✶ CINEC
C A M P U S
Beyond A Graduate

Faculty of Management and Social Sciences
Department of Management and Business Studies
BSc (Hons) in Business and Industrial Mathematics
Course CODE: BSc 562

Year 2 Semester II
SEMESTER END EXAMINATION
E- Commerce - BBIM 2308

- This paper consists of EIGHT (08) questions on NINE (09) pages.
- Answer <u>FIVE (05)</u> questions including question 01.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly.

Date: 2023.03.27   Pass mark: 40%   Time: 03 Hours

Question 01 - Compulsory

Select the most suitable answer.

1. What is the primary benefit of an e-commerce platform?

a) Convenient shopping experience

b) Access to a wide range of products

c) Affordable pricing

d) Social media integration

2. What is the difference between B2B and B2C e-commerce?

a) B2B e-commerce involves selling to individual consumers, while B2C e-commerce involves selling to other businesses.

b) B2B e-commerce involves larger transactions, while B2C e-commerce involves smaller transactions.

c) B2B e-commerce involves a longer sales cycle, while B2C e-commerce involves a shorter sales cycle.

d) B2B e-commerce involves more customization, while B2C e-commerce involves less customization.

3. What is the role of customer reviews in e-commerce?

a) They have no impact on purchasing decisions.

b) They can help to build customer trust and loyalty.

c) They are only important for certain types of products.

d) They are only important for large e-commerce platforms.

4. What is a payment gateway in e-commerce?

a) A service that allows customers to pay with cash

b) A service that allows customers to pay with credit cards

c) A service that verifies the security of the payment transaction

d) A service that allows customers to track their orders

5. What is a digital wallet in e-commerce?

a) A physical wallet used to store cash

b) A service that allows customers to pay with cheques

c) A service that stores payment information for quick and easy checkout

d) A service that allows customers to pay with wire transfers

6. Which type deals with auctions?

a) B2B

b) B2C

c) C2B

d) C2C

7. The best products to sell in B2C e-commerce are:

a) Small products

b) Digital products

c) Specialty products

d) Fresh products

8. All of the following are technologies used to gather information about you online except _____

a) Spyware

b) Cookies

c) Gmail

d) Anonymizers

9. Which of the following is not a key element of a business model?

a) Value proposition

b) competitive advantage

c) market strategy

d) universal standards

10. The source of revenue in a subscription revenue model is _____

a) Fees from advertisers in exchange for advertisements

b) Fees for business referrals

c) Fees from subscribers in exchange for access to content or services

d) Fees for enabling or execution a transaction

11. The _____ business model involves an independently owned vertical digital marketplace for direct inputs.

a) e-distributor

b) Exchange

c) e-procurement

d) private industrial network

12. All of the following are techniques B2C e-commerce companies use to attract customers, except;

a) Registering with search engines

b) Viral marketing

c) Online ads

d) Virtual marketing

13. Which term represents a count of the number of people who visit one site, click on

a) Affiliate programs

b) Click-through

c) Spam

d) All of the above

14. A strategy designed to compete in all markets around the globe is called a _____strategy.

a) Scope

b) Differentiation

c) Cost

d) Focus

15. Which of the following are advantages normally associated with B2B e-commerce?

a) Shorter cycle times

b) Deduction in costs

c) Reaches wider audiences

d) All of the above

16. Which of the following statements accurately reflect the impact of technology?

a) Technology has caused buyer power to increase

b) Technology has lessened the entry barriers for many industries

c) Technology has increased the threat of substitute products and services

d) all of the above

17. Malicious hackers who act with the intention of causing harm are_____

a) White hats

b) Black hats

c) Grey hats

d) Brown hats

18. Which of the following is not a dimension of e-commerce security provided by encryption?

a) availability

b) integrity

c) nonrepudiation

d) confidentiality

19. Which of the following represents a limiting factor for the growth of e-commerce?

a) Persistent cultural attraction of physical markets and traditional shopping experiences

b) Inadequate selection of goods compared to physical marketplaces

c) E-commerce lacks the convenience of other methods of transacting business

d) The potential audience for e-commerce is too low to support it as a widespread method of commerce

20. A patent grants the owner an exclusive monopoly on the ideas behind the invention for _____years.

a) 10

b) 20

c) 30

d) 40

(20 Marks)

Question 02

a) List down six key dimensions of e-commerce security   (03 Marks)

b) Briefly explain the tension between security and other values by using 2 examples

(04 Marks)

c) Explain two types of key security threats in the e-commerce environment.

(06 Marks)

d) Describe how technology helps to secure Internet communications channels and protect networks, servers, and clients using three examples.   (07 Marks)

Question 03

a) Explain following two terms.   (04 Marks)

I. Value proposition

II. Competitive advantage

b) What types of services does Amazon provide for businesses? Which e-commerce business models do Amazon's services fall into?   (06 Marks)

c) Examine the experience of shopping online versus shopping in a traditional environment. Imagine that you have decided to purchase a digital camera (or any other item of your choosing). First, shop for the camera in a traditional manner. Describe how you would do so (for example, how you would gather the necessary information you would need to choose a particular item, what stores you would visit,

how long it would take, prices, etc.). Next, shop for the item on the Web or via a mobile app. Compare and contrast your experiences. What were the advantages and disadvantages of each? Which did you prefer and why?   (10 Marks)

Question 04

a) List down the five main steps in establishing a company's security plan.   (05 Marks)

b) "It is important to implement policies, procedures, and laws in creating security in ecommerce." Do you agree with this statement? Justify your answer.   (06 Marks)

c) Discuss on major e-commerce payment systems in use today while considering the following criteria.   (09 Marks)

- Process
- Advantages
- limitations

Question 05

a) List down five measurements/ tools that can be used to measure the online marketing communications' effectiveness.   (05 Marks)

b) If you were a business manager of a medium-sized firm, how would you decide where to purchase your indirect inputs, from an e-distributor or an e-procurement Net marketplace? Explain your answer.   (07 Marks)

c) Select a business firm and briefly discuss some strategies to improve it by using one of the following digital marketing tactics.   (08 Marks)

- One-to-one marketing
- Viral marketing
- Blog marketing
- Social network marketing
- Affiliate marketing

Question 06

a) Briefly discuss about two strategies to achieve consumer-centric retailing.   (05 Marks)

b) Briefly explain the following.   (08 Marks)

    i.   Service Shift

    ii.   Digital shift in retail industry

c) Critically analyze on the contribution of ICT to the future retail industry using three aspects. Provide examples for each.   (07 Marks)

Question 07

GLOMARK online shopping platform was launched in 2018 to provide customers with a convenient and secure online shopping experience for groceries and household essentials.

The success of GLOMARK can be attributed to several key factors. First, the platform was designed with the needs and preferences of Sri Lankan consumers in mind. This included the ability to search for products in the local language, which made it easier for customers to find the products they were looking for. The platform also offered a wide range of products, including fresh produce, which was not available on other e-commerce platforms in Sri Lanka.

Second, GLOMARK provided customers with a range of payment and delivery options, which made it more convenient for them to shop online. Customers could pay for their purchases using a variety of payment methods, including credit and debit cards, and could choose to have their orders delivered to their doorstep or to pick them up from a nearby store.

Third, GLOMARK invested heavily in logistics to ensure fast and efficient delivery of products. The company partnered with local logistics providers to ensure that products were delivered on time and in good condition. This was a critical factor in the success of the platform, as customers expect fast and reliable delivery when they shop online.

Finally, GLOMARK was marketed aggressively, using social media and other online channels to reach a wider audience. The company used targeted advertising to promote

the platform to specific customer segments, such as young professionals and busy families.

a) According to the case, list down three success factors of GLOMARK.   (03 Marks)
b) Briefly explain the following terms with regards to the case mentioned above.

(07 Marks)

   I.   Using omni-channel
   II.   Reduction of Information asymmetry

c) Discuss an ethical or security issue that can happen due to the implementation of GLOMARK online shopping platform. Then provide strategies/ recommendations to mitigate the issue that you have mentioned.   (10 Marks)

Question 08

Write short notes on following.   (4* 05 Marks = 20 Marks)

   I.   Information Collected at E-commerce Sites
   II.   Limitations of Online Credit Card Payment Systems
   III.   Differentiation business strategy
   IV.   Integrity vs Confidentiality in ecommerce security

--------------------END OF THE QUESTION PAPER-----------------

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Year 2 Semester II
FINAL EXAMINATION
Inventory and Warehouse Management – BBIM 2309

- This paper consists of EIGHT (08) questions on TEN (10) pages.
- Answer <u>FIVE (05)</u> questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Equation sheet, Normal distribution service levels and unit loss function table and Standard normal probability table have been attached with the paper.

Date: 2023.03.22   Pass mark: 40%   Time: 03 Hours

Question 01: (Compulsory)

SELECT MOST APPROPRIATE ANSWER OUT OF THE GIVEN CHOICES.

1. Independent demand is;

    (a) Highly uncertain

    (b) Uncertain

    (c) Certain

    (d) Highly certain

2. Inventory Control can be used;

    (a) To avoid only overstocking of items

    (b) To achieve satisfactory levels of customer service while keeping inventory costs within reasonable bounds

    (c) To achieve maximum levels of customer service while keeping inventory costs within reasonable bounds

    (d) To avoid only understocking of items

3. Inventory is;

    (e)   Moving goods and material held available by a business to meet future demand

    (f)   A collection or stock of goods and material held available by a business to meet future demand

    (g)   A collection or stock of goods and material held available by a business to meet its goals

    (h)   Moving goods and material held available by a business to meet its goals

4. Supplies in Inventory are;

    (a)   Work-In-Progress

    (b)   Maintenance/repair/overhaul

    (c)   Safety goods

    (d)   Ordering goods

5. Reorder point is

    (a)   the quantity on hand when items to be reordered

    (b)   the quantity on hand when items dropped

    (c)   the odder quantity when items to be reordered

    (d)   the order quantity when items dropped

6. Why the inventory should be hold?

    (a) To meet the variations in demand

    (b) Because low demand items need to be held in inventory

    (c) To meet the demand

    (d) Because low demand items need not to be held in inventory

7. FSN classification means;

    (a) Fast, Sleep, Non-moving

    (b) Fast, Sleep, Not using

(c) Free, Slow, Non using

(d) Fast, Slow, Non-moving

8. Minimum Total Cost is the point that

   (a) The total cost curve reaches its minimum where the total and ordering costs are equal.

   (b) The total cost curve reaches its minimum where the carrying and ordering costs are equal.

   (c) The total cost curve reaches its minimum where the carrying and total costs are equal.

   (d) The total cost curve reaches its minimum where the carrying and setup costs are equal.

9. Assumption of EOQ model

   (a) Only few products involved

   (b) Annual demand requirements unknown

   (c) Annual demand requirements known

   (d) Lead time is varied

10. Inventory costs are;

   (a) Holding, Ordering, Shortage

   (b) Holding, Providing, Shortage

   (c) Handling, Ordering, Shortage

   (d) Holding, Ordering, Searching

11. In what form does warehouses store products in the facilities?

   (a) Raw Material

   (b) Work in Progresses/ Semi finished products

   (c) Finished Products.

   (d) All of the above.

12. What's NOT an objective of a warehouse?

   (a) Providing a timely customer service.

   (b) Providing communication links.

   (c) To keep track of items.

   (d) To share the storage space.

13. What's NOT a warehouse operating principle?

   (a) Stock location

   (b) Physical control and security

   (c) Single story facility

   (d) Order picking and assembly.

14. What are the two major categories that warehouses can be classified into?

   (a)   Public and private.

   (b)   Contract and multi-client.

   (c)   Ownership and Operations

   (d)   Consolidation and break-bulk.

15. How does warehousing allows firms to use customer service as a value adding competitive tool?

   (a)   Through storing.

   (b)   Through short haul transportation.

   (c)   Through time and place utility.

   (d)   Through providing communicational links.

16. What's a cost-based benefit of warehousing.

   (a)   Postponement.

   (b)   Spot stocking.

   (c)   Full line stocking.

   (d)   Production support.

17. What's the material handling equipment which is utilized for both horizontal and vertical movements?

    (a)   Tow tractor.

    (b)   Power Pallet truck.

    (c)   Pallet stacker.

    (d)   Hand pallet truck

18. Not a difference between contract and Public warehouses.

    (a) Difference in contract.

    (b) Difference in space availability.

    (c) Difference in ownership.

    (d) None of the above.

19. What's the type of warehouse which comes under operations?

    (a) Fulfillment centers.

    (b) Public warehouses.

    (c) Private warehouses.

    (d) Multi client warehouses.

20. What's not a basic function of a warehouse?

    (a) Transport Consolidation.

    (b) Product mixing.

    (c) Docking.

    (d) Break bulk

(01 Marks*20 = 20 Marks)

Question 02

(a) Garden Variety Flower shop uses 750 clay pots a month. The pots are purchase at $2 each. Annual carrying cost per pot is estimated to be 30 percent of cost, and ordering cost is $20 per order. The manager has been using an order size of 1,500 flowerpots. What additional annual cost is the shop incurring by staying with this order size? (05 Marks)

(b) A jewelry firm buys semiprecious stones to make bracelets and rings. The supplier quotes a price of $8 per stone for quantities of 600 stones or more, $9 per stone for orders of 400 to 599 stones, and $10 per stone for lesser quantities. The jewelry firm operates 200 days per year. Usage rate is 25 stones per day and ordering costs are $48.

    i. If carrying costs are $2 per year for each stone, find the order quantity that will minimize total annual cost. (07 Marks)

    ii. If annual carrying costs are 30% of unit cost, what is the optimal order size? (08 Marks)

Question 03

(a) A restaurant uses an average of 50 jars of a special source each week. Weekly usage of sauce has a standard deviation of 3 jars. The manager is willing to accept no more than a 10% risk of stockout during lead time, which is two weeks. Assume the distribution of usage is normal.

(i) Which of the ROP formula is appropriate for this situation? Why? (03 Marks)

(ii) Determine the value of z. (03 Marks)

(iii) Determine the ROP. (04 Marks)

(b) Suppose that the manager of a construction supply house determined from historical records that demand for sand during lead time averages 50 tons. In addition, suppose the manager determined that demand during lead time could be described by a normal distribution that has a mean of 50 tons and a standard deviation of 5 tons. Answer these questions, assuming that the manager is willing to accept a stockout risk of no more than 3 percent:

      (i)   What value of z is appropriate?   (02 Marks)

      (ii)   How much safety stock should be held?   (03 Marks)

      (iii)   What recorder point should be used?   (05 Marks)

Question 04

(a) A drugstore uses fixed-order cycles for many of the items it stocks. The manager wants a service level of .98. The order interval is 14 days, and lead time is 2 days. Average demand for one item is 40 units per day, and the standard deviation of demand is 3 units per day. Given the on-hand inventory at the reorder time for each order cycle shown in the following table, determine the order quantities for cycles 2, 3, and 4:   (10 Marks)

Table 4.1 – On hand Quantities

Cycle	On Hand
1	42
2	8
3	103

(b) Given the following information:

Lead Time = 4 days

Order interval = 12 days

Average demand = 10 units/day

Standard deviation of demand = 2 units/day

Quantity on Hand = 43 units

Order Quantity = 171 units

Determine the risk a stockout at

      (i).   The end of the initial lead time   (05 Marks)

      (ii).   The end of the second lead time   (05 Marks)

Question 05

(a) The manager of a store that sells office supplies has decided to set an annual service level of 96 percent for a certain model of telephone answering equipment. The store sells approximately 300 of this model a year. Holding cost is $5 per unit annually, ordering cost is $25, and $\sigma_{dLT} = 7$.

      (i).   What average number of units per year will be consistent with the specified annual service level?   (02 Marks)

      (ii).   What average number of units short per cycle will provide the desired annual service level?   (04 Marks)

      (iii). What lead time service level is necessary for the 96 percent annual service level?   (04 Marks)

(c) Demand for jelly doughnuts on Saturdays at Don's Doughnut Shoppe is shown in the following table. Determine the optimal number of doughnuts, in dozens, to stock if labor, materials, and overhead are estimated to be $3.20 per dozen, doughnuts are sold for $4.80 per dozen, and leftover doughnuts at the end of each day ae sold the next day at half price. What is the optimal stocking level.

Table 5.1: Probability of Demand

Demand (dozen)	Relative Frequency
19	0.01
20	0.05
21	0.12
22	0.18
23	0.13
24	0.14
25	0.10
26	0.11
27	0.10
28	0.04
29	0.02

(10 Marks)

Question 06

(a) Even though, warehouse layout design principles suggest that warehouses should possess single story facility, now the trend in most of the Asian countries are to move towards, multi storied warehousing facilities. Discuss in detail, as to why do the Asian countries move towards multi storied warehousing facilities and discuss about its applicability to Sri Lankan context. (08 Marks)

(b) Explain the concept "Short haul transportation in warehousing" (06 Marks)

(c) "One of the major objectives of warehousing is providing communication links with the customers". Explain. (06 Marks)

Question 07

Question 07

(a) Explain how modern-day warehouses utilize modern technologies to improve the cube utilization and accessibility. (06 Marks)

(b) Explain in detail, why a straight product flow should be facilitated in a warehouse. (04 Marks)

(c) Benefits of strategic warehousing can be categorized into two major groups as cost based and service based. Explain in detail, the cost-based benefits of warehousing. (10 Marks)

Question 08

(a) "Husky Coco" is a newly formulated business targeting on exporting coconut related products to many countries. However, they plan to increase the production of their products in the near future. Since the business is still new to the market, their investment capability at the moment is not very high. The company doesn't have a clear idea as in which warehousing facility is suitable for them to store their excess products at the moment. As a student learning Warehouse Management module, advice "Husky Coco" company as in, to which warehousing facility is more suitable for them. (08 Marks)

(b) Classify and explain the major three types of packaging. (06 Marks)

(c) Differentiate between distribution centers and warehousing. (06 Marks)

------------END OF THE PAPER-------------

Appendix B Tables

Table B
1. Areas under the standardized normal curve, from $-\infty$ to $-z$
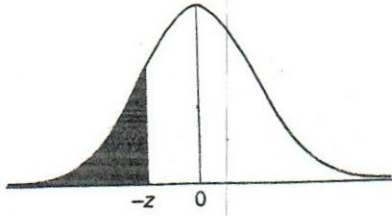
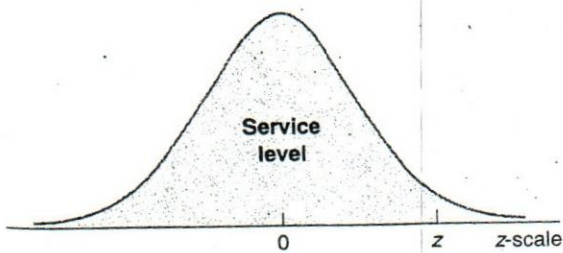| .09	.08	.07	.06	.05	.04	.03	.02	.01	.00	z
.0002	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	−3.4
.0003	.0004	.0004	.0004	.0004	.0004	.0004	.0005	.0005	.0005	−3.3
.0005	.0005	.0005	.0006	.0006	.0006	.0006	.0006	.0007	.0007	−3.2
.0007	.0007	.0008	.0008	.0008	.0008	.0009	.0009	.0009	.0010	−3.1
.0010	.0010	.0011	.0011	.0011	.0012	.0012	.0013	.0013	.0013	−3.0
.0014	.0014	.0015	.0015	.0016	.0016	.0017	.0018	.0018	.0019	−2.9
.0019	.0020	.0021	.0021	.0022	.0023	.0023	.0024	.0025	.0026	−2.8
.0026	.0027	.0028	.0029	.0030	.0031	.0032	.0033	.0034	.0035	−2.7
.0036	.0037	.0038	.0039	.0040	.0041	.0043	.0044	.0045	.0047	−2.6
.0048	.0049	.0051	.0052	.0054	.0055	.0057	.0059	.0060	.0062	−2.5
.0064	.0066	.0068	.0069	.0071	.0073	.0075	.0078	.0080	.0082	−2.4
.0084	.0087	.0089	.0091	.0094	.0096	.0099	.0102	.0104	.0107	−2.3
.0110	.0113	.0116	.0119	.0122	.0125	.0129	.0132	.0136	.0139	−2.2
.0143	.0146	.0150	.0154	.0158	.0162	.0166	.0170	.0174	.0179	−2.1
.0183	.0188	.0192	.0197	.0202	.0207	.0212	.0217	.0222	.0228	−2.0
.0233	.0239	.0244	.0250	.0256	.0262	.0268	.0274	.0281	.0287	−1.9
.0294	.0301	.0307	.0314	.0322	.0329	.0336	.0344	.0351	.0359	−1.8
.0367	.0375	.0384	.0392	.0401	.0409	.0418	.0427	.0436	.0446	−1.7
.0455	.0465	.0475	.0485	.0495	.0505	.0516	.0526	.0537	.0548	−1.6
.0559	.0571	.0582	.0594	.0606	.0618	.0630	.0643	.0655	.0668	−1.5
.0681	.0694	.0708	.0721	.0735	.0749	.0764	.0778	.0793	.0808	−1.4
.0823	.0838	.0853	.0869	.0885	.0901	.0918	.0934	.0951	.0968	−1.3
.0985	.1003	.1020	.1038	.1056	.1075	.1093	.1112	.1131	.1151	−1.2
.1170	.1190	.1210	.1230	.1251	.1271	.1292	.1314	.1335	.1357	−1.1
.1379	.1401	.1423	.1446	.1469	.1492	.1515	.1539	.1562	.1587	−1.0
.1611	.1635	.1660	.1685	.1711	.1736	.1762	.1788	.1814	.1841	−0.9
.1867	.1894	.1922	.1949	.1977	.2005	.2033	.2061	.2090	.2119	−0.8
.2148	.2177	.2206	.2236	.2266	.2296	.2327	.2358	.2389	.2420	−0.7
.2451	.2483	.2514	.2546	.2578	.2611	.2643	.2676	.2709	.2743	−0.6
.2776	.2810	.2843	.2877	.2912	.2946	.2981	.3015	.3050	.3085	−0.5
.3121	.3156	.3192	.3228	.3264	.3300	.3336	.3372	.3409	.3446	−0.4
.3483	.3520	.3557	.3594	.3632	.3669	.3707	.3745	.3783	.3821	−0.3
.3859	.3897	.3936	.3974	.4013	.4052	.4090	.4129	.4168	.4207	−0.2
.4247	.4286	.4325	.4364	.4404	.4443	.4483	.4522	.4562	.4602	−0.1
.4641	.4681	.4721	.4761	.4801	.4840	.4880	.4920	.4960	.5000	−0.0

Table B
(concluded)
2. Areas under the standardized normal curve, from $-\infty$ to $+z$

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7703	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

TABLE 12.3 Normal distribution service levels and unit normal loss function

z	Lead Time Service Level	E(z)	z	Lead Time Service Level	E(z)	z	Lead Time Service Level	E(z)	z	Lead Time Service Level	E(z)
-2.40	.0082	2.403	-.80	.2119	.920	0.80	.7881	.120	2.40	.9918	.0030
-2.36	.0091	2.363	-.76	.2236	.889	0.84	.7995	.112	2.44	.9927	.0020
-2.32	.0102	2.323	-.72	.2358	.858	0.88	.8106	.104	2.48	.9934	.0020
-2.28	.0113	2.284	-.68	.2483	.828	0.92	.8212	.097	2.52	.9941	.0020
-2.24	.0125	2.244	-.64	.2611	.798	0.96	.8315	.089	2.56	.9948	.0020
-2.20	.0139	2.205	-.60	.2743	.769	1.00	.8413	.083	2.60	.9953	.0010
-2.16	.0154	2.165	-.56	.2877	.740	1.04	.8508	.077	2.64	.9959	.0010
-2.12	.0170	2.126	-.52	.3015	.712	1.08	.8599	.071	2.68	.9963	.0010
-2.08	.0188	2.087	-.48	.3156	.684	1.12	.8686	.066	2.72	.9967	.0010
-2.04	.0207	2.048	-.44	.3300	.657	1.16	.8770	.061	2.76	.9971	.0010
-2.00	.0228	2.008	-.40	.3446	.630	1.20	.8849	.056	2.80	.9974	.0008
-1.96	.0250	1.969	-.36	.3594	.597	1.24	.8925	.052	2.84	.9977	.0007
-1.92	.0274	1.930	-.32	.3745	.576	1.28	.8997	.048	2.88	.9980	.0006
-1.88	.0301	1.892	-.28	.3897	.555	1.32	.9066	.044	2.92	.9982	.0005
-1.84	.0329	1.853	-.24	.4052	.530	1.36	.9131	.040	2.96	.9985	.0004
-1.80	.0359	1.814	-.20	.4207	.507	1.40	.9192	.037	3.00	.9987	.0004
-1.76	.0392	1.776	-.16	.4364	.484	1.44	.9251	.034	3.04	.9988	.0003
-1.72	.0427	1.737	-.12	.4522	.462	1.48	.9306	.031	3.08	.9990	.0003
-1.68	.0465	1.699	-.08	.4681	.440	1.52	.9357	.028	3.12	.9991	.0002
-1.64	.0505	1.661	-.04	.4840	.419	1.56	.9406	.026	3.16	.9992	.0002
-1.60	.0548	1.623	.00	.5000	.399	1.60	.9452	.023	3.20	.9993	.0002
-1.56	.0594	1.586	.04	.5160	.379	1.64	.9495	.021	3.24	.9994	.0001
-1.52	.0643	1.548	.08	.5319	.360	1.68	.3535	.019	3.28	.9995	.0001
-1.48	.0694	1.511	.12	.5478	.342	1.72	.9573	.017	3.32	.9995	.0001
-1.44	.0749	1.474	.16	.5636	.324	1.76	.9608	.016	3.36	.9996	.0001
-1.40	.0808	1.437	.20	.5793	.307	1.80	.9641	.014	3.40	.9997	.0001
-1.36	.0869	1.400	.24	.5948	.290	1.84	.9671	.013			
-1.32	.0934	1.364	.28	.6103	.275	1.88	.9699	.012			
-1.28	.1003	1.328	.32	.6255	.256	1.92	.9726	.010			
-1.24	.1075	1.292	.36	.6406	.237	1.96	.9750	.009			
-1.20	.1151	1.256	.40	.6554	.230	2.00	.9772	.008			
-1.16	.1230	1.221	.44	.6700	.217	2.04	.9793	.008			
-1.12	.1314	1.186	.48	.6844	.204	2.08	.9812	.007			
-1.08	.1401	1.151	.52	.6985	.192	2.12	.9830	.006			
-1.04	.1492	1.117	.56	.7123	.180	2.16	.9846	.005			
-1.00	.1587	1.083	.60	.7257	.169	2.20	.9861	.005			
-.96	.1685	1.049	.64	.7389	.158	2.24	.9875	.004			
-.92	.1788	1.017	.68	.7517	.148	2.28	.9887	.004			
-.88	.1894	0.984	.72	.7642	.138	2.32	.9898	.003			
-.84	.2005	0.952	.76	.7764	.129	2.36	.9909	.003			

Service level

0   z   z-scale

Model	Formula		Symbols
1. Basic EOQ	$Q_0 = \sqrt{\dfrac{2DS}{H}}$	(12–2)	Q_o = Economic order quantity D = Annual demand S = Order cost H = Annual carrying cost per unit Q = Order quantity
	$TC = \dfrac{Q}{2}H + \dfrac{D}{Q}S$	(12–1)	
	Length of order cycle $= \dfrac{Q}{D}$	(12–3)	
2. Economic production quantity	$Q_0 = \sqrt{\dfrac{2DS}{H}}\sqrt{\dfrac{p}{p - u}}$	(12–5)	Q_o = Optimal run or order size p = Production or delivery rate u = Usage rate I_{MAX} = Maximum inventory level
	$TC = \dfrac{I_{max}}{2}H + \dfrac{D}{Q}S$	(12–4)	
	Cycle time $= \dfrac{Q}{u}$	(12–6)	
	Run time $= \dfrac{Q}{p}$	(12–7)	
	$I_{max} = \dfrac{Q_0}{p}(p - u)$.	(12–8)	
3. Quantity discounts	$TC = \dfrac{Q}{2}H + \dfrac{D}{Q}S + PD$	(12–9)	P = Unit price
4. Reorder point under: a. Constant demand and lead time b. Variable demand rate c. Variable lead time d. Variable lead time and demand	$ROP = d(LT)$ $ROP = \bar{d}LT + z(\sigma_d)\sqrt{LT}$ $ROP = d\overline{LT} + z(\sigma_{LT})d$ $ROP = \bar{d}\,\overline{LT} + z\sqrt{LT\sigma_d^2 + \bar{d}^2\sigma_{LT}^2}$	(12–10) (12–13) (12–14) (12–15)	ROP = Quantity on hand at reorder point d = Demand rate LT = Lead time $\bar{d}$ = Average demand rate σ_d = Standard deviation of demand rate z = Standard normal deviation $\overline{LT}$ = Average lead time σ_{LT} = Standard deviation of lead time
5. ROP shortages a. Units short per cycle b. Units short per year c. Annual service level	$E(n) = E(z)\sigma_{dLT}$ $E(N) = E(n)\dfrac{D}{Q}$ $SL_{annual} = 1 - \dfrac{E(z)\sigma_{dLT}}{Q}$	(12–16) (12–17) (12–19)	$E(n)$ = Expected number short per cycle $E(z)$ = Standardized number short σ_{dLT} = Standard deviation of lead time demand $E(N)$ = Expected number short per year SL_{annual} = Annual service level
6. Fixed interval	$Q = \bar{d}(OI + LT)$ $\quad + z\sigma_d\sqrt{OI + LT} - A$	(12–20)	OI = Time between orders A = Amount on hand at order time
7. Single period	$SL = \dfrac{C_s}{C_s + C_e}$	(12–21)	SL = Service level C_s = Shortage cost per unit C_e = Excess cost per unit

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Course CODE: BSc 562

Year 2 Semester II
SEMESTER END EXAMINATION
Optimization - BBIM 2307

- This paper consists of EIGHT (08) questions on EIGHT (08) pages.
- Answer <u>FIVE (05)</u> questions including question 01.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Non-programmable calculators are allowed.
- Write legibly.

Date: 2023.03.14   Pass mark: 40%   Time: 03 Hours

Question 01: (Compulsory)

(a) A store has requested a manufacturer to produce pants and sports jackets. For materials, the manufacturer has $750m^2$ of cotton textile and $1000m^2$ of polyester. Every pair of pants (1 unit) needs $1m^2$ of cotton and $2m^2$ of polyester. Every jacket needs $1.5m^2$ of cotton and $1m^2$ of polyester. The price of the pants is fixed at \$50 and the jacket \$40. Develop the LPP to determine the number of pants and jackets that the manufacturer must give to the stores so that these items obtain a maximum sale. (Do not solve). (05 Marks)

(b) Construct the dual problem for the following LP Problem. (Do not solve).

$$Maximize\ Z = 5x_1 + 12x_2 + 4x_3$$

Subject to

$$x_1 + 2x_2 + x_3 \leq 10$$
$$2x_1 - x_2 + 3x_3 = 8$$
$$x_1, x_2, x_3 \geq 0$$

(05 Marks)

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Department of Management and Business Studies
BSc Hons in Business and Industrial Mathematics
Course CODE: BSc 561

(c) Find the optimal assignment for the below problem in table 1.   (05 Marks)

Table 1

		Operator			
		I	II	III	IV
Machine	A	10	5	13	15
	B	3	9	18	3
	C	10	7	3	2
	D	5	11	9	7

(d) Mention two examples (one each) and briefly clarify the difference between discrete systems and continuous systems.   (05 Marks)

Question 02

(a) Nishan holds two part-time jobs, Job A and Job B. He never wants to work more than a total of 12 hours a week. He has determined that for every hour he works at Job A, he needs 2 hours of preparation time, and for every hour he works at Job B, he needs one hour of preparation time, and he cannot spend more than 16 hours on preparation. He earns $40 an hour at Job A and $30 an hour at Job B. Use the simplex method to find how many hours should he work per week at each job to maximize his income?   (12 Marks)

(b) Write the standard form and the Initial Table to use the Big-M Method for the given LPP. (Do not solve.)   (08 Marks)

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Department of Management and Business Studies
BSc Hons in Business and Industrial Mathematics
Course CODE: BSc 561

$$Max\ Z = x_1 + 2x_2 + 3x_3$$

subject to $\quad x_1 + 2x_2 + 3x_3 = 15$

$$2x_1 + x_2 + 5x_3 = 20$$

$$x_1 + 2x_2 + x_3 \leq 10$$

$$x_1, x_2, x_3 \geq 0$$

Question 03

(a) Solve the given LP problem using Two-Phase Method.   (15 Marks)

$$\text{Maximize } Z = 4x + 5y$$

Subject to $2x + 3y \leq 6$

$$3x + y \geq 3$$

$$x \geq 0 \quad y \geq 0$$

(b) Obtain the basic feasible solution for the following cost matrix using the Least Cost Method **and** mention whether the solution is degenerate or not.   (05 Marks)

10	4	2	8
2	3	4	5
1	2	0	6
7	6	6	

Question 04

(a) A company produces two models of electronic gadgets: resistors, capacitors, and chips. Table 2 summarizes the data of the situation:

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BSc Hons in Business and Industrial Mathematics
Course CODE: BSc 561

Table 2

Unit resource requirements in units			
Resource	Model 1 (units)	Model 2 (units)	Maximum availability (units)
Resistor	2	3	1200
Capacitor	2	1	1000
Chips	0	4	800
Unit profit ($)	3	4	

Let x_1 and x_2 be the amounts produced of Model 1 and Model 2, respectively.

(i) Develop the LP model to maximize the profit. (05 Marks)

(ii) Use the answer in 4(a)(i) and construct the Dual problem. (05 Marks)

(iii) Optimal Solution for the Primal problem is given below in Table 3. Determine the solutions of dual variables using <u>two different methods</u>. (06 Marks)

Table 3

Basic	X_1	X_2	S_1	S_2	S_3	Solution
Z	0	0	5/4	1/4	0	1750
X_1	1	0	−1/4	3/4	0	450
S_3	0	0	−2	2	1	400
X_2	0	1	1/2	−1/2	0	100

(b) Briefly explain the reasons to introduce artificial variables to a Linear Programming Problem. Use examples as suitable. (04 Marks)

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Department of Management and Business Studies
BSc Hons in Business and Industrial Mathematics
Course CODE: BSc 561

Question 05

(a) Consider the given LP problem.

$$\text{Minimize } Z = 2x + 3y$$
$$\text{Subject to } \frac{1}{2}x + \frac{1}{4}y \leq 4$$
$$x + 3y \geq 36$$
$$x + y = 10$$
$$x, y \geq 0$$

(i)   Develop the Phase I Simplex tableau.   (04 Marks)

(ii) Obtain the solution for Phase 1.   (08 Marks)

(iii) Explain whether you can obtain an optimal solution using Phase II. Comment based on the solution you obtained in part (ii).   (03 Marks)

(b) Mention 3 elements of a queuing model with a brief explanation.   (05 Marks)

Question 06

(a) Four building companies have presented their projects to a competition called to build four buildings A, B, C, and D. Each builder must be assigned the construction of a building. The following tableau shows the time each building company needs to build each of the buildings.

	1	2	3	4
A	58	58	60	54
B	66	70	70	78
C	106	104	100	95
D	52	54	64	54

(i)   Assign the construction of a building to each building company so that the total building time is minimized.   (08 Marks)

(ii) Calculate the minimum cost for the assignment.   (02 Marks)

(b)   Find the optimal transportation plan for the given transportation problem in Table 4 using the North West Corner Rule and the MODI Method.   (10 Marks)

Table 4

		Destination			Supply
	10	2	20	11	15
Source	12	7	9	20	25
	4	14	16	18	10
Demand	5	15	15	15	

Question 07

(a) A company has 4 machines on which to do 3 jobs. Each job can be assigned to one and only one machine. The cost of each job on each machine is given below.

		Machines			
		W	X	Y	Z
	A	18	24	28	32
Jobs	B	8	13	17	19
	C	10	15	19	22

(i)   Find two optimal assignments for this assignment problem.   (08 Marks)

(ii)   Calculate the minimum cost for above two solutions in part (i). (04 Marks)

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Department of Management and Business Studies
BSc Hons in Business and Industrial Mathematics
Course CODE: BSc 561

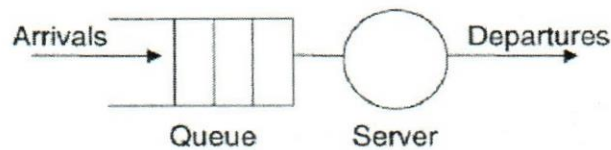(b) Observe figure 1 given below and write answers to the following questions.

Figure 1

(i) What kind of a discrete event simulation system is shown in figure 1?   (02 Marks)

(ii) Give an example for a system similar to above figure.   (02 Marks)

(iii) Mention three state variables in the system you have mentioned in the example in

   (ii).   (04 Marks)

Question 08

(a)   Consider the following standard LP:

$$\text{Maximize } z = 2x_1 + 4x_2 + 4x_3 - 3x_4$$
$$\text{Subject to } x_1 + x_2 + x_3 = 4$$
$$x_1 + 4x_2 + x_4 = 8$$
$$x_1, x_2, x_3, x_4 \geq 0$$

Using x_3 and x_4 as starting variables, the optimal tableau is given in Table 5.

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Department of Management and Business Studies
BSc Hons in Business and Industrial Mathematics
Course CODE: BSc 561

Table 5

Basic	x_1	x_2	x_3	x_4	Solution
Z	2	0	0	3	16
x_3	0.75	0	1	−0.25	2
x_2	0.25	1	0	−0.25	2

(i)   Write the associated dual problem and determine its optimal solution in two
       ways.   (10 Marks)

(ii)   Determine the dual prices based on the optimal table.   (02 Marks)

(b) A company has 5 jobs to be done. The following matrix shows the return in terms of
rupees on assigning i^{th} ($i = 1, 2, 3, 4, 5$) machine to the jth job ($j = A, B, C, D, E$). Assign
the five jobs to the five machines so as to <u>maximize</u> the total expected profit.   (08 Marks)

		Jobs				
		A	B	C	D	E
	1	5	11	10	12	4
	2	2	4	6	3	5
Machines	3	3	12	5	14	6
	4	6	14	4	11	7
	5	7	9	8	12	5

--------------------END OF THE QUESTION PAPER------------------

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Course CODE: BSc 562

Year 2 Semester II
SEMESTER END EXAMINATION
Procurement Management - BBIM 2310

- This paper consists of EIGHT (08) questions on SEVEN (07) pages.
- Answer <u>FIVE (05)</u> questions including question 01.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly.

Date: 2023.03.13   Pass mark: 40%   Time: 03 Hours

Question 01 (Compulsory)

Procurement is the strategic management of the supply chain for organizations. It is crucial to the overall success of any organization. Purchasing costs can represent over 50% of an organization's revenue. A lack of strategic decisions regarding supply can sink an otherwise profitable company. In addition, excessive wastage in the supply chain can hurt a company's reputation and bottom line.

(a) Define "Purchasing".   (10 Marks)

(b) Use below characteristics and fill the differentiation table given below.

The straightforward method of purchasing commodities, Follows a proactive approach to spot and fulfil needs, Consideration of steps happen after, during, and before purchase, Follows a reactive approach to satisfy internal needs, Activities related to acquiring goods and services, Used in a wholesale environment (external process), Functions associated with buying goods and

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Department of Management and Business Studies
BSc (Hons) in Business and Industrial Mathematics
Course CODE: BSc 562

services, Used in a production environment (internal process), Puts more importance on an item's value than its cost, Transactional–focuses on transactions than vendor relationships, Tends to focus more on the item's price than its value, Relational–focuses on creating long-term vendor relationships, Includes multiple stages and has numerous people involved, Has long-term goals like gaining competitive advantage for the business, Aimed at ordering and paying for goods, Has short-term goals like obtaining the necessary goods at the right time, Focused on creating and maintaining strong supplier relationships, Focused on making transactions, Aimed at recognizing and satisfying the company's internal needs, Fewer steps and fewer employees involved

Procurement	Purchasing

(10 Marks)

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Faculty of Management and Social Sciences
Department of Management and Business Studies
BSc (Hons) in Business and Industrial Mathematics
Course CODE: BSc 562

Question 02

Strategic sourcing is used in the procurement process to achieve the best pricing for a product or service. The key objectives are to minimize costs, improve supplier performance, and reduce the risk of failure.

(a) What are the three main steps of strategic analysis? (03 Marks)

(b) Write down two out of three types of purchasing systems? (02 Marks)

(c) Explain how to develop a procurement strategy. (15 Marks)

Question 03

If an organization decides to "buy" from one or more outside sources, it must select the type of contract it needs. In selecting what type of contract to use, the primary objective is to have risk distributed between the buyer and seller so that both parties have motivation and incentives for meeting the contract goal.

(a) What is referred as a "Contract"? (05 Marks)

(b) Describe the types of fixed price contracts. (15 Marks)

Question 04

Good companies practicing CSR practices in every aspect including procurement are able to receive higher rewards, reduce employee turnover, have Transparent & famous supply chains & build up deeper brand connections.

(a) Give another name for CSR. (05 Marks)

(b) Name two types of business drivers for CSR procurement with two examples per each type. (05 Marks)

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Faculty of Management and Social Sciences
Department of Management and Business Studies
BSc (Hons) in Business and Industrial Mathematics
Course CODE: BSc 562

(c) Having a sustainable specification is an important part of the sustainable procurement process. Propose and justify key sustainability criteria for inclusion in purchase specifications for products and services. **(10 Marks)**

Question 05

It is the process of sourcing goods and services from the international market across geopolitical boundaries. It aims to exploit global efficiencies such as lower cost skilled labor, cheaper raw materials and other economic factors like tax breaks and low trade tariffs. Examples are call centers in the Philippines, clothing and shoes manufactured in China and Thailand.

(a) Name five problems when practicing international sourcing? **(05 Marks)**

(b) Narrate the benefit of global sourcing. **(15 Marks)**

Question 06

It is important to know which Incoterms® are applicable in 2023 as they determine the responsibilities of buyers and sellers. Additionally, incorrect Incoterms® can result in costly errors or delays in international trade.

(a) Which organization published Incoterms? **(01 Marks)**

(b) Fill the second column of below tables. **(11 Marks)**

Incoterm Code	Name in English
EXW	
FCA	
CPT	
CIP	
DAP	
DPU	
DDP	

Code	Name in English
FAS	
FOB	
CFR	
CIF	

(c) Which incoterm indicates the highest responsibility on seller? (01 Marks)

(d) Which incoterm indicates the highest responsibility on buyer? (01 Marks)

(e) What is the difference between CFR & CIF? (04 Marks)

(f) There was an incoterm called DAT in the past version - Incoterm® 2010. Which incoterm replaced it in the newest version Incoterm® 2020? (01 Marks)

(g) Seller is only responsible for delivery to the named place. The seller is responsible for the loading. Risk and cost are transferred to the buyer as soon as delivered at the named place. Unloading is the buyer's responsibility. Which incoterm has these characteristics? (01 Marks)

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Faculty of Management and Social Sciences
Department of Management and Business Studies
BSc (Hons) in Business and Industrial Mathematics
Course CODE: BSc 562

Question 07

It is evident that the learning curve is a helpful tool for part purchasing negotiations. In most cases, the curve fits well with the supplier pricing quotations, assuming the fixed and variable costs dominated. In the case where the fit is not as smooth, it could be caused by the quasifixed cost or step variable cost in the supplier pricing analysis.

(a) Mark True/False for below statements about learning curve.

   (i) Learning curve does not describe a practical reality.   (-----------)

   (ii) When labor intensive tasks are repeated, the initial difficulties encountered for the first time are progressively solved and subsequent iterations take less labour and hence cost is less.   (-----------)

(05 Marks)

(b) Draw and explain learning curve highlighting why should purchasers be concerned with learning curves?   (15 Marks)

Question 08

(a) Mark True/False for below statements.

   (i) Value is a part of quality management. (......)

   (ii) When practicing just in time management in procurement, a company should focus on warehousing capacity a lot. (......)

(02 Marks)

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Faculty of Management and Social Sciences
Department of Management and Business Studies
BSc (Hons) in Business and Industrial Mathematics
Course CODE: BSc 562

(b) Contracts should be .... and .... binding. It is best to get the contract in writing.

(02 Marks)

(c) Siri is procurement manager for a software company. He is contracting a long-term software project with a third-party company. That company charges him $200/hour per employee and $1000 overhead per month. What is this contract type?

(02 Marks)

(d) What is the primary objective of negotiation from below?
(Identifying scope of contract, Find a win-win proposition for both parties, Segregate the exact responsibilities of each party, Confirm the best deal possible)

(02 Marks)

(e) A cost-plus incentive fee (CPIF) contract has an estimated cost of $150,000 with a predetermined fee of $15,000 and a share ratio of 80/20. The actual cost of the project is $130,000. How much profit does the seller make?

(10 Marks)

(f) Imagine that your organization is the seller that is bidding on a contract. Which type of contract has the most risk for your organization?

(02 Marks)

------------------END OF THE QUESTION PAPER----------------