CMA JUNE-2019 EXAMINATION

MANAGEMENT LEVEL

SUBJECT: P2: PERFORMANCE MANAGEMENT

Model Solution

Solution to the question No. 1

(a) Just-in-time (JIT) inventory system is a 'pull' system, which responds to demand, in contrast to a 'push' system, in which inventory acts as a buffer between the different elements of the system, such as purchasing, production and sales. Following are the inventory cost that can be eliminated or reduced by its use:

i) Carrying cost
ii) Cost of handling
iii) Cost of handling materials
iv) Cost of space

(b) Volume-based costing is a product costing system when a manufacturing company allocates factory overhead costs to a single cost pool and an Activity-based costing is a measure of the frequency and intensity of demand placed on activities by cost objects. So, Volume-based cost drivers are used to allocate factory overhead costs to individual product or services, on the other hand Activity–based cost driver influences the cost of labor, maintenance, or other variable costs.

(c) Qualitative factors that can influence a special order decision are the special order's impact on sales to regular customers and the customer's ability to maintain an ongoing relationship that includes good ordering and paying practices.

(e) A good BSC should have the following features-

i. Explaining company's strategy by articulating a sequence of cause-and-effect relationships;
ii. Communicate the strategy to all members of the organization through understandable and measurable operational targets;
iii. BSC limits the number of measures used by identifying only the most critical one.

(f) Three main components of strategic analysis of operating income include growth component, price-recovery component and the productivity component.

(g) Conformance quality refers to the performance of a product or service relative to its design and product specifications. For example, if a photocopying machine mishandles paper or breaks down, it fails to satisfy conformance quality.

(h) Economic Value Added (EVA) is a variation of the RI calculation. It equals the after-tax operating income minus the product of after-tax weighted-average cost of capital and total assets minus current liabilities.

Solution to the question No. 2

(a) Although this scorecard is more balanced than its previous one, which used only a single financial measure, it is easy to identify the major gaps in the measurement set. The 4P scorecard has no customer measures and only a single measure each in the process and learning and growth perspectives. This KPI scorecard has no role for information technology (strange for a financial service organization), no linkages from its process measure (quality certification) to a customer value proposition or to a customer outcome, no linkage from the learning and growth measure (diverse worforce) to improving its process

metric (as achieving quality certification), no linkage from a customer measure to a financial outcome and no linkage from a process measure to a financial outcome.

(b)

In order to accept the new order for 1500 modules next week, McGee must give up regular sales of 500 modules per week [(4000- (3000+1500) modules].

Variable costs are Tk.800 per module (Tk.2,400,000/3,000 modules).

Sales price per module Tk. 900

The contribution margin per module on regular sales is Tk.900 – Tk.800 = Tk.100 per module.

Therefore, the opportunity cost (lost CM) of accepting the new order is 500(Tk.100) = Tk.50,000 and McGee will be indifferent between filling the special order and not filling the special order when the contribution margins of the two alternatives are equal (fixed costs will remain unchanged).

That is, McGee will be indifferent at a price P where 1500(P –Tk.800) = Tk.50,000 or P = Tk.833.33. This is the floor price that McGee should charge for the new order.

(c) If SMU's advisors expect to see 300 students each day and it takes an average of 12 minutes to advise each students, then the average time that a student will wait can be calculated as:

If 300 students are seen in a day then,

$$\text{Wait time} = \frac{(\text{Average No. of students per day}) \times (\text{Time taken to advise a student})^2}{2 \times [\text{Maximum time available} - \{(\text{Average No. of students per day}) \times (\text{Time taken to advise a student})\}]}$$

$$= \frac{300 \times (12)^2}{2 \times [10 \text{ advisors} \times 10 \text{ hours} \times 60 \text{ minutes} - (300 \times 12)]}$$

$$= \frac{43{,}200}{2 \times [6{,}000 - 3{,}600]} = 9 \text{ minutes (Ans.)}$$

If 420 students are seen in a day then,

$$\text{Wait time} = \frac{(\text{Average No. of students per day}) \times (\text{Time taken to advise a student})^2}{2 \times [\text{Maximum time available} - [\{(\text{Average No. of students per day}) \times (\text{Time taken to advise a student})\}]}$$

$$= \frac{420 \times (12)^2}{2 \times [10 \text{ Advisors} \times 10 \text{ hours} \times 60 \text{ minutes} - (420 \times 12)]}$$

$$= \frac{60{,}480}{2 \times [6{,}000 - 5040]}$$

$$= \frac{60{,}480}{1{,}920} = 31.5 \text{ Minutes (Ans.)}$$

(d) The amount paid, whether it be Tk.0, Tk.8,000 or Tk.100,000, should make no difference to the decision. You have the ticket, and you have paid for it. That cannot be changed. If you really prefer to watch the game on television, it may have been a bad decision to pay Tk.8,000 for a ticket. But you cannot erase that bad decision. All you can do is choose the future action that has the most value to you. You should not suffer through a less pleasant experience just because you paid Tk.8,000 for the Ticket.

A manager must make the same analysis regarding the replacement of a piece of equipment. What the company spent for the old equipment is irrelevant. Keeping equipment that is no longer economical is just like using a ticket for an event that you would rather not attend. Additionally, keeping the equipment creates an opportunity cost because the company forgoes the disposal value of the old equipment, in the same way that keeping the ticket prevents you from reselling it to another fan (which is a relevant item in this scenario).

(e) Selling Price per piece for good units: Tk.456,000 ÷ 2,400 = Tk.190

Selling amount of defective pieces = 25 pounds X 100 pieces X Tk. 2.50 per pound
= Tk. 6,250

So, selling price per piece of defective pieces = Tk. 6,250/100 pieces = Tk. 62.50

Profits lost: 100 × (Tk.190.00 –Tk.62.50) = Tk.12,750 (Ans.)

Solution to the question No.3

Req. (a)

(1) **Internal Manufacturing costs of component P will be as follows**:

	Tk./unit
Direct Labor (1 hour @Tk.8/hour)	8.00
Direct Material B (2kgs@Tk.5/kg)	10.00
Variable Overhead (**Working#1**)	
Direct Labor (1 hour @Tk.0.50/hour)	0.50
Machine Hours (0.5 hours @Tk.0.25/hour)	0.125
	18.625

(2) **Comparing the internal manufacturing cost with the buying price:**

The buying price of component P is Tk. 35 per unit, so the company should manufacture the component if resources are readily available. As resources are scarce in the next 10 weeks the contribution from the component needs to be compared with the contribution that can be earned from the other products

(3) **Establishing which material is scarce (If any):**

Resource	Available	Total	J	K	L	M	P
Direct material A	21,000	20,150	2,200	3,700	0	14,250	0
Direct material B	24,000	31,050	2,200	0	8,850	19,000	1,000

(Working -2: Material requirements)

It can be seen above that material B is a binding constraint and so the contribution from each product and the component per kg of material B must be compared. As product K does not use the scarce material it can be omitted.

(4) Ranking products in order of contribution earned per kg of material B:

Particulars	J Tk./unit	L Tk./unit	M Tk./unit	P Tk./unit
Selling price/buying costs	56	78	96	35
Direct labor	20	24	20	8
Material A	6	0	9	0
Material B	10	15	20	10
Overhead:				
Labor	1.25	1.50	1.25	0.50
Machinery	1.25	0.75	1	0.125
Contribution	17.50	36.75	44.75	16.375
Contribution/kg of material B	8.75	12.25	11.19	8.19
Rank	3	1	2	4

Since component P has the lowest ranking, WZ should continue to purchase the component from the external supplier so that the available resources can be used to manufacture products L, M and J.

Workings:

1. **Variable overhead rates per hour**:

   Variable overhead rates per hour can be calculated by referring to any product. Using product J the rates are as follows:

   Labor related variable overhead per unit Tk. 1.25
   Direct Labor hours per unit = Tk. 20/8 = 2.5 hours
   Labor related variable overhead per hour = Tk. 1.25/2.5 hours = Tk. 0.50 per hour

   Machine related variable overhead per unit Tk. 1.25
   Labor related variable overhead per hour = Tk. 1.25/5 hours = Tk. 0.25 per hour

2. **Material requirements**:
   Product J:

   Weekly units = 1,000 +100 = 1,100

   Material A weekly usage = 2 litres X 1,100 = 2,200 litres

   Material B weekly usage = 2 kg X 1,100= 2,200 kg

   Product K:

   Weekly units = 3,500 +200 = 3,700

   Material A weekly usage = 1 litre X 3,700 = 3,700 litres

   Material B weekly usage = 0 kg X 3,700 = 0 kg

   Product L:

   Weekly units = 2,800 + 150 = 2,950

   Material A weekly usage = 0 litres X 2,950 = 0 litres

   Material B weekly usage = 3 kg X 2,950 = 8,850 kg

   Product M:

   Weekly units = 4,500+250 = 4,750

   Material A weekly usage = 3 litres X 4,750 = 14,250 litres

   Material B weekly usage = 4 kg X4,750 = 19,000 kg

Component P:

Weekly units = 500

Material A weekly usage = o litres X 500 = 0 litres

Material B weekly usage = 2 kg X 500 = 1,000 kg

Req. (b)

The optimum weekly usage of material B is based on the ranking calculated above:

Particulars	Kg of material B per unit	Kg used	Total Kg remaining
Contract units			24,000
Product L (150 units)	3	450	
Product M (250 units)	4	1000	
Product J (100 units)	2	200	
			1,650
			22,350
Normal weekly demand:			
Product L (2800 units)	3	8400	(8,400)
Balance to Product M			13,950
Product M (3,487.5 units *)	4	13,950	(13,950)
			0

*13950 kg remaining/ 4 kg per unit = 3,487.5 Units
Weekly production plan:
Product J = 100 units
Product L = 2,950 units [(2,800 +150)]
Product M =3,737.5 units [(3,487.5 +250)]

Req. (c)

The decision to purchase component P would change if the contribution from manufacturing the component is equal to the lowest contribution from the products produced that use material B. From the weekly production plan, product J is only manufactured to satisfy the contractual demand. The lowest contribution (per kg.) for products manufactured to cater for “normal” weekly demand is from product M.

Product M has a contribution per kg. of Tk. 11.19 which is Tk. 3 per kg higher than from component P.As each unit of P uses 2 kgs of material B then the buying price would have to be 2 X Tk. 3 = Tk. 6 per component higher to have the same rank as product M. Therefore the buying price at which the decision would change is Tk. 35 + Tk. 6 = Tk. 41

Req. (d)

There are a number of non-financial factors that should be considered include:

Employee skill level:

WZ should consider whether the employees have the necessary skill level to produce component P. If not, WZ should purchase from external suppliers to ensure the components are of appropriate quality.

Contro:

WZ may prefer to control /oversee the production P and may not wish to be dependent on a third party for delivering component P on time and with adequate quality. In this case WZ should take steps to enable component P to be manufactured internally.

Req.(e) Objective function:

$Maximize\ Contribution\ (C) = 17.5J + 18.0K + 36.75L + 44.75M$ Subject to the following constraints:

$2J + 1K + 0L + 3M \leq 21{,}000$ (Material A constraint)

$2J + 0K + 3L + 4M \leq 24{,}000$ (Material B constraint)

Solution to the question No. 4

(a) Demand from the receiving division (R) 20,000 components and capacity of the supplying division (S) is 35,000 components since internal and external demand will equal or exceed the available capacity. The question also states that R must buy from S and S must satisfy demand for R before making any external sales. Therefore, internal sales will be 20,000 components and external sales will be 15,000 components for S for all alternatives given in the question. However, since transfers are at opportunity cost the opportunity cost to S will depend on whether internal transfers result in lost external sales.

For an external demand of 15,000 components there will be no lost external sales so opportunity cost will be zero and 20,000 components will be transferred at the variable cost of Tk.105. When demand is 19,000 components meeting internal demand will result in lost external sales of 4,000 components giving a transfer price of Tk.200 (Tk.105 variable cost plus Tk.95 lost contribution) for 4,000 components and a variable cost of Tk.105 for the remaining transfers. When external demand is 35,000 components lost external sales will be 20,000 components and all transfers will be at Tk.200 (the transfer price). The profits for each division will be as follows:

Division S			
External Demand (components)	15,000	19,000	35,000
	Tk.'000	Tk.'000	Tk.'000
Internal Sales at variable cost of Tk.105	2,100	1,680	-
Internal Sales at market price (Tk.200)	-	800	4,000
External Sales (15,000 at Tk.200)	3,000	3,000	3,000
Total Sales	5,100	5,480	7,000
Less: Production costs [Variable (3,675) + Fixed (1,375)]	5,050	5,050	5,050
Profit	**50**	**430**	**1,950**
Division R			
Sales	8,000	8,000	8,000
Internal Purchases	(2,100)	(2,480)	(4,000)
Other variable costs	(2,500)	(2,500)	(2,500)
Fixed Costs	(900)	(900)	(900)
Profit	**2,500**	**2,120**	**600**

(b) In part (a) external sales were 15,000 units for all demand levels. If R purchases externally S will increase its capacity for external sales from 15,000 to 35,000 components. If demand is 15,000 components S will not be able to sell any additional output, for a demand of 19,000 components it will be able to sell an additional 4,000 components and if demand is 35,000 components it will be able to sell an additional 20,000 components. The total impact on the group will be as follows:

External Demand (components)	15,000	19,000	35,000
	Tk.'000	Tk.'000	Tk.'000
Extra cost of external purchases 20,000 × (170 – 105)	1,300	1,300	1,300
Extra contribution by S external at Tk.95 per component	-	380	1,900
Total Impact	(1,300)	(920)	600

(c) (i) The "arm's-length principle" of transfer pricing states that the amount charged by one related party to another for a given product must be the same as if the parties were not related. An arm's-length price for a transaction is therefore what the price of that transaction would be on the open market. For commodities, determining the arm's-length price can sometimes be as simple a matter as looking up comparable pricing from non-related party transactions, but when dealing with proprietary goods and services or intangibles, arriving at an arm's length price can be a much more complicated matter.

(ii) The OECD Transfer Pricing Guidelines (OECD Guidelines) provide 5 common transfer pricing methods that are accepted by nearly all tax authorities. The five transfer pricing methods are divided in "traditional transaction methods" and "transactional profit methods."

<u>Traditional transaction methods:</u>

CUP method
Resale price method
Cost plus method

<u>Transactional profit methods:</u>

Transactional net margin method (TNMM)
Transactional profit split method.

= THE END =