PAPER 15 – BUSINESS STRATEGY AND STRATEGIC COST MANAGEMENT

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

	Learning objectives	Verbs used	Definition
LEVEL C	KNOWLEDGE What you are expected to know	List	Make a list of
		State	Express, fully or clearly, the details/facts
		Define	Give the exact meaning of
	COMPREHENSION What you are expected to understand	Describe	Communicate the key features of
		Distinguish	Highlight the differences between
		Explain	Make clear or intelligible/ state the meaning or purpose of
		Identity	Recognize, establish or select after consideration
		Illustrate	Use an example to describe or explain something
	APPLICATION How you are expected to apply your knowledge	Apply	Put to practical use
		Calculate	Ascertain or reckon mathematically
		Demonstrate	Prove with certainty or exhibit by practical means
		Prepare	Make or get ready for use
		Reconcile	Make or prove consistent/ compatible
		Solve	Find an answer to
		Tabulate	Arrange in a table
	ANALYSIS How you are expected to analyse the detail of what you have learned	Analyse	Examine in detail the structure of
		Categorise	Place into a defined class or division
		Compare and contrast	Show the similarities and/or differences between
		Construct	Build up or compile
		Prioritise	Place in order of priority or sequence for action
		Produce	Create or bring into existence
	SYNTHESIS How you are expected to utilize the information gathered to reach an optimum conclusion by a process of reasoning	Discuss	Examine in detail by argument
		Interpret	Translate into intelligible or familiar terms
		Decide	To solve or conclude
	EVALUATION How you are expected to use your learning to evaluate, make decisions or recommendations	Advise	Counsel, inform or notify
		Evaluate	Appraise or asses the value of
		Recommend	Propose a course of action

Paper 15 - Business Strategy and Strategic Cost Management

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

This paper contains 4 questions, representing two separate sections as prescribed under syllabus 2012. All questions are compulsory, subject to the specific guidance/ instructions stated against each question. All workings, wherever necessary, must form a part of your answer. Assumptions, if any, should be clearly stated.

Question No. 1. (Read the Case and Answer the following Questions)

1. **DD is the India's premier public service broadcaster with more than 1,000 transmitters covering 90% of the country's population across an estimated 70 million homes. It has more than 20,000 employees managing its metro and regional channels. Recent years have seen growing competition from many private channels numbering more than 65, and the cable and satellite operators (C & S). The C & S network reaches nearly 30 million homes and is growing at a very fast rate.**

   DD's business model is based on selling half-hour slots of commercial time to the programme producers and charging them a minimum guarantee. For instance, the present tariff for the first 20 episodes of a programme is ₹30 lakhs plus the cost of production of the programme. In exchange the producers get 780 seconds of commercial time that he can sell to advertisers and can generate revenue. Break-even point for producers, at the present rates, thus is ₹ 75,000 for a 10 second advertising spot. Beyond 20 episodes, the minimum guarantee is ₹65 lakhs for which the producer has to charge ₹1,15,000 for a 10 second spot in order to break-even. It is at this point the advertisers face a problem - the competitive rates for a 10 second spot is ₹50,000. Producers are possessive about buying commercial time on DD. As a result the DD's projected growth of revenue is only 6-10% as against 50-60% for the private sector channels. Software suppliers, advertisers and audiences are deserting DD owing to its unrealistic pricing policy. DD has three options before it. First, it should privatize, second, it should remain purely public service broadcaster and third, a middle path. The challenge seems to be to exploit DD's immense potential and emerge as a formidable player in the mass media.

   Required:

   (a) Discuss the best option, in your view, for DD.

   (b) Analyze the SWOT factors the DD has.

   (c) Explain the proposed alternatives which you suggested.

   (d) State the basic objectives for conducting SWOT analysis. [6+6+4+4]

Answer

(a) 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.

(b) The SWOT analyses involve study of strengths, weaknesses, opportunities and threats of an organization. SWOT factors that are evidently available to the Doordarshan are as follows:

S - Strength

More than 1000 transmitters. Covering 90% of population across 70 million homes against only 30 million homes by C & S More than 20,000 employees.

W-Weakness

Rigid pricing strategy. Low credibility with certain sections of society, Quality of program's is not as good as compared to C & S network

O - Opportunities

Infrastructure can be leased out to cable and satellite channel. Digital terrestrial transmission, Regional focused channels, Allotment of time, slots to other broadcasters.

T- Threats

Desertion of advertisers and producers may result in loss of revenues. Due to quality of program the reach of C & S network is continuously expanding. As the C & S network need the trained staffs, some employees of DD may switchover and take new jobs, Best of the market-technology is being used by the private channels.

(c) It is suggested that the DD should adopt a middle path. It should have a mix of both the options. It should economize 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 public monopoly 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) The basic objectives of conducting SWOT analysis are:

- To identify the shortcomings in the company's present skills and resources.
- To exploit the strengths of the company to achieve its objectives.
- To focus on profit-making opportunities in the business environment and for identifying threats.

- To highlight areas within the company, which are strong and which might be exploited more fully and weaknesses, where some defensive planning might be required to prevent the company from downfall.

Question No. 2. (Answer **any two** questions. Each question carries **15 marks**)

2. (a)
(i) State the drawbacks of Vertical Integration. [5]

Answer:

Vertical Integration:

Vertical integration represents an expansion or extension of the firm by integrating preceding or successive productive processes. That is, the firm incorporates more processes toward the original source of raw materials (backward integration) or toward the ultimate consumer (forward integration). For example, an automobile manufacturer might supply its own parts or make its own engines to secure sources of supply.

Drawbacks of Vertical Integration

While some of the benefits of vertical integration can be quite attractive to the firm, the drawbacks may negate any potential gains. Vertical integration potentially has the following disadvantages:

- Capacity balancing issues. For example, the firm may need to build excess upstream capacity to ensure that its downstream operations have sufficient supply under all demand conditions.
- Potentially higher costs due to low efficiencies resulting from lack of supplier competition.
- Decreased flexibility due to previous upstream or downstream investments. (Note however, that flexibility to coordinate vertically-related activities may increase.)
- Decreased ability to increase product variety if significant in-house development is required.
- Developing new core competencies may compromise existing competencies.
- Increased bureaucratic costs.

2.(a)
(ii) Enumerate the advantages of Strategic Planning. [5]

Answer:

Strategic Planning

Strategic planning refers to the formulation of a unified, comprehensive and integrated plan to get the strategic advantages by challenging the environment. It is concerned with appraising the environment in relation to the firm, identifying the strategies for the future with the best possible knowledge of their probable outcome and effect to obtain sanction for one of the alternatives, which is to be ultimately interpreted and communicated in operational terms. Thus strategic planning provides the framework within which future activities of firm are expected to be carried out.

Strategic planning has following advantages or usefulness:-

- According to different research studies, strategic planning contributes positively to the performance of enterprise and predicts better outcomes and isolates key factors of the firm.
- It is concerned with the allocation of resources to product market opportunities and concerned to realize the company's profit potential through selected strategies.
- It measures the strengths and weaknesses of the firm.
- It selects the optimum strategy from the alternatives considering the interest of the firm, personal values of top management and social responsibility of the firm.
- With fast changing product market condition, technology economic condition the strategic planning is the only means by which future opportunities and problems can be anticipated by company executives.
- It enables executives to provide necessary direction for the firm, to take full advantage of new opportunities and to minimize the risk.

2.(a)

(iii) Describe about the Internal and Competitive Benchmarking. [5]

Answer:

Internal Benchmarking

It involves looking within the organization to determine other departments, locations and projects which have similar activities and then defining the best practices amongst them. It involves seeking partners from within the same organization. For example, from business units located in different areas. The main advantages of internal benchmarking are that access to sensitive data and information are easier; standardized data is often readily available; and usually less time and resources are needed. There may be fewer barriers to implementation as practices maybe relatively easy to transfer across the same organization. However real innovation may be lacking and best in class performance is more likely to be found through external benchmarking.

Competitive Benchmarking

It involves examining the products, services and processes of competitors and then comparing them with their own. It involves the comparison of competitors' products, process and business results with own. It requires that the company perform a detailed analysis of its competitors' products, services, and processes. Benchmarking partners are drawn from the same sector. However to protect confidentiality it is common for the companies to undertake this type of benchmarking through trade associations or third parties.

2.(b)

(i) Discuss about the Organizational Development and its characteristics. [5]

Answer:

Organizational Development:- Organizational development (OD) is a complex educational strategy designed to increase organizational effectiveness and wealth through planned involvement by a consultant using theory and techniques of applied behavioural science.

Characteristics of OD

- It is educational strategy, which attempts to bring about a planned change.
- It is concerned with improving organizational climate and culture.

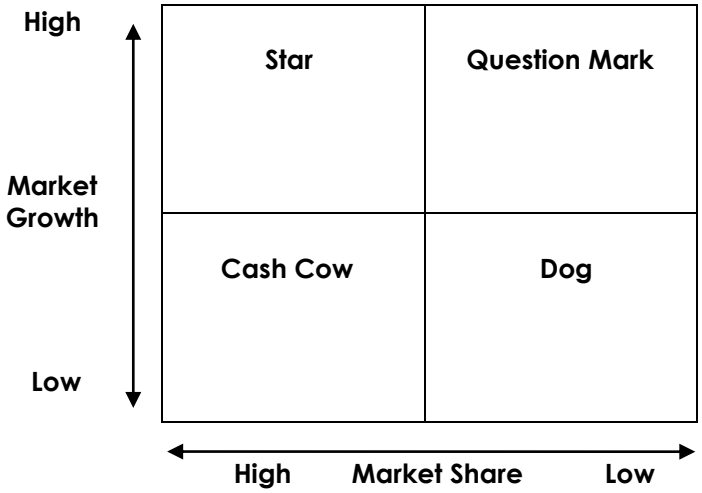
- It related to real organizational problems instead of hypothetical classroom cases.
- It uses sensitivity training methods and emphasizes the importance of experimentally based training.
- Its change agents are almost external consultants outside of the organization.
- External change agents and internal organization executives establish a collaborative relationship involving mutual trust and influence, and jointly determined goals.
- It provides feedback data and information to the participants.
- It is a long-term approach concerned with people for increasing organizational effectiveness.
- It is research based as most of its interventions are based on research findings.

2.(b)

(ii) Explain about the BCG Matrix. **[10]**

Answer:

The Boston Consulting Group (BCG) have developed a matrix, based on empirical research, which analyses products and businesses by market share and market growth. This growth/ share matrix for the classification of products into cash cows, rising stars and questions marks is known as the Boston classification.



I. **Stars** are products with a high share of a high growth, market. In the short term, these require capital expenditure, possibly in excess of the cash they generate, in order to maintain their market position, but promise high returns in the future.

II. In due course, however, stars will become **cash cows**, with a high share of a low-growth market. Cash cows need very little capital expenditure and generate high levels of cash income. The important strategic feature cash cows are that they are generating high cash returns, which can be used to finance the stars.

III. A **question mark** (sometimes called **problem child**) is a product in a high growth market, but has a low market share. A decision needs to be taken about whether the product justifies considerable expenditure in the hope of increasing its market share, or whether it should be allowed to die quietly as it are squeezed out of the expanding market by rival products. Because, considerable expenditure would be needed to turn

a question mark into a star by building up market share, question marks will usually be poor cash generators and show a negative cash flow.

IV. **Dogs** are products with a low share of a low growth market. They may be ex-cash cows that have now fallen on hard times. Dogs should be allowed to die or should be killed off.
Although they will show only a modest net cash flow or even a modest cash inflow, they are cash traps which tie up funds and provide a poor return on investment, and not enough to achieve the organization's target rate of return.

V. There are also **infants** (i.e. products in an early stage of development) and **warhorse** (i.e. products that have been cash cows in the past, and still are making acceptable sales and profits even now) and **dodos** (low share, negative growth, and negative cash flow).

2.(c)

(i) "In maturity stage of product life cycle the market becomes saturated, price competition intensifies, and the rate of sales growth slows down." — Suggest strategic choices in such situations. [8]

Answer:

Marketing and distribution strategic choices for maturity stage of product life cycle :

The following is the list of alternative marketing and distribution strategies available before the marketing management to face the situations characterized by the maturing stage of the Product Life Cycle:

I. Intensification of brand promotion by means of –
- More intensive and brand-stressing advertising;
- Heavier point-of-sale effort;
- More attractive design and functional packaging;
- Advertising messages and media for different market segments;
- More after-sales service for the product; and
- Increase in sales promotion expenditure rather than advertising to hold customer loyalty rather than seek out new buyers.

II. Trading down through –
- Entering a 'fighting brand' on the market at a lower price to avoid jeopardizing an established premium brand;
- Introduction of low-priced models of an established brand;
- Lowering of prices of the entire product line and keeping prices close to private levels; and
- Production for private levels.

III. Proliferation, exclusive or radical, by –
- Offering more variety in features and designs, etc.;
- Seeking more exclusive and innovative features;
- Creating more radical and distinct package designs; and
- Making more options available in accessories, and design, etc.

IV. Trading up (strategy opposite to item 2) through -

- Improvement of quality, appearances, etc. to offer better product;
- Use of prestige packages, brand name, etc.; and
- Increase of prices to cream market labels (in order to increase penetration of markets willing to pay higher prices, earn more margin on possibly lower sales, and keep greater differentiation over competitive products).

V. Increase of product availability and point-of-sale service through -
- More distribution centers closer to the point of use or sale;
- Longer channels to make the product more available at wholesale level;
- More outlets and different channels; and
- Improvement of services offered by dealers (where applicable) or establishment of own service centers.

2.(c)

(ii) Discuss how 'Gap Analysis' might be applied to a product/market situation. [7]

Answer:

If 'gap analysis' is applied to a product/market situation, the organization will consider its targets for different types of products it wants to manufacture and different types of markets/ market segments where it wants sell its products.

The product/market targets may be quantified —

I. The organization should have targets (quantitative) for its products it wants to sell, classified into—
- ❖ Those in the introductory stage of their life, those in the growth stage, those in the maturity stage and those in the decline stage (PLC classification);
- ❖ Cash cows, stars, dogs and question marks (BCG classification);
- ❖ What sort of products the organization wants to sell, e.g. does it want a more diversified range of products?

II. There should also be targets for markets/market segments that the organization would like to be in and targets for —
- ❖ Market share or market segment share (both in the existing markets and the markets it would likely to enter into);
- ❖ Market positioning - positioning is concerned with such matters as product quality, image and reliability, price, outlets, types of customers.

A projection of the organization's products and the market shares and market positioning for each of its products would be made on the assumption that:—
- No new products are developed.
- The market mix for the existing products remains the same.

The gap could be analysed in terms of -
- What products the organization will be missing from the product range?
- What markets/market segments it is failing to enter into?
- How far out of position in the market will the product be?

Strategies to close the gap would include -
- new product development strategies or new market development strategies;
- a strategy of product and market diversification through a takeover policy;
- a marketing mix strategy to gain the required position in target markets.

Question No. 3. (Read the Case and Answer the following Questions)

3. Medical Instruments uses a manufacturing costing system with one direct-cost category (direct materials) and three indirect-cost categories:

- **Setup, production order, and materials-handling costs that vary with the number of batches**
- **Manufacturing operations costs that vary with machine-hours**
- **Costs of engineering changes that vary with the number of engineering changes made**

In response to competitive pressures at the end of 2013, Medical Instruments employed value engineering techniques to reduce manufacturing costs. Actual information for 2013 and 2014 are:

	2013	2014
Setup, production-order, and materials-handling cost per batch	₹8,000	₹7,500
Total manufacturing operating cost per machine-hour	55	50
Cost per engineering change	12,000	10,000

The management of Medical Instruments wants to evaluate whether value engineering has succeeded in reducing the target manufacturing cost per unit of one of its products, HJ6, by 10%. Actual results for 2013 and 2014 for HJ6 are

	Actual Result for 2013	Actual Result for 2014
Units of HJ6 produced	3,500	4,000
Direct material cost per unit of HJ6	₹1,200	₹1,100
Total number of batches required to produce H J6	70	80
Total machine- hours required to produce HJ6	21,000	22,000
Number of engineering changes made	14	10

Required:

(a) Calculate the manufacturing cost per unit of HJ6 in 2013.

(b) Calculate the manufacturing cost per unit of HJ6 in 2014.

(c) Did Medical Instruments achieve the target manufacturing cost per unit for HJ6 in 2014 Explain?

(d) Explain how Medical Instruments reduced the manufacturing cost per unit of HJ6 in 2014.

(e) List out the steps involved in implementing a Target Costing.

(f) State the role of Cost Accountant to be assigned to a Target Costing Team.

[2+2+2+4+6+4]

Answer:

(a) And **(b).** Manufacturing costs of HJ6 in 2013 and 2014 are as follows:

	2013		2014	
	Total	Per Unit	Total	Per unit
	(1)	(2) = (1) ÷ 3,500	(3)	(4) = (3) ÷ 4,000
Direct materials, ₹1,200 × 3,500;	₹42,00,000	₹1,200	₹44,00,000	₹1,100

₹1,100 × 4,000				
Batch – level costs, ₹8,000 × 70; ₹7,500 × 80	5,60,000	160	6,00,000	150
Manufacturing operations costs, ₹55 × 21,000; ₹50 × 22,000	11,55,000	330	11,00,000	275
Engineering change costs, ₹12,000 × 14; ₹10,000 × 10	1,68,000	48	1,00,000	25
Total	₹60,83,000	₹1,738	₹62,00,000	₹1,550

(c) Target manufacturing cost per unit of HJ6 in 2014 = Manufacturing costs per unit in 2013 × 90% = ₹ 1,738 × 0.90 = ₹ 1,564.20
Actual manufacturing cost per unit of HJ6 in 2014 was ₹1,550. Hence, Medical Instruments did achieve its target manufacturing cost per unit of ₹ 1,564.20

(d) To reduce the manufacturing cost per unit in 2014, Medical Instruments reduces the cost per unit of activity in each of the four cost categories—direct materials costs, batch-level costs, manufacturing operations costs, and engineering change costs. It also reduced machine-hours and number of engineering changes made—the quantities of the cost drivers. In 2013, Medical Instruments used 6 machine-hours per unit of HJ6 (21,000 machine-hours ÷ 3,500 units). In 2014, Medical Instruments used 5.5 machine-hours per unit of HJ6 (22,000 machine-hours ÷ 4,000 units). Medical Instruments reduced engineering changes from 14 in 2013 to 10 in 2014. Medical Instruments achieved these gains through value engineering activities that retained only those product features that customers wanted while eliminating activities and their costs.

(e) The following preliminary steps are involved in implementing a Target Costing System:-

- **Create a Project Charter:** Project Charter is a document, approved by top management that describes its goals and what it is authorized to do. This Charter is based on the Corporate Mission Statement and related goals. Written approval of Project Charter by the top management provides the target costing effort with strong basis of support and direction in all subsequent efforts.
- **Obtain a Management Sponsor:** Management Sponsor is an individual belonging to top management. His role will be to support the initiative in all respects, to obtain funding, to co-ordinate with other members of top management, to eliminate problems in a timely manner.
- **Obtain a Budget:** The funding should be based on a formal allocation of money through the corporate budget. The funds should be given unreservedly to the target costing effort.
- **Assign a strong Team Manager:** The Target Costing Team involves the active participation of many members with diverse backgrounds. A strong Team Manager is required to bring the group together as a smooth functioning team focused on key objectives. He should be skilled in dealing with management, the use of project tools, and working with a diverse group of people. This manager should be a full-time employee, so that his or her complete attention can be directed towards the welfare of the project.
- **Enroll Full-time Participants:** It is essential that the members of the team be devoted to it full-time rather than trying to fulfill other commitment elsewhere in the Company

at the same time. They should have a single focus on ensuring the success of the target-costing program.

- **Use Project Management Tools:** Target Costing is a highly complex effort for high-cost products with many features and components. The team should use all available project management tools, software, a Company database containing various types of costing information, and a variety of product design tools.

(f) The role of the Cost accountant in a Target Costing Team is very significant; he should have the following qualification.

- Good knowledge of Company's products as well as their features and components.
- Knowledge of how to create an Activity Based Costing system to evaluate related production costs, or at least interpret such costing data developed by someone else.
- Skill to work well in a team environment, proactively assisting other members of the team in constantly evaluating the cost of new design concepts.
- Good analytical and presentation skills, since the ongoing costing results must be continually presented not only to other members of the team and to top management.

Question No. 4. (Answer **any two** questions. Each question carries **15 marks**)

4.(a)

(i) Difference in operating speeds of machines may lead to higher WIP inventory. How does a JIT system resolve this issue? Explain. [4]

Answer:

At times, there may be huge differences between the operating speeds of different machines, e.g. process I Machinery may produce 180 components per hour whereas process II Machinery may finish only 135 units per hour. This difference in operating speeds affects cost in the following manner:-

- **Piling up of WIP Inventory:** Work-in-process inventory builds up in front of the slowest machines. In the above case, after four hours of work, there will be a WIP of 180 components. This is because, process I would have produced 180x4=720 components whereas process II would have finished only 135 x 4=540 units in the four-hour period.
- **Delayed Tracing of Defectives:** Defective components or parts produced by an upstream machine (e.g. Process I) may not be discovered until the next downstream machine operator (e.g. Process II) finds them later. By that time, the upstream machine may have created more defective parts, all of which must now be destroyed or reworked.

In JIT philosophy, there are two ways to resolve the above problems:-

- **Kanban Card:** It is a notification card that a downstream machine sends to each upstream machine that feeds it with parts, authorizing the production of just enough components to fulfill the production requirements. This is also known as a "pull" system, since these cards are initiated at the end of the production process, pulling work authorizations through the production system. WIP cannot pile up since it can be created only with kanban Authorization.

- **Working Cells:** A Working Cell is a small cluster of machines, which can be run by a single machine operator. The establishment of Working Cell has the following advantages:-
  - The individual machine takes each output part from machine to machine within the cell, and thus there is no way for WIP to build up between machines.
  - The operator can immediately identify defective output (Which otherwise is difficult) for each machine of the cell. The smaller machines used in a machine cell are generally much simpler than the large, automated machinery they replace. Hence, Maintenance costs are reduced.
  - It is much easier to reconfigure the production facility when it is necessary to produce different products, avoiding the large expense of carefully repositioning and aligning the equipments.

4.(a)

(ii) A single product company prepares quarterly budgets. Budgeted variable costs per unit are as under:

	₹
Direct materials	**24**
Direct labour 8 hours (₹ 6 per hour)	**48**
Factory overheads	**16**
Selling price	**180**

Administration overhead is ₹1,00,000 per month and fixed factory overhead is ₹ 90,000 per month including ₹ 20,000 depreciation. The normal capacity of the factory is 3,000 units per month. Finished goods stocks are valued at full factory cost of production and the budgeted opening stock on 1st July 2014 is estimated at 2,400 units valued at ₹ 2,66,000. It is the policy of the company to keep the opening finished stock of each month at a constant ratio to the budgeted unit sales of that month. Extra production in excess of the capacity of 3,000 units per month can be achieved by working overtime at double the labour hour rate.

Estimated sales are as under:

Month	Units
June 2014	**2,600**
July 2014	**2,000**
August 2014	**2,800**
September 2014	**3,200**
October 2014	**3,600**

The direct material costs relating to the production of each month are paid for in the succeeding month. The patterns of collection of sales are as under:

30% in the same month

70% in the next month

All other costs are paid in the month in which they are incurred. An installment of deferred payment of ₹14,000 in respect of the purchase of machinery is due for payment in July 2014. The company has to pay dividend amount to ₹15,000 in September 2014. The projected cash balance on 1st July, 2014 is ₹1,00,000.

Required:

I. Prepare a combined budgeted Profit & Loss Statement for the quarter ended 30th September, 2014.

II. Prepare a cash budget for each of the three months of the quarter ended 30th September, 2014 *viz.* July, August and September 2014. [5+6]

Answer:

Preliminary Workings:

It is given in the question that as per policy of the company, opening finished stock of each month is kept at a constant ratio to the budget sales units of that month. The ratio of stock to sales is thus arrived at as under:

July 2014:	Opening stock	2,400 units
	Sales	2,000 units
	Ratio of Stock to sales	1.2 times

I.

(in units)

	June	July	August	September	October
Sales	2,600	2,000	2,800	3,200	3,600
Opening Stock 1.2 times	3,120	2,400	3,360	3,840	4,320
Closing Stock (i.e., O/S of next month	2,400	3,360	3,840	4,320	
Increase/decrease in stock	(720)	960	480	480	
Sales	2,600	2,000	2,800	3,200	
Closing Stock	2,400	3,360	3,840	4,320	
Total	5,000	5,360	6,640	7,520	
Less: Opening Stock	3,120	2,400	3,360	3,840	
Production	1,880	2,960	3,280	3,680	9,920
Capacity		3,000	3,000	3,000	
Production at overtime		-	280	680	960

Statement showing combined Profit & Loss for the

Quarter ended 30th Sept. 2014

Sales (8,000 × ₹180)		₹14,40,000
Cost of production: Variable (9,920 × ₹88)	₹8,72,960	
Overtime (960 × ₹48)	46,080	
Fixed factory overheads (90,000 × 3)	2,70,000	
Total factory cost	11,89,040	
Less: closing stock (₹11,89,040 ÷ 9,920) × 4,320	5,17,808	
	6,71,232	
Add: opening stock of 2,400 units	2,66,000	
Total cost production	9,37,232	
Administrative overheads (₹1,00,000 × 3)	3,00,000	
Cost of production of goods sold		12,37,232
Profit		2,02,768

II.

	June	July	August	September
Sales (units)	2,600	2,000	2,8000	3,200
Sales value @ ₹180	(₹)4,68,000	3,60,000	5,04,000	5,76,000

Collections – Current 30%	1,40,400	1,08,000	1,51,200	1,72,800
Next month 70%		3,27,600	2,52,000	3,52,800
Total		4,35,600	4,03,200	5,25,600
Production (units)	1,880	2,960	3,280	3,680
Raw materials @ ₹24	(₹)45,120	71,040	78,720	88,320
Direct wages @ ₹48	90,240	1,42,080	1,57,440	1,76,640
Overtime @ ₹48	-	-	13,440	32,640
Variable overheads @ ₹16	30,080	47,360	52,480	58,880
Receipts (₹) (A)		4,35,600	4,03,200	5,25,600
Payments:				
Raw materials		45,120	71,040	78,720
Direct wages		1,42,080	1,57,440	1,76,640
Overtime		-	13,440	32,640
Variable overheads		47,360	52,480	58,880
Fixed factory overheads		70,000	70,000	70,000
Admn. Overheads		1,00,000	1,00,000	1,00,000
Deferred payment		14,000	-	-
Dividend		-	-	15,000
Total (B)		4,18,560	4,64,400	5,31,880
Surplus/ Deficit (A – (B)		17,040	(61,200)	(6,280)
Add: Opening balance		1,00,000	1,17,040	55,840
Closing balance		1,17,040	55,840	49,560

4.(b)

(i) A book store wishes to carry 'Ramayana' in stock. Demand is probabilistic and replenishment of stock takes 2 days (i.e. if an order is placed on March 1, it will be delivered at the end of the day on March 3). The probabilities of demand are given below:

Demand(daily)	**0**	**1**	**2**	**3**	**4**
Probability	**0.05**	**0.10**	**0.30**	**0.45**	**0.10**

Each time an order is placed, the store incurs an ordering cost of ₹ 10 per order. The store also incurs a carrying cost of ₹ 0.50 per book per day. The inventory carrying cost is calculated on the basis of stock at the end of each day.

The manager of the bookstore wishes to order 5 books when the inventory at the beginning of the day plus order outstanding is less than 8 books.

Currently (beginning 1st day) the store has a stock of 8 books plus 6 books ordered two days ago and expected to arrive next day.

Use Monte-Carlo Simulation for 10 cycles.

The two digits random numbers are given below:

89	**34**	**78**	**63**	**61**	**81**	**39**	**16**	**13**	**73**

[10]

Answer:

Demand	Probability	Cum. Prob.	Random No.

0	0.05	0.05	00-04
1	0.10	0.15	05-14
2	0.30	0.45	15-44
3	0.45	0.90	45-89
4	0.10	1.00	90-99

Stock in hand = 8 and stock on order = 6 (excepted next day)

R. No.	Demand	Op. Stock in hand	Receipt	Cl. Stock	Op. Stock on order	Order Qty.	Cl. Stock on order
89	3	8	-	5	6	-	6
34	2	5	6	9	-	-	-
78	3	9	-	6	-	5	-
63	3	6	-	3	5	-	5
61	3	3	-	0	5	5	10
81	3	0	5	2	5	5	10
39	2	2	-	0	10	-	10
16	2	0	5	3	5	-	5
13	1	3	5	7	0	5	5
73	3	7	-	4	5	-	5
			Total	39			

No. of orders = 4 orders, ordering cost = ₹10 × 4 = ₹40.
Closing Stock for 10 days = 39, carrying cost = 39 × ₹0.50 = ₹19.50
Total cost for 10 days = ₹59.50

4.(b)

(ii) A firm has received an order from customer 'X' to be executed for ₹1,800 (all inclusive). The order requires the following materials, labour etc.:

Materials	Requirements	In stock	Book value	Replacement cost per kg.	Realisable value per kg.
Material 'A'	**100 kg.**	**50kg.**	**₹250**	**₹7**	**₹3**
Material 'B'	**300 kg.**	**140 kg.**	**₹280**	**₹3**	**₹1**

Labour:

Department I : 10 hrs @ ₹15
Department II : 8 hrs @ ₹12
Variable Overhead : ₹150

Materials 'A' is one that is regularly used by the firm and if used on this order has to be replaced for the use of other orders – Materials 'B' has no use and the result of excessive purchase made for an order executed two years ago.

Labour in department I is available for this order but labour in department II is fully engaged on another order which is earning a contribution of ₹20 per hour and if the order

from 'X' is to be executed, labour in department II has to be diverted from current operations.

State whether the order received from customer 'X' has to be accepted. Show workings. **[5]**

Answer:

Relevant Cost of Order received from Customer 'X'

Material	A	(100 kgs. @ ₹7)	700	
	B	(140 kgs. @ ₹1)	140	
		(160 kgs. @ ₹3)	480	1,320
Labour		(Dept. I 10 hrs @ ₹15)	150	
		(Dept. II 8hrs@ ₹12)	96	
		Opportunity cost of contribution lost	160	406
Variable overheads				150
Total relevant Cost of order				1,876

Analysis: The relevant Cost of order amount to ₹1,876 whereas custom 'X' has offered only ₹1,800 and it cannot be accepted.

4.(c)

(i) A city hospital has the following minimal daily requirement for nurses:

Period	Clock time (24 hours day)	Minimal number of nurses required
1	**6AM - 10AM**	**2**
2	**10AM – 2PM**	**7**
3	**2PM – 6PM**	**15**
4	**6PM – 10PM**	**8**
5	**10PM – 2AM**	**20**
6	**2AM – 6AM**	**6**

Nurses report to the hospital at the beginning of each period and work for consecutive 8 hours. The hospital wants to determine the minimal number of nurses to be employed so that there will be sufficient number of nurses available for each period. Formulate LPP. Do not solve. **[5]**

Answer:

Let the number of nurses reporting at 6 AM= x_1
Let the number of nurses reporting at 10 AM= x_2
Let the number of nurses reporting at 2 PM= x_3
Let the number of nurses reporting at 6 PM= x_4
Let the number of nurses reporting at 10 PM= x_5
Let the number of nurses reporting at 2 AM = x_6

Objective function: Minimize $x_1 + x_2 + x_3 + x_4 + x_5 + x_6$			
Subject to: →	(i) $x_6 + x_1 \geq 2$	(ii) $x_1 + x_2 \geq 7$	(iii) $x_2 + x_3 \geq 15$
(iv) $x_3 + x_4 \geq 8$	(v) $x_4 + x_5 \geq 20$	(vi) $x_5 + x_6 \geq 6$	(vii) $x_1, x_2, x_3, x_4, x_5, x_6 \geq 0$

4.(c)

(ii) A company has 4 Zones and 4 Marketing Managers available for Assignment. The zones are not equal in sales potentials. It is estimated that a typical marketing Manager operating in each zone would bring in the following Annual sales –

Zones	East	West	North	South
₹	2,40,000	1,92,000	1,44,000	1,20,000

The four Marketing managers are also different in ability. It is estimated that working under the same conditions, their yearly sales would be proportionately as under:

Manager	M	N	O	P
Proportion	8	7	5	4

If the criterion is Maximum Expected Total sales, find the optimum Assignment and the Maximum sales. [10]

Answer:

Given Matrix –

Zone	East	West	North	south
Sales value	2,40,000	1,92,000	1,44,000	1,20,000

Manager	Proportion
M	8/24
N	7/24
O	5/24
P	4/24

80	64	48	40
70	56	42	35
50	40	30	25
40	32	24	20

I. Opportunity Loss Matrix

0	16	32	40
10	24	38	45
30	40	50	55
40	48	56	60

II. Row Operation

0	16	32	40
0	14	28	35
0	10	20	25
0	8	16	20

III. Colum Operation

0	8	16	20
0	6	12	15
0	2	4	5
0	0	0	0

IV. Line Drawing

0	8	16	20
0	6	12	15
0	2	4	5
0	0	0	0

No. of Lines (2) ≠ Order of Matrix (4) LOE= 2

V. Revised Matrix 1 with LOE = 2

0	6	14	18

0	4	10	13
0	0	2	3
~~2~~	~~0~~	~~0~~	~~0~~

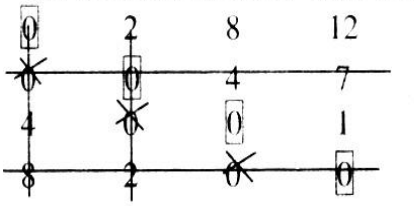
No. of Lines (3) ≠ order of Matrix (4) LOE = 2

VI. Revised Matrix 2 with LOE = 2

~~0~~	6	12	16
~~0~~	4	8	11
~~0~~	~~0~~	~~0~~	~~1~~
~~4~~	~~2~~	~~0~~	~~0~~

Lines (3) ≠ Order (4), LOE = 4

VII. Revised Matrix 3 with LOE=4



Lines (4) = Order of Matrix (4)

VII. Maximum sales

M – East – ₹80,000
N – West – ₹56,000
O – North – ₹30,000
P- South – ₹20,000

Total – ₹1,86,000