is not possible under the diversified political scenario. Nor it would be desirable to hand over the broadcasting emotively in the private hand as it proves to be a great means of communication of many socially oriented public programmers. The government could also think in term of creating a corporation (as it did by creating Prasar Bharti) and provide reasonable autonomy to DD. So far as its advertisement tariff is concerned that can be made fairly competitive. However, at the same time cost of advertising is to be compared with the reach enjoyed by the doordarshan. The number of viewers may be far more to justify higher tariffs.

**(c)** It is suggested that the DD should adopt a middle path. It should have a mix of both the options. It should economized on its operational aspects and ensure more productivity in term of revenue generation and optimization of use of its infrastructure.

Wherever, the capacities are underutilized, these may be leased out to the private operations. At the same time quality and viewership of programmes should be improved. Bureaucracy may reduce new strategic initiatives or make the organization less transparent. Complete privatization can fetch a good sum and may solve many of the managerial and operational problems. However, complete control with private sector is not advisable because that denies the government to fully exploit the avenue for social and public use. The government will also lose out as it will not be able to take advantage of rising potential of the market.

**(d)** I think it is the best way to develop the Prasar Bharati. The objectives for this organization include: the promotion of unity and integrity of the country; the fostering of communal harmony; the safeguarding of the citizens' right to be informed freely; the payment of special attention to the fields of education, agriculture, rural development, and public health; the production of appropriate programmes to meet the special needs of youth and women; the propagation of goals of social justice, and of issues concerning the rights of the working classes; and the protection of the interests of children, the aged,

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and the handicapped. The corporation has not been asked to raise funds to become a self-financing organization

- 3 Reduce the following two-person zero-sum game to 2 x 2 order, and obtain the optimal strategies for each player and the value of the game**

		Player B			
		B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
Player A	A <sub>1</sub>	3	2	4	0
	A <sub>2</sub>	3	4	2	4
	A <sub>3</sub>	4	2	4	0
	A <sub>4</sub>	0	4	0	8

[7+3]

**Solution:**

We observe that all entries in the third row of the given matrix are greater than, or equal to, the corresponding entries in the first row. Thus the first row is dominated by the third row and as such can be deleted. The deletion of the first row leads to the following matrix.

	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
A <sub>2</sub>	3	4	2	4
A <sub>3</sub>	4	2	4	0
A <sub>4</sub>	0	4	0	8

Next, all elements of the first column are at least equal to their counterparts in the third column. We can, thus, delete the first column to get the following matrix:

	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
A <sub>2</sub>	4	2	4
A <sub>3</sub>	2	4	0
A <sub>4</sub>	4	0	8

We notice now that the first column is dominated by a convex linear combination of the second and the third columns because

$$4 > \frac{1}{2}(2) + \frac{1}{2}(4); \quad 2 = \frac{1}{2}(4) + \frac{1}{2}(0); \quad \text{and} \quad 4 = \frac{1}{2}(0) + \frac{1}{2}(8)$$

Its deletion results in the following:

	B <sub>3</sub>	B <sub>4</sub>
A <sub>2</sub>	2	4
A <sub>3</sub>	4	0
A <sub>4</sub>	0	8

Similarly, the first row is equated to the convex linear combination of the other two rows as shown.

$$2 = \frac{1}{2}(4) + \frac{1}{2}(0); \quad \text{and} \quad 4 = \frac{1}{2}(0) + \frac{1}{2}(8)$$

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Hence, we deleted the first row to get the following 2 x 2 matrix which can be solved analytically.

	B <sub>3</sub>	B <sub>4</sub>
A <sub>3</sub>	4	0
A <sub>4</sub>	0	8

For this game,

$$x = \frac{8-0}{(4+8)-(0+0)} = \frac{8}{12} = \frac{2}{3}; \quad y = \frac{8-0}{(4+8)-(0+0)} = \frac{8}{12} = \frac{2}{3}; \quad \text{and } v = \frac{4 \times 8 - 0 \times 0}{(4+8)-(0+0)} = \frac{32}{12} = \frac{8}{3}.$$

Thus, the optimal strategy for A is (0, 0, 2/3, 1/3), for B it is (0, 0, 2/3, 1/3) and the game value  $v = 8/3$ .

**4 HP Ltd manufactures two parts 'A' and 'B' for Computer Industry.**

- **A: Annual Production and Sales of 1,00,000 units at a Selling Price of ₹100.05 per unit.**
- **B: Annual Production and Sales of 50,000 units at a Selling Price of ₹150 per unit.**

**Direct and Indirect Costs incurred on these two parts are as follows - (₹ in thousands)**

Particulars	A	B	Total
<b>Direct Material Cost (Variable)</b>	<b>4,200</b>	<b>3,000</b>	<b>7,200</b>
<b>Labour Cost (Variable)</b>	<b>1,500</b>	<b>1,000</b>	<b>2,500</b>
<b>Direct Machining Costs (See Note)</b>	<b>700</b>	<b>550</b>	<b>1,250</b>
<b>Indirect Costs:</b>			
<b>Machine Set Up Cost</b>			<b>462</b>
<b>Testing Cost</b>			<b>2,375</b>
<b>Engineering Cost</b>			<b>2,250</b>
<b>Total</b>			<b>16,037</b>

**Note:** Direct Machining Costs represent the cost of machine capacity dedicated to the production of each product. These costs are fixed and are not expected to vary over the long-run horizon.

**Additional information is as follows -**

Particulars	A	B
<b>Production Batch Size</b>	<b>1,000 units</b>	<b>500 units</b>
<b>Set up time per batch</b>	<b>30 hours</b>	<b>36 hours</b>
<b>Testing time per unit</b>	<b>5 hours</b>	<b>9 hours</b>

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Engineering Cost incurred on each product	₹8,40,000	₹14,10,000
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A foreign competitor has introduced product very similar to 'A'. To maintain the Company's share and profit, HP Ltd. has to reduce the price to ₹86.25. The Company calls for a meeting and comes up with a proposal to change design of product 'A'. The expected effect of new design is as follows:

- Direct Material Cost is expected to decrease by ₹5 per unit.
- Labour Cost is expected to decrease by ₹2 per unit.
- Machine time is expected to decrease by 15 minutes, previously it took 3 hours to produce 1 unit of 'A'. The machine will be dedicated to the production of new design.
- Set up time will be 28 hours for each set up.
- Time required for testing each unit will be reduced by 1 hour.
- Engineering Cost and Batch Size will be unchanged.

Required:

(a) Company management identifies that cost driver for Machine Set-Up Costs is 'set up hours used in batch setting' and for Testing Costs is 'testing time'. Engineering Costs are assigned to products by special study. Calculate the full cost per unit for 'A' and 'B' using Activity-Based Costing.

(b) What is the Mark-up on full cost per unit of A?

(c) What is the Target cost per unit for new design to maintain the same mark up percentage on full cost per unit as it had earlier? Assume cost per unit of cost drivers for the new design remains unchanged.

(d) Will the new design achieve the cost reduction target?

(e) List four possible management actions that the HP Ltd. should take regarding new design.

[3+1+1+3+2]

Solution:

**(a) Computation of Quantities of Cost Drivers**

Particulars	A	B	Total
a. Quantity	1,00,000 units	50,000 units	
b. Batch Size	1,000 units	500 units	
c. Number of Batches (a ÷ b)	100 batches	100 batches	
d. Set Up Time per batch	30 hours	36 hours	
e. Total Set Up Time for Production (c x d)	3,000 hours	3,600 hours	6,600 hours
f. Testing Time per unit	5 hours	9 hours	
g. Total Testing Time for Production (a x f)	5,00,000 hours	4,50,000	9,50,000 hours

**Computation of ABC Recovery Rates**

Activity	Activity Cost Pool	Cost Driver	Cost Driver Quantity	ABC Rate
Machine Set Up	₹ 4,62,000	Set Up Hours	6,600 Set Up Hours	₹70 per hour.
Testing	₹23,75,000	Testing Hours	9,50,000 Testing Hours	₹2.50 per hour.

Note: Engineering Costs are assigned by special study. Hence ABC Rate is not calculated.

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### Computation of Cost per unit using ABC System

Particulars	A	B
<b>Direct Costs:</b>		
Direct Materials	$42,00,000 \div 1,00,000 = 42.00$	$30,00,000 \div 50,000 = 60.00$
Direct Labour	$15,00,000 \div 1,00,000 = 15.00$	$10,00,000 \div 50,000 = 20.00$
Direct Machining	$7,00,000 \div 1,00,000 = 7.00$	$5,50,000 \div 50,000 = 11.00$
Sub Total Direct Costs	64.00	91.00
<b>Indirect Costs:</b>		
Machine Set Up	$(₹70 \times 30 \text{ hrs}) \div 1,000 \text{ uts} = 2.10$	$(₹70 \times 36 \text{ hrs}) \div 500 \text{ uts} = 5.04$
Testing	$(₹2.5 \text{ ph} \times 5 \text{ hours}) = 12.50$	$(₹2.5 \text{ ph} \times 9 \text{ hours}) = 22.50$
Engineering	$8,40,000 \div 1,00,000 = 8.40$	$14,10,000 \div 50,000 = 28.20$
Sub Total Indirect Costs	23.00	55.74
Total Costs	87.00	146.74

(b) Markup (or) Profit per unit of A = Selling Price - Full Cost = ₹ 100.05 - ₹87.00 = ₹13.05 p.u.  
 Percentage of Markup to Full Cost = ₹13.05 ÷ ₹87 = 15% on Cost.

**(c) Computation of Target cost for New Design of A**

New Selling Price (given)	₹86.25
Less: Target Profit at 15% on Cost i.e. 15/115 on SP = $86.25 \times 15/115$	₹11.25
Target Cost for New Design of A	₹75.00

**(d) Computation of Cost per unit of New Design A**

Particulars	A
Direct Costs: Direct Materials Direct Labour	$42.00 - 5.00 = 37.00$
Direct Machining (dedicated machine, hence time saved is	$15.00 - 2.00 = 13.00$
Sub Total Direct Costs	57.00
Indirect Costs: Machine Set Up	$(₹70 \times 28 \text{ hours}) \div 1,000 \text{ units} = 1.96$
Testing	$(₹2.5 \text{ ph} \times 4 \text{ hours}) = 10.00$
Sub Total Indirect Costs	20.36
Total Estimated Costs of New Design A	77.36

Target Cost is ₹75.00 only. Hence, the new design will not achieve the cost reduction target.

**Note:** It is assumed that output of A will remain at 1,00,000 units, inspite of the reduction in machine time. To maintain 15% profit margin, probable SP of New Design A will be ₹77.36 + 15% = ₹88.96.

**(e) Possible management actions for new design**

- (i) Value Engineering and Value Analysis to reduce the Direct Material Costs.
- (ii) Time and Motion Study in order to redefine the Direct Labour time and related costs.
- (iii) Exploring possibility of cost reduction in costs of Direct Machining.
- (iv) Identifying non-value added activities and eliminating them in order to reduce Overheads.
- (v) Analysis of effect of sale of New Design A on sale of B.
- (vi) Analyses of sensitivity of sale quantity of New Design A to price change from ₹86.25 to ₹88.96.

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**Note:** Student may answer any 4 alternatives of the above

- 5 (a) List the Objectives of pricing Policy.
- (b) The cost function is  $C = 100+q$ , where the product is sold at ₹ 5 per unit . Determine break even sales and profit when 125 units are sold.
- (c) The total cost function of a firm  $C = \frac{x^3}{3} - 5x^2 + 28x + 10$  , where C is total cost and 'x' is the output. A tax @ ₹2 per unit of output is imposed and the producer adds it to his cost. If the demand function is given by  $P = 2530 - 5x$ , where 'P' is the price per unit of output, Find the profit maximizing output and the price at the level.
- (d) The price (P) per unit at which company can sell all that it produces is given by the function  $P(x) = 300 - 4x$ . The cost function is  $500 + 28x$ , where 'x' is the number of units, find x, so that profit is maximum. [2+2+3+3]

**Solution:**

**(a) Objectives of a Pricing Policy**

Each pricing decision of a firm has generally one of the following objectives:

- To achieve a given rate of return for the entire product line;
- To maintain or increase the existing market share of the firm;
- To maintain at least a particular level of price stability;
- To choose and adopt a price policy which fits into the market conditions faced by the different products in the product line;

- (b)** Let, Total Revenue (TR) =  $Pq = 5q$  [where, P = selling price per unit of the product  
And, q = Quantity of the product]

$$\text{And } C = 100+q$$

$$\text{For Break even } TR = C \Rightarrow 5q = 100+q \Rightarrow q = 25$$

$$\text{For Break even sales} = 5 \times 25 = ₹ 125$$

Again, say that Profit =  $\pi$

$$\text{Now } \pi = TR - C = 5q - 100 \quad q = 4q - 100.$$

$$\text{As per question, } q = 125, \quad \pi = 4 \times 125 - 100 = 400$$

So, Break Even sales is ₹ 125 and Break even profit is ₹ 400

- (c)** Given  $(C) = \frac{x^3}{3} - 5x^2 + 28x + 10 + 2x$

$$P = 2530 - 5x$$

$$\text{Revenue} = xp = 2530x - 5x^2$$

$$\text{Profit} = 2530x - 5x^2 + 5x^2 - 28x - 10 - \frac{x^3}{3} - 2x$$

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$$= -\frac{x^3}{3} - 2,502x - 10 - 2x$$

For Max

$$\frac{dp}{dx} = \frac{-3x^2}{3} - 2,500 = 0$$

$$x^2 = 2,500$$

$$\therefore x = \sqrt{2,500} = 50$$

Again,

$$\frac{d^2p}{dx^2} = -2x$$

For  $x = 50$ ,

$$\frac{d^2p}{dx^2} = -2 \times 50 = -100 \text{ which is negative}$$

$\therefore$  Maximum profit is at  $x = 50$  units

$$\text{Price} = 2,530 - 5 \times 50 = 2,280$$

**(d)**  $P = 300 - 4x$

$$R = P(x) = 300x - 4x^2$$

$$C = 500 + 28x$$

$$P = R - C$$

$$\text{Profit} = 300x - 4x^2 - 500 - 28x$$

$$= -4x^2 + 272x - 500$$

$$\frac{dz}{dx} = -8x + 272 = 0$$

$$-8x = -272$$

$$x = 272/8 = 34$$

$$\frac{d^2z}{dx^2} = -8, \text{ which is Negative}$$

Profit is maximum at  $x = 34$  units.

**6 (a) State the steps to be considered in strategies Bench Trending.**

**(b) "EVA is period-to-period computation, which can be used to monitor the process of value creation and record historically the growth of the enterprise. The MVA can be expressed as the present value of all EVAs." - Discuss the statements**

**(c) Describe the different perspectives of Balanced Scorecard.**

**[3 + 3 + 4]**

**Solution:**

**(a) The Steps in Strategies Bench Trending are as follows:**

(i) Firstly the market is defined by determining its size, customer preferences, competitors and relative business position of the company within the market.

(ii) The industry direction, technology shifts, geopolitical changes, customer changes and potential threats from outside sources are assessed.

(iii) The strongest current and potential competitors are then determined by evaluating the trends in industry.

(iv) Data on performance of competitors is gathered and the current and future performance of the unit is compared with that of its competitor.

(v) A performance baseline for the business units is then established and the relative performance of current and projected competition is estimated.

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(vi) A set of initiatives which form the basis of an improvement plan are identified to maintain strengths while reducing projected gaps.

(b) The above statement said that the difference between Economic value Added and Market Value Added. Discuss it,

EVA is period-to-period computation, which can be used to monitor the process of value creation and record historically the growth of the enterprise. The MVA can be expressed as the present value of all EVAs. The MVA measures the total performance of the firm in economic terms since its inception. It is cumulative measure while the EVA is a single period measure, usually a year. A firm having a positive EVA is expected to have positive MVA and vice-versa. However, there can be a contradiction in MVA and EVA because the MVA is derived from the share prices, which are forward looking discounting the future potential, while the EVA records performance during a period. We may have negative EVA, yet a positive MVA due to the good potential of the firm.

According to the proponents of EVA other parameters of value like growth, rates of return and dividends do not matter. Growth in EPS will increase MVA only when investments earn more than the cost of capital. Similarly, the rates of return do not matter. What matters is the creation of absolute EVA. Likewise dividend and its growth will be inconsequential as long as the market value falls by the amount of dividend. MVA will be affected only when change in dividend signals some change in fundamental investment policy. The only way for creation of value is undertaking all the projects with positive NPV and rejecting all negative NPV Projects – the standard rule of capital budgeting. Once this is done, growth in both returns and dividend will take care of themselves automatically. This will lead to maximization of both EVA and MVA.

(c) The Balanced Scorecard suggests that we view the organization from four perspectives, and to develop metrics, collect data and analyze it relative to each of the following perspectives:

**Perspective:**

**The Learning & Growth Perspective:**

This perspective includes employee training and corporate cultural attitudes related to both individual and corporate self-improvement. In a knowledge worker organization, people, the only repository of knowledge, are the main resource. In the current climate of rapid technological change, it is becoming necessary for knowledge workers to be in a continuous learning mode. Kaplan and Norton emphasize that 'learning' is more than 'training'; it also includes things like mentors and tutors within the organization, as well as that ease of communication among workers that allows them to readily get help on a problem when it is needed.

**The Business Process Perspective:**

This perspective refers to internal business processes. Metrics based on this perspective allow the managers to know how well their business is running, and whether its products and services conform to customer requirements (the mission). These metrics have to be carefully designed by those who know these processes most intimately.

**The Customer Perspective:**

Recent management philosophy has shown an increasing realization of the importance of customer focus and customer satisfaction in any business. These are leading indicators. If customers are not satisfied; they will eventually find other suppliers that will meet their needs. Poor performance from this perspective is thus a leading indicator of future decline, even though the current financial picture may look good.

**The Financial Perspective:**

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Kaplan and Norton do not disregard the traditional need for financial data. Timely and accurate funding data will always be a priority, and managers will do whatever necessary to provide it. In fact, often there is more than enough handling and processing of financial data. With the implementation of a corporate database, it is hoped that more of the processing can be centralized and automated. But the point is that the current emphasis on financials leads to the "unbalanced" situation with regard to other perspectives. There is perhaps a need to include additional financial-related data, such as risk assessment and cost-benefit data, in this category.

### Section – B

[Answer any one]

- 7 (a) "Data mining is a process of discovering various models, summaries, and derived values from a given collection of data." – Discuss it and state the problem of adoption of Data Mining Process.
- (b) Describe about the Fuzzy Sets and discuss the role of Fuzzy sets in HR Management.
- (c) Define the following terms in the context of Supply Chain Management:  
(i) Quality, (ii) Promotions, (iii) Strategic Alliance [8+6+(2x3)]

#### Solution :

(a) Without trying to cover all possible approaches and all different views about data mining as a discipline, let us start with one possible, sufficiently broad definition of data mining: Data Mining is a process of discovering various models, summaries, and derived values from a given collection of data.

The word "process" is very important here. Even in some professional environments there is a belief that data mining simply consists of picking and applying a computer-based tool to match the presented problem and automatically obtaining a solution. This is a misconception based on an artificial idealization of the world. There are several reasons why this is incorrect. One reason is that data mining is not simply a collection of isolated tools, each completely different from the other, and waiting to be matched to the problem. A second reason lies in the notion of matching a problem to a technique. Only very rarely is a research question stated sufficiently precisely that a single and simple application of the method will suffice. In fact, what happens in practice is that data mining becomes an iterative process. One studies the data, examines it using some analytic technique, decides to look at it another way, perhaps modifying it, and then goes back to the beginning and applies another data-analysis tool, reaching either better or different results. This can go round and round many times; each technique is used to probe slightly different aspects of data—to ask a slightly different question of the data. What is essentially being described here is a voyage of discovery that makes modern data mining exciting. Still, data mining is not a random application of statistical, machine learning, and other methods and tools. It is not a random walk through the space of analytic techniques but a carefully planned and considered process of deciding what will be most useful, promising, and revealing.

It is important to realize that the problem of discovering or estimating dependencies from data or discovering totally new data is only one part of the general experimental procedure used by scientists, engineers, and others who apply standard steps to draw conclusions from the data.

The general experimental procedure adapted to data-mining problems involves the following steps:

- (i) Collect the data

This step is concerned with how the data are generated and collected. In general, there are two distinct possibilities. The first is when the data-generation process is under the control of an expert (modeler): this approach is known as a designed experiment. The second possibility is when the expert cannot influence the data-generation process: this is known as the observational approach. An observational setting, namely, random data generation, is assumed in most data-mining applications. Typically, the sampling distribution is completely unknown after data are collected, or it is partially and implicitly given in the data-collection procedure. It is very important, however, to understand how data collection affects its theoretical distribution, since such a priori knowledge can be very useful for modeling and, later, for the final interpretation of results. Also, it is important to make sure that the data used for estimating a model and the data used later for testing and applying a model come from the same, unknown, sampling distribution. If this is not the case, the estimated model cannot be successfully used in a final application of the results.

### **(ii) Preprocessing the data**

In the observational setting, data are usually "collected" from the existing databases, data warehouses, and data marts. Data preprocessing usually includes at least two common tasks:

**(A) Outlier detection (and removal)** - Outliers are unusual data values that are not consistent with most observations. Commonly, outliers result from measurement errors, coding and recording errors, and, sometimes, are natural, abnormal values. Such non representative samples can seriously affect the model produced later. There are two strategies for dealing with outliers:

- (a) Detect and eventually remove outliers as a part of the preprocessing phase, or
- (b) Develop robust modeling methods that are insensitive to outliers.

**(B) Scaling, encoding, and selecting features** - Data preprocessing includes several steps such as variable scaling and different types of encoding. For example, one feature with the range [0, 1] and the other with the range [-100, 1000] will not have the same weights in the applied technique; they will also influence the final data-mining results differently. Therefore, it is recommended to scale them and bring both features to the same weight for further analysis. Also, application-specific encoding methods usually achieve dimensionality reduction by providing a smaller number of informative features for subsequent data modeling.

These two classes of preprocessing tasks are only illustrative examples of a large spectrum of preprocessing activities in a data-mining process.

Data-preprocessing steps should not be considered completely independent from other data-mining phases. In every iteration of the data-mining process, all activities, together, could define new and improved data sets for subsequent iterations. Generally, a good preprocessing method provides an optimal representation for a data-mining technique by incorporating a priori knowledge in the form of application-specific scaling and encoding.

### **(iii) Estimate the model**

The selection and implementation of the appropriate data-mining technique is the main task in this phase. This process is not straightforward; usually, in practice, the implementation is based on several models, and selecting the best one is an additional task.

### **(iv) Interpret the model and draw conclusions**

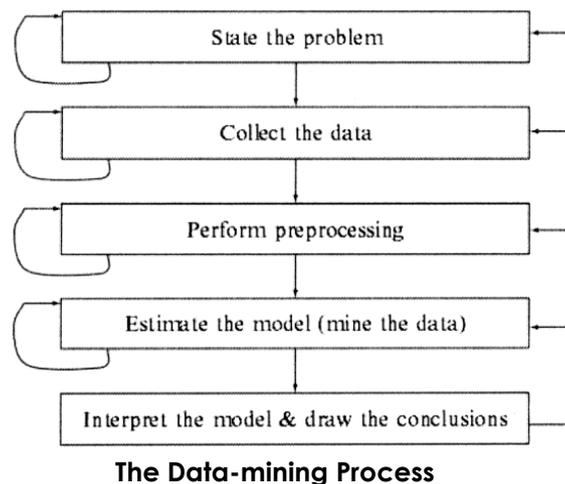
In most cases, data-mining models should help in decision making. Hence, such models need to be interpretable in order to be useful because humans are not likely to base their decisions on complex "black-box" models. Note that the goals of accuracy of the model and accuracy of its interpretation are somewhat contradictory. Usually, simple models are more interpretable, but they are also less accurate. Modern data-mining methods are expected to yield highly accurate results using high-dimensional models. The problem of interpreting these models, also very important, is considered a separate task, with specific techniques to

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validate the results. A user does not want hundreds of pages of numeric results. He does not understand them; he cannot summarize, interpret, and use them for successful decision-making.

All phases, separately, and the entire data-mining process, as a whole, are highly iterative, as has been shown in the following figure. A good understanding of the whole process is important for any successful application. No matter how powerful the data-mining method used in step 4 is, the resulting model will not be valid if the data are not collected and preprocessed correctly, or if the problem formulation is not meaningful.



(b) Fuzzy sets are sets whose elements have degrees of membership. Fuzzy sets were introduced by Lotfi A. Zadeh and Dieter Klauain 1965 as an extension of the classical notion of set. At the same time, Sali (1965) defined a more general kind of structures called L-relations, which were studied by him in an abstract algebraic context. Fuzzy relations, which are used now in different areas, such as linguistics (De Cock, et al, 2000), decision-making (Kuzmin, 1982) and clustering (Bezdek, 1978), are special cases of L-relations when L is the unit interval  $[0, 1]$ .

In classical set theory, the membership of elements in a set is assessed in binary terms according to a bivalent condition — an element either belongs or does not belong to the set. By contrast, fuzzy set theory permits the gradual assessment of the membership of elements in a set; this is described with the aid of a membership function valued in the real unit interval  $[0, 1]$ . Fuzzy sets generalize classical sets, since the indicator functions of classical sets are special cases of the membership functions of fuzzy sets, if the latter only take values 0 or 1. In fuzzy set theory, classical bivalent sets are usually called crisp sets. The fuzzy set theory can be used in a wide range of domains in which information is incomplete or imprecise, such as bioinformatics.

Fuzzy sets can be applied, for example, to the field of genealogical research. When an individual is searching in vital records such as birth records for possible ancestors, the researcher must contend with a number of issues that could be encapsulated in a membership function. Looking for an ancestor named John Henry Pittman, who you think was born in (probably eastern) Tennessee circa 1853 (based on statements of his age in later censuses, and a marriage record in Knoxville), what is the likelihood that a particular birth record for "John Pittman" is your John Pittman? What about a record in a different part of Tennessee for "J.H. Pittman" in 1851? (It has been suggested by Thayer Watkins that Zadeh's ethnicity is an example of a fuzzy set.)

### Fuzzy Sets in HR Management

This project specializes in the implementation of the Microsoft Dynamics NAV information system. The evaluation of employees is based on multiple criteria evaluations. The criteria

are derived from typical competencies of the employees. A competency model has been created for any given role with different normalized weights assigned to various competencies. The evaluation proceeds in the following manner: Firstly, the appointed evaluators fill in a questionnaire indicating to what extent, in their view, the tested employee meets his/her competencies. These evaluations are expressed using fuzzy scales. Normalized weights assigned to the evaluators of any given employee are set based on the intensity of cooperation between the employee and his/her evaluators. The level of fulfillment of each competency by the given employee is calculated as a weighted average of the fuzzy evaluations, conducted by each of his/her evaluators. Then, the overall fulfillment level of the employee's working role, again as a weighted average of fuzzy numbers, is calculated according to a specified model. This produces an overall evaluation of the employee. The evaluation process is followed by an interview where the employee is informed of his/her evaluation results, the employees gaps are discussed, and possibilities for improvement are proposed.

### (c) (i) Quality

Conformance to requirements or fitness for use. Quality can be defined through five principal approaches: (1) Transcendent quality is an ideal, a condition of excellence. (2) Product-based quality is based on a product attribute. (3) User-based quality is fitness for use. (4) Manufacturing-based quality is conformance to requirements. (5) Value-based quality is the degree of excellence at an acceptable price. Also, quality has two major components: (1) quality of conformance—quality is defined by the absence of defects, and (2) quality of design—quality is measured by the degree of customer satisfaction with a product's characteristics and features.

### (ii) Promotions

One of the four P's (product, price, place, and promotion) that constitute the set of tools used to direct the business offering to the customer. Promotion is the mechanism whereby information about the product offering is communicated to the customer and includes public relations, advertising, sales promotions, and other tools to persuade customers to purchase the product offering.

### (iii) Strategic Alliance

A relationship formed by two or more organizations that share (proprietary), participate in joint investments, and develop linked and common processes to increase the performance of both companies. Many organizations form strategic alliances to increase the performance of their common supply chain.

### 8 (a) Describe the problems which supply chain management should address.

**(b) "Business Intelligence (BI) is the ways in which we store and use business information. It encompasses the technologies, applications, and means for collecting, integrating, analyzing, and presenting business data."- Discuss the above statement and how would choose the right business solution. Discuss the 7 layer Business Intelligence Stack.**

**(c) Discuss the different types of On – Line Analytical Processing [OLAP] [4+ (2+2+7)+ 5]**

### Solution:

**(a)** Supply chain management must address the following problems:

- **Distribution Network Configuration:** number, location and network missions of suppliers, production facilities, distribution centers, warehouses, cross-docks and customers.
- **Distribution Strategy:** questions of operating control (centralized, decentralized or shared); delivery scheme, e.g., direct shipment, pool point shipping, cross docking, direct store delivery (DSD), closed loop shipping; mode of transportation, e.g., motor carrier, including truckload, Less than truckload (LTL), parcel; railroad; intermodal transport, including trailer on flatcar (TOFC) and container on flatcar (COFC); ocean freight; airfreight; replenishment strategy (e.g., pull, push or hybrid); and

transportation control (e.g., owner-operated, private carrier, common carrier, contract carrier, or third-party logistics (3PL)).

- **Trade-Offs in Logistical Activities:** The above activities must be well coordinated in order to achieve the lowest total logistics cost. Trade-offs may increase the total cost if only one of the activities is optimized. For example, full truckload (FTL) rates are more economical on a cost per pallet basis than LTL shipments. If, however, a full truckload of a product is ordered to reduce transportation costs, there will be an increase in inventory holding costs which may increase total logistics costs. It is therefore imperative to take a systems approach when planning logistical activities. These trade-offs are key to developing the most efficient and effective Logistics and SCM strategy.
- **Information:** Integration of processes through the supply chain to share valuable information, including demand signals, forecasts, inventory, transportation, potential collaboration, etc.
- **Inventory Management:** Quantity and location of inventory, including raw materials, work-in-process (WIP) and finished goods.
- **Cash-Flow:** Arranging the payment terms and methodologies for exchanging funds across entities within the supply chain.

### (b) Business Intelligence (BI)

Business Intelligence (BI) is the ways in which we store and use business information. It encompasses the technologies, applications, and means for collecting, integrating, analyzing, and presenting business data. Using data that has been stored in a data warehouse, software applications are able to use this data to report past business information as well as predict future business information, including trends, threats, opportunities and patterns. Popular BI applications are very complex and experts in this field are in high demand. Some of the currently popular enterprise level systems, which can manage information about all of the business functions and systems, are sold and implemented by Oracle, SAP, IBM, and Hewlett Packard (HP). Companies often need in-house experts in these systems to assist with the implementation and the on-going use of these systems, which are quite complex!

Business Intelligence is becoming a critically important tool that can allow your company to better understand your customers and suppliers, or measure the efficiency of your own internal operations. If you are new to BI, try reading our Business Intelligence Overview first. Now, it's time to start planning a new BI project. You will need to design the right BI solution for the kind of analysis you plan to do, and evaluate your existing IT infrastructure to ensure that it can support this kind of solution.

#### Choosing the Right BI Solution

BI tools offer functionality ranging from simple reports to drill-down analytical solutions targeted at specific industries and operational environments. When choosing a Business Intelligence solution, firms need to ask two key questions:

(i) What kind of data needs to be analyzed and where does it come from? Many packaged application and database vendors include some BI functionality in their core product, and if you plan to source all of your data from the same application or database, you may not need to buy additional products. However, this strategy may also limit the analytical range.

(ii) Who will be doing the analysis and how do they need to receive the results? Historically, report or analysis requests would be sent to the IT department, which would then code and generate the report. Today, BI is on the front lines of business and the tools may well be used by executives or sales and marketing professionals. As a result, firms need to know the technical capabilities of the end user upfront.

#### The Business Intelligence Technology Stack

To build a Business Intelligence solution, enterprises will need to consider new investments and upgrades to current technology to build out the BI technology stack. The technology stack is designed to highlight the different layers of technology that will be affected by a

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BI project, all the way from the hardware hosting your data at the bottom of the stack to the portal product used to present information to users at the top. Starting from the bottom, this seven-layer stack includes:

- (i) **Storage and computing hardware:** To implement BI, firms will need to invest or upgrade their data storage infrastructure. This includes Storage Area Networks (SAN), Network Attached Storage (NAS), Hierarchical Storage Management (HSM), and silo-style tape libraries. The trend over the next five years is for storage resources to be amalgamated into a single, policy-managed, enterprise-wide storage pool.
- (ii) **Applications and data sources:** To develop an effective BI solution, source data will need to be scrubbed and organized. The challenge is that source data can come from any number of applications, most using proprietary data formats and application-specific data structures. Customer Relationship Management (CRM), Supply Chain Management (SCM), and Enterprise Resource Planning (ERP) systems and other applications are the common sources of data. The trend over the next five years will be for applications to standardize the data format using extensible Markup Language (XML) schema and leverage BI specific standards like XML for Analysis.
- (iii) **Data integration:** Middleware allows different systems supporting different communication protocols, interfaces, object models, and data formats to communicate. Firms will need to invest in these "connectors" to allow data from source applications to be integrated with the BI repository. Extraction, transformation and loading (ETL) tools pull data from multiple sources, and load the data into a data warehouse. Again, the trend in data integration and Enterprise Application Integration, in general, is toward standardization through XML and web services.
- (iv) **Relational databases and data warehouses:** Firms will need a data warehouse to store and organize tactical or historical information in a relational database. Organizing data in this way allows the user to extract and assemble specific data elements from a complete dataset to perform a variety of analyses.
- (v) **OLAP applications and analytic engines:** Online analytic processing (OLAP) applications provide a layer of separation between the storage repository and the end user's analytic application of choice. Its role is to perform special analytical functions that require high-performance processing power and more specialized analytical skills.
- (vi) **Analytic applications:** Analytic applications are the programs used to run queries against the data to perform either "slide-and-dice" analysis of historical data or more predictive analyses, often referred to as "drill-down" analysis. For example, a customer intelligence application might enable a historical analysis of customer orders and payment history. Alternatively, users could drill down to understand how changing a price might affect future sales in a specific region.
- (vii) **Information presentation and delivery products:** The results of a query can be returned to the user in a variety of ways. Many tools provide presentation through the analytic application itself and offer dashboard formats to aggregate multiple queries. Also, enterprises can purchase packaged or custom reporting products, such as Crystal Reports. An important trend in BI presentation is leveraging XML to deliver analyses through a portal or any other Internet-enabled interface, such as a personal digital assistant (PDA).

### (c) Types

OLAP systems have been traditionally categorized using the following:

#### **Multidimensional**

MOLAP is a "multi-dimensional online analytical processing". 'MOLAP' is the 'classic' form of OLAP and is sometimes referred to as just OLAP. MOLAP stores this data in optimized multi-dimensional array storage, rather than in a relational database. Therefore it requires the pre-computation and storage of information in the cube - the operation known as processing. MOLAP tools generally utilize a pre-calculated data set referred to as a data cube. The data cube contains all the possible answers to a given range of questions.

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MOLAP tools have a very fast response time and the ability to quickly write back data into the data set.

### Relational

**ROLAP** works directly with relational databases. The base data and the dimension tables are stored as relational tables and new tables are created to hold the aggregated information. Depends on a specialized schema design. This methodology relies on manipulating the data stored in the relational database to give the appearance of traditional OLAP's slicing and dicing functionality. In essence, each action of slicing and dicing is equivalent to adding a "WHERE" clause in the SQL statement. ROLAP tools do not use pre-calculated data cubes but instead pose the query to the standard relational database and its tables in order to bring back the data required to answer the question. ROLAP tools feature the ability to ask any question because the methodology does not limit to the contents of a cube. ROLAP also has the ability to drill down to the lowest level of detail in the database.

### Hybrid

There is no clear agreement across the industry as to what constitutes "Hybrid OLAP", except that a database will divide data between relational and specialized storage. For example, for some vendors, a HOLAP database will use relational tables to hold the larger quantities of detailed data, and use specialized storage for at least some aspects of the smaller quantities of more-aggregate or less-detailed data. HOLAP addresses the shortcomings of MOLAP and ROLAP by combining the capabilities of both approaches. HOLAP tools can utilize both pre-calculated cubes and relational data sources.

### Other types

The following acronyms are also sometimes used, although they are not as widespread as the ones above:

- **WOLAP** - Web-based OLAP
- **DOLAP** - Desktop OLAP
- **RTOLAP** - Real-Time OLAP

### Section C [Answer any one]

- 9 (a) "The important principle to consider that in an efficient capital market, investors should not hold all their eggs in one basket; they should hold a well-diversified portfolio. In order to diversify risk for the creation of an efficient portfolio" – Do you agree this statement. Justify your answer.
- (b) Discuss about the Risk Retention. Describe the guidelines to be followed for Risk Retention.
- (c) Briefly describe about the Value at Risk. [8+4+8]

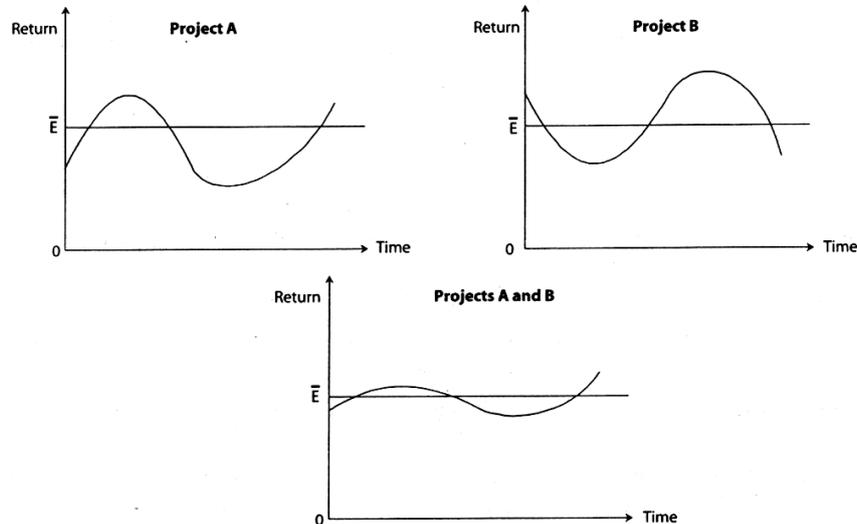
#### Solution:

- (a) I agree this above statement. In order to diversify risk for the creation of an efficient portfolio (one that allows the firm to achieve the maximum return for a given level of risk or to minimize risk for a given level of return), the concept of correlation must be understood. Correlation is a statistical measure that indicates the relationship, if any, between series of numbers representing anything from cash flows to test data. If the two-series move together, they are positively correlated; if the series move in opposite directions, they are negatively correlated. The existence of perfectly correlated (especially negatively correlated) projects is quite rare. In order to diversify project risk and thereby reduce the firm's overall risk, the projects that are best combined or added

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to the existing portfolio of projects are those that have a negative (or low positive) correlation with existing projects.



### Reduction of Risk through Diversification

By combining negatively correlated projects, the overall variability of returns or risk can be reduced. It shows that a portfolio containing the negatively correlated projects A and B, both having the same expected return,  $E$ , also has the return  $E$ , but less risk (i.e., less variability of return) than either of the projects taken separately. This type of risk is sometimes described as diversifiable or alpha risk. The creation of a portfolio by combining two perfectly correlated projects cannot reduce the portfolio's overall risk below the risk of the least risky project, while the creation of a portfolio combining two projects that are perfectly negatively correlated can reduce the portfolio's total risk to a level below that of either of the component projects, which in certain situations may be zero. Combining projects with correlations falling between perfect positive correlation (i.e., a correlation coefficient of +1) and perfect negative correlation (i.e., a correlation coefficient of -1), can therefore reduce the overall risk of a portfolio.

#### Benefits of Diversification

The gains in risk reduction from portfolio diversification depend inversely upon the extent to which the returns on securities in a portfolio are positively correlated. Ideally the securities should display negative correlation. This implies that if a pair of securities has a negative correlation of returns, then in circumstances where one of the securities is performing badly the other is likely to be doing well and vice versa in reverse circumstances. Therefore the 'average' return on holding the two securities is likely to be much 'safer' than investing in one of them alone.

#### (b) Risk Retention

This denotes acceptance of the loss or benefit arising out of a risk when it takes place. In short, it is also termed as self insurance. This strategy is viable when the risks are small enough to be transferred at a cost that may be higher than the loss arising out of the risk itself. On the other hand, the risk can be so big that it cannot be transferred or insured. Such risks will have to be phased out when the eventuality occurs. War is an example as also are 'Acts of God' such as earthquakes and floods. The reasons for risk retention can be cited as follows:

- (i) While risk in a business is taken to increase its return, risk retention relates to such risks which have no relation to return but are part of an individual's life or organization or a

company operational risk can be cited as such a risk that is inherent and needs to be accepted for retention.

(ii) Sometimes, such risks are so small that they are ignored and/or phased out when they surface.

(iii) This method is also useful when the probability of occurrence is very low and a reserve built within the system over a period can take care of such losses arising out of risk retention. This is normally resorted to in businesses against credit risks that are inherent due to marketing on credit basis.

(iv) In some cases, the subject, who is susceptible to risk, also becomes fully aware of the nature of risk. In these situations, there is a certain amount of preparedness in the system due to risk retention.

### **Certain guidelines relating to risk retention should be followed:**

(A) Determine the risk retention level through proper estimation of risk using sales projections, cash flows, contracts, liquidated damages, and guarantees.

(B) Though there is no precise formula for estimation of risks to be retained, statistical averages of such losses over a period of time give an indication to estimate such losses. For instance, bad debts occurring over a period of time are taken into consideration as an estimate to create a reserve for doubtful debts.

(C) It is also necessary to ascertain the capacity for funding a loss arising out of retained risk that is the measure for transferring the risk beyond that level.

Risk retention as an exercise and a strategy is attempted mainly in the case of operational risk in business.

### **(c) Value at Risk**

Value at Risk (VaR) is one of the popular methods of measuring financial risks. There are different types of VaR—long-term VaR, marginal VaR, factor VaR, and shock VaR. VaR is also defined as the threshold value such that the probability of a portfolio making a market to a market loss over a specific time horizon exceeds this value. For example, if a portfolio stock has a one day 3 per cent VaR of ₹10 million, there is 0.03 probability that the portfolio may face a reduction in value by more than ₹10 million over a specific time period. This is on assuming that normal market operations and there is no trading. A loss which exceeds VaR threshold is known as 'VaR break'. VaR has applications in financial risk management, risk measurement, control and reporting. It can also be used in calculating regulatory capital.

VaR essentially identifies the boundary between normal days and extreme occurrences. The probability level is specified as 1 minus probability of a VaR Break. Normally VaR parameters are 1 per cent and 5 per cent probabilities and 1 day and 2 week horizons. While VaR represents loss, a negative VaR would indicate that a portfolio has a high probability for making profits.

There are two types of VaR—one is applied primarily in risk management and the other in risk measurement. For a manager who is managing financial risk, VaR is essentially a system and not just a number as it runs periodically and is compared with the movement of computed prices in opening positions over the particular time horizon. An interesting application of VaR is the governance of endowments, trusts and pension plans. VaR utilized for this purpose is to monitor risk.

VaR has the advantage of a structured methodology for critically analyzing a risk that is available as part of management function. Daily publication of a number on time and with particular statistical data enables an organization to maintain a high objective standard. However, robust backup systems and assumptions regarding default need to be established. A quotation runs thus, 'risk taking institution that does not compute VaR might escape disaster but an institution that cannot compute VaR will not' according to Aaron Brown.

Another advantage of VaR is that it differentiates risks into two regimes, that is, normal days and extreme occurrences. Inside the VaR limit, application of the conventional statistical methods is reliable. Out VaR limit risk should be analyzed with stress testing on the basis of data available on the long-term and in the broad market. Distribution losses beyond VaR point are both impossible and useless. As such the finance manager should concentrate on developing plans to limit the loss if possible or to survive the loss.

VaR as a risk measurement is usually reported with other risk measurements such as standard deviation, expected shortfall, partial derivatives of portfolio value, etc.

Application of VaR is to segregate extreme occurrences in a systematic way. They can be studied over the long-term in a qualitative manner on the basis of day-to-day movement of prices, both quantitatively and qualitatively. As VaR can at best be utilized to define risk as a market to market loss on a fixed portfolio over a fixed time horizon in normal markets, it is not useful in abnormal situations.

There has been criticism against VaR. It is said that this concept has led to excessive risk taking and leveraging by financial institutions. Again VaR is not sub-additive which means that VaR of a combined portfolio can be larger than the sum of the VaRs of its components.

- 10 (a) There are different recommendations to reduce the Risk of the corporate failures. Mention the recommendations.**  
**(b) Explain the Genetic Algorithm under the Corporate Bankruptcy Prediction Models.**  
**(c) Describe the Business Process Improvement. [5+5+10]**

**Solution:**

**(a) Preventing corporate failures**

It is a fact that some companies perform well and that some underperform and some fails. In many, if not most cases, these companies are led by executives that are quite experienced. Below are some recommendations that can help to reduce the risk of failures of organizations:

**Appointment of non-executive directors**

The non-executive directors will bring their special expertise and knowledge on strategies, innovative ideas and business planning of the organization. They will monitor the work of the executive management and will help to resolve situations where conflict of interest arises. Overall, the non-executive directors will act as a Cross Check.

**Audit committees**

Very often, there is occurrence of fraud in management and financial reporting. The presence of the audit committees will help to resolve this problem. Audit committees have the potential to reduce the occurrence of fraud by creating an environment where there is both discipline and control.

**Development of environment learning mechanism**

Some organizations fail because they lose touch with their environment. Therefore, to counter this problem, there is a need to develop the environmental learning mechanism. Through it, new information can be brought on continuous basis. This is mainly done by carrying customer-feedback surveys. In this way, the organization can realign itself with the new needs and challenges.

**Focus on research and development**

Organizations can generate new knowledge by investing and focusing more on research and development. Thus, there will be more ideas how to make the products much better than that of their competitors.

### Conclusion

It can be deduced that a director has a big responsibility that he has to assume there commendations mentioned above can help directors to reduce corporate failure

### (b) Genetic Algorithms (GA)

Based on the idea of genetic inheritance and Darwinian theory of natural evolution (survival of the fittest), GAs work as a stochastic search technique. GAs perform their search for optimal solution to the problem posed from a large and complicated space of solutions.

GAs are usually explained with the help of vocabulary, inevitably, borrowed from natural genetics. Each individual potential candidate solution to the problem is represented by a 'string' (also called 'chromosome', 'genotype' or 'structure'). These 'strings' are made of 'units' (also called 'genes', 'features', 'characters', or 'decoders'). Under GAs, an evolution process is run on a population of 'strings' that corresponds to a search through a space of potential solutions.

GAs execute this search process in three phases: genetic representation & initialization, selection, and genetic operation (crossover and mutation). Genetic representation that is normally in binary alphabet (0 and 1) creates an initial population of solutions. After the initialization, each string is evaluated with the help of a user-defined fitness function. Over time, such a selection process is likely to result into best performing strings only. Straightforward reproduction of selected strings entails no benefit in terms of exploration of solution space, as this will only reproduce the identical off springs from the parent strings. Genetic operations of Crossover and Mutation are introduced for this purpose. The process continues until the actual population converges towards increasingly homogeneous strings. In general, the process is stopped when we are satisfied with a certain level of homogeneity. In order to solve a classification problem like bankruptcy, researchers extract a set of rules or conditions using GAs. These conditions are associated with certain cut off points. Based on these conditions, the model would predict whether or not a firm is likely to go bankrupt.

### (c) Business Process Improvement

Business process improvement (BPI) is a systematic approach to help an organization optimize its

Underlying processes to achieve more efficient results. The methodology was first documented in H. James Harrington's 1991 book Business Process Improvement. It is the methodology that both Process Redesign and Business Process Reengineering are based upon. BPI has been responsible for reducing cost and cycle time by as much as 90% while improving quality by over 60%.

Process improvement is an aspect of organizational development (OD) in which a series of actions are taken by a process owner to identify, analyze and improve existing business processes within an organization to meet new goals and objectives, such as increasing profits and performance, reducing costs and accelerating schedules. These actions often follow a specific methodology or strategy to encourage and ultimately create successful results. Process improvement may include the restructuring of company training programs to increase their effectiveness.

Process improvement is also a method to introduce process changes to improve the quality of a product or service, to better match customer and consumer needs.

### Identify, Analyze and Improve the Key Processes

An organization is only as good as its processes. To be able to make the necessary changes in an organization, one needs to understand the key processes of the company. Rummler and Brache suggested a model for running a Process Improvement and Management project (PI&M), containing the following steps:

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(i) Identify the process to be improved (based on a critical business issue): The identification of key processes can be a formal or informal exercise. The management team might select processes by applying a set of criteria derived from strategic and tactical priorities, or process selection is based on obvious performance gaps. It is important to select the process (es) which have the greatest impact on a competitive advantage or customer requirement.

(ii) Develop the objective(s) for the project based on the requirements of the process: The focus might be on quality improvement, productivity, cost, customer service or cycle time. The goal is however always the same; to get the key process under control.

(iii) Select the members of the cross-functional team: A horizontal (cross-functional) analysis is carried out by a team composed of representatives of all functions involved in the process. While a consultant or in-house staff person can do the job, the quality of the analysis and the commitment to change is far greater with a cross-functional team.

(iv) Document the current process by creating a flowchart or "organization map.": Describe the process regarding the Organizational level, the Process level and the Job/Performer level according to Rummler. Develop a cross-functional process map for the process.

(v) Identify "disconnects" in the process: "Disconnections" are everything that inhibit the efficiency and effectiveness of the process. The identification should be categorized into the three levels: The Organizational level, the Process level and the Job/ Performer level.

(vi) Recommend changes (organizational, in the process or in its execution): Categorize and prioritize the main problems and possibilities, evaluate alternative solutions. Develop a cross-functional process map for the recommended process.

(vii) Establish process and sub-process measures: The process measures should reflect the objectives of the project.

(viii) Implement the improvements.

### **The elements of a successful implementation effort**

- Executive leadership and management commitment to see the project through to successful implementation.
- A clear statement of why the change is necessary.
- A clear vision of how the organization will be different after the changes.
- Sound, comprehensive recommendations.
- A sound implementation strategy and plan.
- Adequate resources and time.
- Communication of plans, roles and responsibilities, benefits, progress, resolutions.
- Willingness of affected functions and individuals to support the proposed changes.
- Implementation is effectively managed and executed

This model for process analysis is just as useful for smaller processes as for larger and more complex processes. Completion of Steps 4-7 can take from three days to three months, depending on the complexity of the process and the extent of change required to remove the disconnects. Some of the benefits of this cross-functional team approach to process improvement are that the participants learn a tremendous amount about the overall business and their role in it. People earlier seen as unskilled might suddenly understand what is required from them, and will start behaving according to this. The increased understanding of the process will also increase the learning from additional formal training initiated, but also reduce the amount of training needed. When the organization finally understands what their

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key processes are they will more easily feel committed to the implementation of improvements.