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PAST PAPERS

Faculty	Department / Section/Division
Not Applicable	Learning Resource Centre

Past Papers

Faculty of Management, Humanities & social Sciences
Department of Logistics & Transport

BMgt. (Hons) in Supply Chain Management
(Year 3 – Semester I)

2022

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Faculty of Management and Social Sciences
Department of Logistics & Transport
BMgt Hons in Supply Chain Management
Course CODE: COM552

Year 3 Semester I

SEMESTER END EXAMINATION

Customs and Commodity Inspections Operations – BSCM3207

- This paper consists of SEVEN questions on FIVE (05) pages.
- Answer FOUR 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.
- Write Legibly.
- Required documents are attached.

Date: 2022.10.01 Pass mark: 40% Time: 02 Hours

Question 01 (Compulsory)

Power Drink Lanka (Pvt) Ltd is a limited liability company registered under the Companies Act of Sri Lanka. "Pump-up" is a popular energy drink manufactured by Power Drink Lanka (Pvt) Ltd according to a secret recipe comprising several herbs and 1.5% of alcohol in the volume. This popular energy drink was sold in 300ml glass bottles until the company's Marketing Director proposed to market the same in 200ml cans. Since there was no facility for canning the energy drink in Sri Lanka Power Drink Lanka (Pvt) Ltd contracted a company namely Can Can (Bhd) Ltd in Malaysia for this purpose. According to the contract signed between the two companies Power Drink Lanka (Pvt) Ltd must supply Pump-up concentrate, alcohol, and empty cans to Can Can (Bhd) Ltd free of charge. The canning process included;

1. Preparation of beverage by mixing the Pump-up concentrate, alcohol, and water in the following proportion and can the same into the empty cans.
   (a) Pump-up concentrate – 10 units
   (b) Alcohol – 03 units
   (c) Water – 187 units

2. Packing the cans in the following manner for shipping and marketing purposes.
   (a) 6 cans in a pack
   (b) 10 packs in a carton
   (c) 20 cartons in a pallet

The price agreed by the two parties for the above process is USD 0.75 ExWorks (EXW) per can.

To manufacture empty cans Power Drink Lanka (Pvt) Ltd retained the services of a company in Singapore namely Alu Can Co. Ltd. According to the agreement entered, Power Drink Lanka (Pvt) Ltd had to provide the artwork to print the empty cans to Alu Can Co. Ltd free of charge and the Alu Can Co. Ltd had to ship the empty cans directly from Singapore to Can Can (Bhd) Ltd. The price agreed by the two parties for this process was USD 0.25 DDP per can.

Power Drink Lanka (Pvt) Ltd retained the services of renowned Sri Lankan artist Mr. Sanura Silva to design the can and develop the artwork. He was paid Sri Lanka Rupees (SLR) 1 million (Rs. 1,000,000.00) for this task. Once the artwork was completed Power Drink Lanka (Pvt) Ltd sent the same to Alu Can Co. Ltd free of charge.

Power Drink Lanka (Pvt) Ltd purchased the alcohol from Best Spirits (Pty) Ltd in South Africa. According to the agreement entered, Best Spirits (Pty) Ltd had to ship the alcohol directly from South Africa to Can Can (Bhd) Ltd. The price agreed by the two parties for this process was USD 0.15 DDP per liter.

Accordingly, to start the manufacturing process Power Drink Lanka (Pvt) Ltd supplied the following items to Can Can (Bhd) Ltd free of charge.

1. A shipment of 1,500 litres of Pump-up concentrate exported from Sri Lanka for USD 120,000 on DDP term.
2. A shipment of 150,000 empty cans exported from Singapore.

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3. A shipment of 25,000 litres of alcohol from South Africa

As the first shipment Power Drink Lanka (Pvt) Ltd has imported a shipment of 01x20' container said to contain 400 cartons of Pump-up Energy Drink cans from Can Can (Bhd) Ltd.

Ms. Power Drink Lanka (Pvt) Ltd has entrusted the transportation of the said container from Malaysia to the Port of Colombo to a Freight Forwarding company namely Sea-Sky Lanka Ltd. The following charges have been paid by Power Drink Lanka (Pvt) Ltd to Sea-Sky Lanka Ltd as the total cost of transport.

1. Main Carrier Charges (Sea Freight) - USD 1285
2. Packing Cost - USD 315
3. Inland Transport - USD 725
4. Terminal Handling Charges at the origin port - USD 250
5. Currency Adjustment Factor (CAF) - USD 145
6. Bunker Adjustment Factor (BAF) - USD 135
7. Terminal Handling Charges at the destination port - USD 150
8. Container Deposit - Rs. 5750
9. Container Washing - Rs. 1150

The marine insurance has been obtained by Power Drink Lanka (Pvt) Ltd locally from Sri Lanka Insurance Company on payment of Rs. 18,436/= for the whole shipment.

In the Customs Declaration (CusDec) submitted by Power Drink Lanka (Pvt) Ltd to clear the subject shipment, the Customs Value was declared as Rs. 13,766,161.20. However, the Customs Officers rejected this value and move to calculate the correct Customs Value.

Presume that you are the Customs Officer who was entrusted with this task and calculate the Customs Value of the subject shipment in Sri Lankan Rupees.

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The document containing the exchange rates published by Sri Lanka Customs is provided attached to this question paper. (40 Marks)

Question 02

Puff Promoters (Pvt) Ltd has imported a consignment of 49,235 kg "Pipe Tobacco" from South Africa in a 20' container. The transaction price is FOB USD 13.35 per kg. The freight charge paid for the full shipment is USD 1850. The insurance has been obtained for USD 85 for the full shipment.

According to the Sri Lanka Tariff Guide, Pipe Tobacco is classified within HS Code 2403.99.10 and the following taxes are payable for the importation.

1. Customs Duty - 250% or Rs. 2000/= per kg
2. VAT - 8%
3. PAL - 10%
4. Excise (Special Provision) Duty - 15% or Rs. 600/= per kg
5. Cess - 30% or Rs. 375/= per kg

Calculate all five taxes payable for the above shipment in Sri Lankan rupees. Formulas and exchange rates are provided in the attached documents to this question paper.
(20 Marks)

Question 03

Write an essay describing the functions and the legal framework of the Sri Lanka Customs
(20 Marks)

Question 04

Name the **6 methods** given in the WTO Valuation Agreement to determine the Customs Value and explain the Transaction Value Method described in Article 1 and the adjustments under Article 8 of Schedule E of the Customs Ordinance. (20 Marks)

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Question 05

Explain the structure of an HS Code up to 8 digit level and the procedure one should follow to determine the HS Code of any given commodity. (20 Marks)

Question 06

a) Explain **Section 10** and **Schedule A** (Table of Duties) of the Customs Ordinance

b) Explain **Section 12** and **Schedule B** (Table of Prohibitions and Restrictions) of the Customs Ordinance

(20 Marks)

Question 07

The payment methods in international trade have evolved based on how the risk is transferred between the buyer and the seller. Explain the six methods of payment in international trade with an emphasis on how the risk is transferred between the buyer and the seller. (20 Marks)

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

Computation formulae for imported goods

Where

v	=	CIF value in Rupee
c	=	Cess levy under Sri Lanka Export Development Act
d	=	Customs Duty
e	=	Excise (Special Provisions) Duty (ED)
t	=	Value Added Tax (VAT)
p	=	Port and Airport Development Levy (PAL)
r_e	=	Rate of Excise (Special Provisions) Duty (ED)
r_t	=	Rate of Value Added Tax (VAT)
r_n	=	Rate of Nation Building Tax

- Customs Duty (d) = (CIF value) × (Customs duty rate)
  or
  = (quantity) × (unit rate of customs duty)
- Value Added Tax (t) = (v + 10% of v + d + c + p + e) × r_t
- Cess Levy (c) = (v + 10% of v) × (Cess levy rate)
  or
  = (quantity) × (unit rate of Cess levy)
- Port and Airport Development Levy (p) = (CIF value) × (PAL rate)
- Excise (Special Provisions) Duty (e) = (v + 15% of v+ d + c + p) × r_e
  or
  = (quantity) × (unit rate of Excise Duty)
- Special Commodity Levy = (Quantity) × (unit rate of Special Commodity Levy)

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கொள்கை, திட்டமிடல் மற்றும் ஆராய்ச்சிப் பிரிவு
Policy, Planning and Research Directorate

No: RE/38/2022

ශ්‍රී ලංකා රේගුව
இலங்கைச் சுங்கம் Sri Lanka Customs

Telephone: 2221510 (DC), 2445146 (DDC), 2445146(SC) E-mail:ddcppnr@customs.gov.lk

Customs Notification (General)
Customs Ordinance (Chapter 235)
Rates of Exchange

It is hereby notified that by virtue of powers vested in me under Section 17 of the Customs Ordinance (Chapter 235) I, **P.B.S.C. Nonis, Director General of Customs,** determine that with effect from **26.09.2022** all duties of Customs as well as other charges, penalties and forfeitures incurred under the Customs Ordinance (Chapter 235), shall be paid and received at the Rates of Exchange set out in the schedule overleaf.

The notification relating to the Rates of Exchange published in Gazette No: **2298/01** of **19.09.2022** is hereby rescinded.

P.B.S.C. Nonis
Director General of Customs

Sri Lanka Customs
Colombo 11
23.09.2022

Ref. DGC A877/PL305 The letter No. 33/04/001/0011/015 (38) Dated 23.09.2022 of Central Bank of Sri Lanka

Schedule

Rates of Exchange Effective From 26.09.2022 TO 02.10.2022

00035

	Country	Country Code	Currency	Currency Code	Rate of Exchange (Rs.)
1	Australia	AU	Dollar	AUD	245.3333
2	Bahrain	BH	Dinar	BHD	981.1904
3	Bangladesh	BD	Taka	BDT	3.5880
4	Brazil	BR	Brazil Real	BRL	72.2846
5	Brunei	BN	Brunei Dollar	BND	260.5554
6	Canada	CA	Canadian Dollar	CAD	274.4647
7	China	CN	Renminbi	CNY	52.1518
8	China	CN	Offshore	CNH	52.1181
9	Czechoslovakia	CZ	Koruna	CZK	14.7386
10	Denmark	DK	Kroner	DKK	48.8987
11	Egypt	EG	Pound	EGP	18.9802
12	Euro Zone		Euro	EUR	363.6163
13	Ghana	GH	Cedi	GHS	36.0901
14	Hongkong	HK	Dollar	HKD	47.1273
15	Hungary	HU	Forint	HUF	0.8970
16	India	IN	Rupee	INR	4.5616
17	Indonesia	ID	Rupiah	IDR	0.0246
18	Iran	IR	Riyal	IRR	0.0088
19	Japan	JP	Yen	JPY	2.6041
20	Jordan	JO	Dinar	JOD	521.7539
21	Korea	KR	Won	KRW	0.2624
22	Kuwait	KW	Dinar	KWD	1,194.7276
23	Macau	MO	Pataca	MOP	45.7317
24	Malaysia	MY	Ringgit	MYR	80.9638
25	Maldives	MV	Rufiya	MVR	23.9278
26	Mauritius	MU	Rupee	MUR	8.3036
27	Myanmar	MM	Kyat	MMK	0.1762
28	Nepal	NP	Rupee	NPR	2.8591
29	New Zealand	NZ	Dollar	NZD	216.0353
30	Nigeria	NG	Naira	NGN	0.8599
31	Norway	NO	Kroner	NOK	35.4969
32	Oman	OM	Riyal	OMR	960.8278
33	Pakistan	PK	Rupee	PKR	1.5446
34	Papua New Guinea	PG	Kina	PGK	105.0583
35	Philippines	PH	Peso	PHP	6.3376
36	Poland	PL	Zloty	PLN	76.5048
37	Qatar	QA	Riyal	QAR	101.2421
38	Russia	RU	Rouble	RUB	6.0150
39	Saudi Arabia	SA	Riyal	SAR	98.3185
40	Seychelles	SC	Rupee	SCR	25.4688
41	Singapore	SG	Dollar	SGD	260.5646
42	South Africa	ZA	Rand	ZAR	21.0212
43	Sweden	SE	Krona	SEK	33.3789
44	Switzerland	CH	Francs	CHF	378.1869
45	Taiwan	TW	Dollar	TWD	11.6820
46	Thailand	TH	Baht	THB	9.9109
47	U.A.E.	AE	Dirham	AED	100.7115
48	United Kingdom	GB	Sterling Pound	GBP	415.7940
49	United States of America	US	Dollar	USD	369.9235
50	Zambia (Old)	ZM	Kwacha	ZMK	0.0712
51	Zambia (New)	ZM	Kwacha	ZMW	23.5290
52	Zimbabwe	ZW	Dollar	ZWD	0.9748

Library.

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Faculty of Management and Social Sciences
Department of Logistics & Transport
BMgt Hons in Supply Chain Management
Course CODE: COM552

Year 3 Semester I

SEMESTER END EXAMINATION

Production and Operations Management – BSCM3201

- This paper consists of SEVEN (07) questions on ELEVEN (11) pages.
- Answer FOUR (04) 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.
- Write legibly.
- Formulae sheet is attached

Date: 2022.09.25 Pass mark: 40% Time: 02 Hours

Question 01 (Compulsory)

SELECT THE MOST APPROPRIATE ANSWER OUT OF THE GIVEN CHOICES.

1. Operations Management is
   (a) The management of transforming that create goods and/or provide services
   (b) The management of transforming that achieve the goals of the organization
   (c) The management of systems or processes that create goods and/or provide services
   (d) The management of systems or processes that achieve the goals of the organization

2. System Operations functions are
   (a) Decisions concerning capacity, inventory, scheduling, project management and quality assurance
   (b) Decisions concerning personnel, inventory, scheduling, project management and quality assurance
   (c) Decisions concerning personnel, location, scheduling, project management and quality assurance
   (d) Decisions concerning personnel, inventory, arrangement of departments, project management and quality assurance

3. Characteristic of a Service operation,
   (a) Low consumer participation
   (b) Facility site selection dictated by the transportation facilities available
   (c) Labor intensive
   (d) Tangible

4. Manufacturing operations
   (a) transform some inputs or raw materials into some outputs with systems
   (b) transform some inputs or raw materials into some outputs with effective and efficient systems
   (c) transform some inputs or raw materials into some outputs effectively and efficiently
   (d) transform some tangible input or raw materials into some tangible output

5. Forecasting is
   (a) A process of predicting a future event
   (b) A process of guessing a future event
   (c) A process of identifying a future event
   (d) A process of ready for a future event

6. Short range forecast is for
   (a) Purchasing, job scheduling, workforce levels, job assignments, production levels
   (b) Sales and production planning, budgeting
   (c) New product planning, facility location, research and development
   (d) workforce levels, facility location

7. Most accurate forecasting is
   (a) Short Term forecasting
   (b) Medium Term Forecasting
   (c) Both Short Term and Medium-Term Forecasting
   (d) Long Term Forecasting

8. Four stages of Product Life Cycle
   (a) Introducing, Entering, Maturity, Decline
   (b) Introduction, Growth, Maturity, Decline
   (c) Introducing, Entering, Stable, Decline
   (d) Introduction, Growth, Competition, Decline

9. Trend in Product and Service Design
    (a) Reduce time to capture the market
    (b) Market survey
    (c) Reduce time to introduce new product or service
    (d) Identify marketing features

10. Reasons for product and service design
    (a) Be competitive
    (b) Development of new product
    (c) Be comparative
    (d) Change the existing product

11. Process selection decision is based on
    (a) Forecasting, Capacity Planning, Technological Change
    (b) Forecasting, Product and Service Design, Technological Change
    (c) Product and Service Design, Capacity Planning, Technological Change
    (d) Forecasting, Capacity Planning, Product and Service Design

12. Process Types are
    (a) Job Shops, Batch, Repetitive, Continuous
    (b) Make to Stock, Make to Assemble, Make to Order
    (c) Job Shops, Intermediate, Repetitive, Continuous
    (d) Make to Stock, Make to Assemble, Make to Order

13. When you modify the capacity

(a) Facilities can be added

(b) People can be added

(c) Jobs can be scheduled

(d) Machines can be allocated

14. Importance of Capacity Decision

(a) Impacts ability to make future requirements

(b) Involves short term commitment

(c) Affects operating cost

(d) Increase competitiveness

15. Design capacity is

(a) the maximum theoretical output of a system

(b) the minimum theoretical output of a system

(c) the capacity a firm expects to achieve given current operating constraints

(d) the capacity a firm needs to achieve given current operating constraints

(01 Mark*15 = 15 Marks)

16. There are several policies which are considered in Aggregate Planning. They are

(a) Workforce, Subcontracting, Hiring/Layoff

(b) Subcontracting, Overtime, Inventory

(c) Facilities, Backorders, Workforce

(d) Hiring/Layoff, Overtime, Workforce

17. Aggregate planning is a

(a) Short Range Planning

(b) Intermediate Range Planning

(c) Both Short Range and Intermediate Range Planning

(d) Long Range Planning

18. One of the Aggregate Planning outputs is

(a) Total cost of a plan

(b) Total budget

(c) Total capacity

(d) Labor flexibility

19. Product Standardization will not help you to

(a) Reduce the parts in your inventory

(b) Reduce the training cost

(c) Fill the orders from inventory

(d) Do small production runs

20. Sources of ideas for product and service design

(a) Employees, Marketing, Management Information System

(b) Employees, Customers, Competitors

(c) Marketing, Management Information System, Customers

(d) Competitors, Suppliers, Management information System

(02 Marks*5 = 10 Marks)

17. Aggregate planning is a

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(b) Intermediate Range Planning

(c) Both Short Range and Intermediate Range Planning

(d) Long Range Planning

18. One of the Aggregate Planning outputs is

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(b) Total budget

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20. Sources of ideas for product and service design

(a) Employees, Marketing, Management Information System

(b) Employees, Customers, Competitors

(c) Marketing, Management Information System, Customers

(d) Competitors, Suppliers, Management information System

(02 Marks*5 = 10 Marks)

Question 02

(a) Briefly explain the Business Operations Overlap in the industry. (07 Marks)

(b) Identify three characteristics of Service Operation and briefly explain one. (08 Marks)

(c) Identify three Manufacturing Operations and briefly explain each. (10 Marks)

Question 03

(a) New car sales for a dealer in a Company, for the past year are shown in the following table, along with monthly seasonal relatives, which are supplied to the dealer by the regional distributor.

Table 3:1 – Car sales

Month	Unit sold	Seasonal relative
Jan	640	0.80
Feb	648	0.80
Mar	630	0.70
Apr	761	0.94
May	735	0.89
Jun	850	1.00
Jul	765	0.90
Aug	805	1.15
Sep	840	1.20
Oct	828	1.20
Nov	840	1.25
Dec	800	1.25

i. Does there seem to be trend? (03 Marks)

ii. Deseasonalize car sales. (06 Marks)

iii. Forecast sales for the first three months of the next year. (10 Marks)

(b) A bank manager wants to estimate quarterly relatives for fixed deposit openings, based on the data shown.

Table 2:2 – Fixed Deposits

	Quarter			
Year	1	2	3	4
1	200	250	210	340
2	210	252	212	360
3	215	260	220	358
4	225	272	233	372
5	232	284	240	381

Determine quarter relatives. (06 Marks)

Question 04

(a) Identify the product and service activities. (07 Marks)

(b) Briefly explain legal, environment and ethical issues of product and service design. (08 Marks)

(c) Briefly explain three reasons for product and service design. (10 Marks)

Question 05

(a) In a job shop, effective capacity is only 50% of design capacity, and actual output is 80% of effective output. What design capacity would be needed to achieve an actual output of eight jobs per week? (05 Marks)

(b) A producer of felt-tip pens has received a forecast of demand of 30,000 pens for the coming month from its marketing department. Fixed costs of $25,000 per month are allocated to the felt-tip operation, and variable costs are 37 cents per pen.

(i) Find the brek-even quantity if pens sell for $1 each. (04 Marks)

(ii) At what price must pens be sold to obtain a monthly profit of $15,000, assuming that estimated demand materialises? (05 Marks)

(c) A small firm intends to increase the capacity of a bottleneck operation by adding a new machine. Two alternatives, A and B, have been identified, and the associated costs and revenues have been estimated. Annual fixed costs would be $40,000 for A and $30,000 for B; variable costs per unit would be $10 for A and $11 for B; and revenue per unit would be $15.

(i) Determine each alternative's break-even point in units. (03 Marks)

(ii) At what volume of output would the two alternatives yield the same profit? (04 Marks)

(iii) If expected annual demand is 12,000 units, which alternative would yield the higher profit? (04 Marks)

Question 06

For the set of tasks given below, do the following:

(a) Develop the precedence diagram. (03 Marks)

(b) Determine the minimum and maximum cycle times in seconds for a desired output of 500 units in a 7-hour day. Why might a manager use a cycle time of 50 seconds? (03 Marks)

(c) Determine the minimum number of workstations for output of 500 units per day. (04 Marks)

(d) Balance the line using the largest popsitional weight heuristic. Break ties with the most following tasks heuristic. Use a cycle time of 50 seconds. (10 Marks)

(e) Calclate the percentage idle time for the line. (05 Marks)

Table 6:1 - Tasks

Task	Task Time (Seconds)	Immediate Predecessors
A	45	-
B	11	A
C	9	B
D	50	-
E	26	D
F	11	E
G	12	C
H	10	C
I	9	F, G, H
J	10	I

Question 07

SummerFun, Inc., produces a variety of recreation and leisure products. The production manager has developed an aggregate forecast:

Month	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Forecast	50	44	55	60	50	40	51	350

Use the following information to develop aggregate plans.

Regular Production cost - Rs. 80 per unit
Overtime cost - Rs. 120 per Unit
Regular capacity - 40 units per month
Overtime capacity - 8 units per month
Subcontracting cost - Rs. 140 per Unit
Holding cost - Rs. 10 per unit per month
Subcontracting capacity - 12 units per month
Back -order cost - Rs. 20 per Unit
Beginning Inventory - 0 units

Develop the aggregate plan using a combination of backlogs, subcontracting, and inventory to handle variations in demand. (25 Marks)

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

Formula Sheet

Simple Moving Average

$$F_{t+1} = \frac{D_t + D_{t-1} + \ldots + D_{t-n+1}}{n}$$

D_t : actual demand in period t

n : number of periods in the average

1. **Weighted Moving Average**

$$T_{t+1} = W_1D_1 + W_2D_{t-1} + \ldots + W_nD_{t-n+1}$$

2. **Exponential Smoothing**

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

F_t = new forecast

F_{t-1} = previous forecast

α = smoothing (or weighting) constant ($0 \leq \alpha \geq 1$)

4. **Trend Projections**

$y = a + bx$

y = computed value of the variable to be predicted

a = y-axis intercept

b = slope of the regression line

x = the independent variable

$$b = \frac{\Sigma xy - n\bar{x}\bar{y}}{\Sigma x^2 - n\bar{x}^2} \qquad a = \bar{y} - b\bar{x}$$

5. **Exponential Smoothing with Trend Adjustment**

$$F_t = \alpha (A_{t-1}) + (1- \alpha) (F_{t-1} + T_{t-1})$$

$$T_t = \beta (F_t - F_{t-1}) + (1-\beta) T_{t-1}$$

$$FIT_t = F_t + T_t$$

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Faculty of Management and Social Sciences
Department of Logistics & Transport
BMgt Hons in Supply Chain Management
Course CODE: COM552

Year 3 Semester I

SEMESTER END EXAMINATION

Environmental and Social Impacts of Logistics and Transport – BSCM3204

- This paper consists of SEVEN (07) questions on THREE (03) pages.
- Answer FOUR (04) 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.
- Write legibly.

Date: 2022.09.23 Pass mark: 40% Time: 02 Hours

Question 01 (Compulsory)

a) "Urban sprawl reflects a strong negative relationship between urban density and automobile use emerged". Explain this statement in your own words. (10 Marks)

b) Congestion is a major challenge faced by urban transportation and many countries have taken different initiatives to mitigate congestion. Discuss in detail three such initiatives. (15 Marks)

Question 02

a) The Paradox of mobility suggests that benefits are internal to the users and costs are in part externalized. Explain this statement in your own words. (08 Marks)

b) Explain how different transportation activities are impacting the environment in your own words with real world examples.

(07 Marks)

c) Differentiate between centralized and diffused network structures in terms of;
   i. Emission level
   ii. Transport Rates.

(05*02 Marks)

Question 03

a) Even though there're various forms of environmental pollutions, noise pollution has turned to be an adverse source of environmental externality of transportation. Do you agree or disagree? Elaborate your answer with examples.
(07 marks)

b) **"Traffic emissions contribute the major part of air pollution in traffic-related microenvironments".** Group and explain the factors which are contributing to air pollution. (06 Marks)

c) Categorize and elaborate the major three costs of air pollution with examples.
(12 Marks)

Question 04

a) What are the major ways that energy sources are utilized in transportation?
(07 marks)

b) Even though energy brings about significant benefits to human life, there are so many issues related to energy. Mention and explain 5 such issues of energy.
(10 marks)

c) Select two types of alternative energy sources and through a SWOT analysis elaborate the pros and cons that they possess. (08 marks)

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Question 05

a) Explain the annexes of MARPOL Convention in detail. (10 marks)
b) What are the two basic types of measures that achieve the goal of improving transport system efficiency? Explain in detail (05 marks)
c) Elaborate in detail, transport demand management strategies that can be used to solve road transportation problems of Sri Lanka. (10 marks)

Question 06

a) What are the major types of scoping techniques used in EIA? (05 marks)
b) Discuss in detail, the mitigation measures that can be practiced to minimize the urban freight transport challenges with practical examples. (10 marks)
c) Discuss the importance of conducting an EIA prior to a road construction project. (10 marks)

Question 07

Write shorts notes on the below topics. (05 * 5 Marks= 25 Marks)

a) Marine oil pollution
b) Externalities of noise pollution
c) Paradox of mobility
d) Distribution Sprawl
e) City Logistics.

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

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Beyond A Graduate

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Course CODE: COM552

Year 3 Semester I

SEMESTER END EXAMINATION

Operational Research – BSCM3203

- This paper consists of SEVEN questions on SEVEN (07) pages.
- Answer FOUR 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 e wording of a question, make your own decision, but clearly state it on the script.
- Write Legibly.

Date: 2022.09.21 Pass mark: 40% Time: 02 Hours

Question 01: Compulsory

(a) Underline the most suitable answer. (10 Marks)

1. If any value in value column of the simplex tableau is negative, then the solution is .....
    a. Unbounded
    b. Infeasible
    c. Optimal
    d. Feasible
    e. Alternative optima
2. .....is another method of solving a given LP problem involving some artificial variables
    a. Simplex method
    b. Dual Simplex method
    c. Two phase method
    d. Big M method
    e. VAM
3. .....assumption means the prior knowledge of all the coefficients in the objective function, the coefficients of the constraints and the resource values.

a. Additivity
b. Certainty
c. Multiplicity
d. Proportionality
e. Divisibility

4. A basic solution which also satisfies the condition in which all basic variables are non-negative is called.....
    a. Feasible solution
    b. Optimal solution
    c. Infeasible solution
    d. Basic Feasible Solution
    e. Unbounded Solution
5. A given Transportation problem is said to be unbalanced, if the total supply is not equal to the total .....
    a. Cost
    b. Optimal value
    c. Feasible solution
    d. Initial solution
    e. Demand
6. A minimization problem can be converted into a maximization problem by changing the sign of coefficients in the .....
    a. Constraints
    b. Objective function
    c. Both a. and b.
    d. None of a. and b.
    e. Artificial function
7. If there is no non-negative replacement ratio value in solving a Linear Programming problem then the solution is .....
    a. Unbounded
    b. Infeasible
    c. Optimal
    d. Feasible
    e. Bounded

8. The coefficient of slack variables in the objective function are always assumed to be .....
   a. 0
   b. 1
   c. -1
   d. 2
   e. -2

Table given below is an initial table of a Linear programming problem with maximization objective function and Two-phase method is used to solve the LP Problem. Question 9 and 10 are based on the below table.

BASIC	X1	X2	X3	S1	S2	R1	VALUE	RATIO
S1	2	1	1	1	0	0	2	
R1	3	3	2	0	-1	1	5	
Z	-2	-2	-4	0	0	0	0	
F	3	4	2	0	-1	0	8	

9. What is the entering variable of the above table according to Two-phase method.
   a. S1
   b. X1
   c. X2
   d. X3
   e. X1

10. What is the leaving variable of the above table according to Two-phase method?
    a. X1
    b. X2
    c. S1
    d. R1
    e. X3

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(b) G flock is a clothing manufacturer employs three inputs: man hours, machine-hours and clothing material to manufacture two types of dresses. Type A dress makes a profit of LKR 500 per piece, while type B that of LKR 600 per piece. The manufacturer has enough man-hours to manufacture 50 pieces of type A or 20 pieces of type B dresses per day while the machine-hour possesses suffice only for 36 pieces of type A or for 24 pieces for type B dresses. Cloth material available per day is limited but sufficient for 30 pieces of either type of dress.
Formulate this as Linear Programming Problem. (15 Marks)

Question 02, 03 and Question 04 based on the Case Study given below.

Case Study

Manufacturing company produces TWO products namely Product I and Product II using THREE raw materials P, Q and R.

- Profit contribution of product I and II and USD 10 and USD 12 respectively.
- To produce one unit from Product I, 5 units from P, 8 units from Q and 3 units from R is required.
- To produce one unit from Product II, 6 units from P, 4 units from Q and 5 units from R is required.
- Availability of raw materials P,Q and R are 60, 72 and 45 units respectively.

Question 02:

(a) Model the above case as a Linear Programming problem (LPP). (05 Marks)
(b) Find the optimal solution using graphical approach. (20 Marks)

Question 03

(a) Find the optimal solution to the above LPP {Question 02 part (a)} using Simplex method. (20 Marks)
(b) Is there alternative optima exist, if yes, find the alternative optima. (05 Marks)

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Question 04

(a) Write the dual problem of the Primal problem formulated above {Question 02, part (a)} (05 Marks)

(b) Solve the Dual Problem using Dual Simplex algorithm. (20 Marks)

Question 05

Solve the below Linear Programming Problem using two phase method. (25 Marks)

Minimize $Z = 10\,X1 + 20\,X2$

Subject to

$3\,X1 + 2\,X2 \geq 18$

$2\,X1 + X2 \geq 6$

$X1, X2 \geq 0$

Question 06

A manufacturing firm has three plants A, B and C with daily output of 500, 300, and 200 units respectively. It also has FOUR warehouses P, Q, R and S with daily requirements of 180, 150, 350 and 320 units respectively. Shipping charges on different routes per unit is as given below.

To	P	Q	R	S
From A	12	10	12	13
From A	7	11	8	14
From C	6	16	11	7

(a) Formulate an LP model for the above transportation model. (05 Marks)

(b) Construct the transportation tableau. (02 Marks)

(c) Find the initial solution using Least Cost method. (03 Marks)

(d) Find the optimal solution using any appropriate method. (12 Marks)

(e) Depict optimal solution in pictorial form. (03 Marks)

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Question 07

The manager of a warehouse is interested in designing an inventory control system for one of the products in stock. The demand for the product comes from numerous retail outlets and the orders arrive on a weekly basis. The warehouse receives its stock from a factory, but the lead time is not a constant. The manager wants to determine the best time to release the orders to the factory so that stockouts are minimized. Yet the inventory holding costs are at acceptable levels. Any order from retailers, not supplied on a given day, constitute lost demand. Based on a sample study, the following distributions for demand and lead time are given.

Weekly Demand (in thousand)	Probability
0	0.20
1	0.40
2	0.30
3	0.10

Lead time	Probability
2	0.30
3	0.40
4	0.30

Consider the cost parameters given below.

- Ordering cost per order – LKR 500
- Carrying Cost – LKR 20 per thousand unit per week
- Shortage cost - LKR 100 per thousand units

Objective of this inventory analysis is to determine the optimal size of an order and the best time to place an order. Following ordering policy s suggested.

Ordering Policy:

Whenever the inventory level falls to or below 2000 units (reorder level), order of 4000 – I is placed. I – current inventory level.

Consider the below information.

- Current Inventory Level I = 3000 units
- No back orders are permitted.
- Each order is placed at the begging of the week, as soon as the inventory level is less than or equal to the reorder level.
- Replenishment orders are received at the begging of the week.

Simulate the above inventory management system for 10 days and calculate total average inventory cost for the suggested ordering policy using the random numbers given below.

Random numbers for Demand:

31 70 53 86 32 78 26 64 45 12

Random Numbers for Lead time:

29 83 70 52

(25 Marks)

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

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Year 3 Semester I

END SEMESTER EXAMINATION

Transport Planning and Logistics Management - BSCM3208

- This paper consists of SEVEN questions on SEVEN (07) pages.
- Answer FOUR (04) 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.
- Write Legibly.

Date: 2022.09.27 Pass mark: 40% Time: 02 Hours

Question 01 - Compulsory

Transportation terminal is the key node in transport systems. Efficient terminals can enhance and adjust the operational efficiency & layout of passenger/ cargo transportation networks, provide a passenger/freight guidance system, and regulate the development of commercial forms, as well as optimize the assembly and distribution of modern logistic modes, among others.

(a) Define the term "transport terminal". (02 Marks)

(b) Name main three functions of transport terminals. (03 Marks)

(c) Explain four elements defining the hinterland of a port terminal. (20 Marks)

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Question 02

As terminals, sea ports are vast freight handling platforms. For handling freight, port infrastructures collectively have to accommodate transhipment activities both on ships and inland and thus facilitate convergence between land transport and maritime systems. Around the globe, sea ports are the points of convergence from which inland transport systems, particularly rail, were laid. Majority of global sea ports, especially those have historical importance, owe their initial emergence to their site as the great majority of harbors are taking advantage of a natural coastline or a natural site along a river.

(a) Name four elements depicting the nature of transport terminals. (05 Marks)

(b) Critically differentiate intermodalism & multimodalism. (20 Marks)

Question 03

Refer the data below which is gathered for a Transport Study in September 2022, for the study area of Western Province and three (03) study zones were identified as Municipal Council Boundaries, which are:

Study Zone I – Mount Lavinia and Dehiwala - Dehiwala

Study Zone II – Sri Jayewardenepura Kotte – Hanwella

Study Zone III – Colombo – Peliyagoda

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From the each study zone : below trip productions and trip attractions were identified.

Table 3.1 : Trip Productions and Trip attractions from each zone

Zone	Trip Production	Trip Attraction
Zone I	100	104
Zone II	108	120
Zone III	124	108

If the generalized cost function is give as

$f(cij) = 1/cij^2$

and the cost matrix is shown as:

Table 3.2 : Cost Matrix

Zone	I	II	III
I	1.00	1.20	1.80
II	1.20	1.00	1.50
III	1.80	1.50	1.00

Calculate:

(a) The adjusted Generalized Cost Matrix (02 Marks)

(b) The Balancing Factors using an appropriate tabulae format (10 Marks)

(c) Each combination of Trip Distribution (08 Marks)

(d) The final Table with expected Trip Productions and Trip attractions (05 Marks)

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Formulae to be used:

$$T_{(ij)} = \quad A(i) * O(i) * B(j) * D(j) * f(cij)$$

$$B(i) = \frac{1}{\sum A(i) * O(i) * f\ (cij)}$$

$$A(i) = \frac{1}{\sum B(j) * D(j) * f\ (cij)}$$

Question 04

(a) Briefly explain two (02) factors affecting Freight Distribution Planning and Modelling (05 Marks)

(b) What are the four types of Aggregate Demand Planning models? Briefly state those main applications. (05 Marks)

(c) Assume that the growth factor is related to variables of :

(i) Population in the study Zone (P)

(ii) Car ownership (C)

(iii) Average Monthly income per capita (IPC)

Referring to the above variables,

(I) Formulate an equation to calculate the growth factor (02 Marks)

(II) If the car ownership is estimated to be increased by 10%, and the population is estimated to be increased by 12.50% calculate the growth factor using the above formulated equation in part (I) (04 Marks)

(III) For the below base year trip matrix, formulate the estimated trip matrix.

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(09 Marks)

Tale 4.1: Base year Trip Matrix

		Destination Zones				D_j
		D1	D2	D3	D4	
Origin Zones	O1	19	23	20	22	84
	O2	18	20	21	19	78
	O3	20	21	19	18	78
	O4	22	23	24	20	89
O_i		79	87	84	79	329

Question 05

(a) Differentiate between **"charter air services"** and **"scheduled air services"**.

(05 Marks)

(b) Discuss in detail, the conditions that ensure the complementarity of modes.

(05 Marks)

(c) What are the three dimensions that modal competition is based on? Explain.

(05 Marks)

(d) Map, illustrate and explain the functioning of intermodal transport supply chain.

(10 Marks)

Question 06

(a) "It's often said that containerization has revolutionized the transportation in terms of many aspects". Explain (10 Marks)

(b) Discuss in detail the advantages and disadvantages of containerization in your own words with suitable examples. (10 Marks)

(c) Define what's a modal shift in your own words. (05 Marks)

Question 07

(a) Define below terms. Use appropriate figures where necessary. (02 * 05 Marks)

(i) Weighted Graph

(ii) Vertex and Edge

(iii) Multiplicity

(iv) A Walk

(v) A Closed Path

(b) Using the figure 7.1 illustrated below of a topological network (a weighted, two-way graph) of public busses in Sri Lanka from Pettah to Borella, Answer the following questions.

S = 1 = Starting Node

E = 5 = Ending Node

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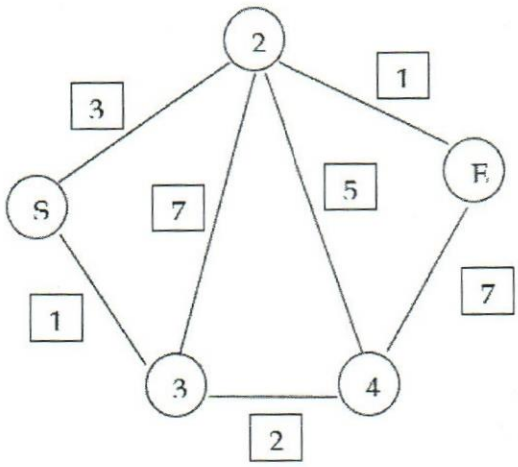

Figure 7.1 : Topological Public Bus Network from Pettah to Borella

(a) What is the k(G) ? (01 Mark)

(b) Identify and write a path with a loop (01 Mark)

(c) Explain the terminology of Incident, Adjacent and isolated edges/vertices. Give one (01) example for each Incident, Adjacent and isolated edges/vertices (05 Marks)

(d) Find the shortest path for each node using Dijkstra Algorithm, Greedy method (08 Marks)

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

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Course CODE: COM552

Year 3 Semester I

SEMESTER END EXAMINATION

Entrepreneurship Development – BSCM3205

- This paper consists of SEVEN (07) questions on SEVEN (07) pages.
- Answer FOUR (04) 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.
- Write legibly.

Date: 2022.09.19 Pass mark: 40% Time: 02 Hours

Question 01: Case Study - (Compulsory)

Read the following case carefully and answer the following questions.

Even though Sirimal strongly felt the need of a job after finishing university education, his intention was to do good to himself and to the society by starting his own business. But the starting period of Sirimal's business was very tough. Sirimal strongly felt the difficulties of getting required raw materials and finding the areas where those resources are available, paying a high price when obtaining resources and introducing his products to the market. Difficulty of transporting goods and lack of money etc. further embarrassed Sirimal. He had to suffer even losses at the beginning. Sirimal remained steady even though he encountered many obstacles. He considered those obstacles as challenges and tried to find strategies to overcome them day by day. Since the initial invested capital was not adequate, Sirimal thought that he should somehow invest more money to the business. As a result, he obtained a bank loan from Development Bank and

invested it in the business. Since he introduced neatly finished creative products to the market, the demand for the products increased daily. Sirimal reinvested the profit he earned from his sales in the business.

Meantime in order to improve the entrepreneurial knowledge, Sirimal participated in a training program on entrepreneurship development. The opinion of Sirimal at the end of that program was as follows.

- An entrepreneur should know many things for running a business successfully.
- Further, it is very important to have a good understanding regarding the business, its income and expenses and the profits and costs.
- At the same time knowledge on doing the production to suit present requirements and running a business in the competitive market too is very crucial.

a) What is Sirimal's main objective of starting his own business? Briefly explain. (05 Marks)

b) Explain two entrepreneurial characteristics that can be seen in Sirimal as an entrepreneur. (05 Marks)

c) Explain two challenges faced by Sirimal whilst operating the business. (05 Marks)

d) Identify factors an entrepreneur should know in order to make a business successful. (05 Marks)

e) Explain two sources of finance of a business that can Sirimal draw to the business. (05 Marks)

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Question: 02

(a) Sasmitha Perera decided to start a business of manufacturing and selling confectionary items. She visited several confectionary shops in the area to find out about the sweets available for sale and the demand for them. Based on the information given by the confectionary shop owners, she understood that there were many who manufactured sweets using wheat four. However, there were only a few who manufactured sweets out of rice four and kurakkan four. Through a market analysis, she understood that a considerable number of people, being diabetic, were starting to use rice four and kurakkan four. Given below is some information that she has collected:

- Her hometown, Jayagama in Akuressa, has a population of around 80 000 Citizens
- 20% of the population like food made of kurakkan four and rice four
- They wish to buy sweets at least once in two days
- The main competitors and their market shares are as follows
  - Vimansi Sweets' – 30%
  - Arundathi Sweets' – 35%
- The marketing strategies of the competitors –
  - Ensuring the taste and hygienic quality
  - Distributing once per two days and having the unsold items returned to them
  - Displaying sales posters near shops that sell sweets

Sasmitha decided to start up the business covering 25% of the market. She will be using the same marketing strategies as her competitors. In addition, she decided to circulate E-flyers and Print Flyers giving information about her products. At the beginning, she decided to offer rice-and kurakkan-four-mixed cake and Aluva. Their market price will be as follows:

- Cake - Rs. 20 per piece
- Aluva - Rs. 10 per piece

A motorcycle worth Rs. 200 000 will be bought to distribute the products.

Given below are the estimated expenses:

- Monthly salary for the employee distributing the products – Rs. 15 000
- Insurance (Annual) Rs. 3 000
- Fuel (Monthly) Rs. 10 000
- Service charges (Monthly) Rs. 1 500
- Motorcycle depreciation (Annual) Rs. 4 800
- Flyers and sales posters will cost Rs. 6 000 per year.

❖ Based on the above information, prepare the **Marketing Plan** for 'Sasmitha Sweets' Business. (20 Marks)

(b) "Marketing plan helps you to understand your customer". Briefly explain the statement with the aid of an example. (05 Marks)

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Question: 03

a) What factors affect the success rate of a small business? (05 Marks)

b) Explain the importance of the executive summary of a business plan. (05 Marks)

c) Indicate the parties that would benefit from a successful business plan (05 Marks)

d) Highlight the importance of a Solid Business Plan with the aid of an example. (05 Marks)

e) Briefly describe the disadvantages of Buying out a micro scale business in Tourism **OR** Logistics industry. (05 Marks)

Question: 04

a) State two steps of the process of selecting a good business idea. (02 Marks)

b) Explain the differences between business ideas and business opportunities. (05 Marks)

c) Explain four alternative ways that a new entrepreneur can be followed for entering to the market. (08 Marks)

d) Select a business that you like to start in future and state an example and explain for each its strength, weakness, opportunity, and threat of your business. (10 Marks)

Question: 05

a) "Entrepreneurship and Intrapreneurship are not mutually exclusive these are rather dependent on each other for the development of an economy". Explain the statement. (06 Marks)

b) " Entrepreneurs can be found only in the business environment" . Analyze the statement with the aid of an example. (06 Marks)

c) What types of conflict are possible in family business? How can these conflicts be averted or overcome? Answer these questions in the light of business families. (06 Marks)

d) Examine critically the government policies and programs to foster the growth of entrepreneurship. What changes should be made in them? (07 Marks)

Question: 06

a) Identify the 02 examples of Trade Secrets and Processes that give a company a competitive advantage over its competitors. (05 Marks)

b) "Intellectual property rights are difficult to protect". Briefly explain the statement with the aid of an example. (05 Marks)

c) "The protection of creative efforts encourages further creations" Briefly explain the statement with the aid of an example. (05 Marks)

d) Analyze the major changes face by the small medium entrepreneurs in an economic downturn period of the Island. (10 Marks)

Question: 07

Briefly explain the following terms. You may quote suitable examples to support your answer. **Answer only 5 questions.**

1) Capital Expenditure
2) Short Term Financing
3) Trademark
4) Business Plan
5) Drone Entrepreneur

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6) Working Capital
7) Sole Proprietorship
8) Joint Venture
9) Common Traits of Entrepreneurs
10) SWOT Analysis (5*05 Marks)

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

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Year 3 Semester I

SEMESTER END EXAMINATION

Airline Business Management – BSCM3206

- This paper consists of SEVEN (07) questions on THREE (03) pages.
- Answer FOUR (04) 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.
- Write legibly.

Date: 2022.09.14 Pass mark: 40% Time: 02 Hours

Question 01: Compulsory

(a) For continued airworthiness, standards are set for performing maintenance tasks. Briefly explain why aircraft maintenance is important. (05 Marks)

(b) Differentiate between Preventive maintenance and Corrective maintenance. (10 Marks)

(c) 'Objective of crew pairing is to find a set of pairing that covers all flights and minimizes the total cost.' Discuss the above statement with examples. (10 Marks)

Question 02

(a) Graphically explain the economic evaluation process used for fleet planning. (10 Marks)

(b) Top-Down approach or Bottom-Up approach can be used for fleet planning evaluations. Explain which model is more applicable with reasons. (06 Marks)

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(c) The spread of the coronavirus has caused airlines to reconsider the airline planning processes. Explain how the outbreak of COVID -19 has impacted the airline fleet planning process. (09 Marks)

Question 03

(a) Write down 3 (three) airline profit maximizing strategies indicating the intended benefit and the strategy pitfall of each. (09 Marks)

(b) Explain with examples factors that affects supply and demand of airline services of SriLankan airlines, the flag carrier of Sri Lanka. (16 Marks)

Question 04

(a) Airlines publish a variety of fares between each city pair. Every published fare has a published set of fare rules. Explain such fare rules that must be met for a passenger to qualify for a fare. (15 Marks)

(b) Objective of airline revenue management is to extract the maximum revenue that a passenger is willing to pay. Explain revenue management fences. (10 Marks)

Question 05

(a) Briefly explain the final product of the flight schedule development process with examples. (05 Marks)

(b) Explain the 4(four) steps of the flight schedule planning process. (08 Marks)

(c) Flight schedule represents the foundation or basis of the airline product. There are conflicting objects the schedule planner attempts to balance during the development of a flight schedule. Explain such conflicts between revenue maximization and cost minimization with suitable examples. (12 Marks)

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Question 06

(a) Advances in technology is revolutionizing airline business management. Explain how technological factors has impacted airline marketing in the present day. (10 Marks)

(b) Market segmentation in the airline industry helps to better understand passenger needs and tells how you can best meet those needs with your product or service. Assume you are an airline marketer and explain the wants and needs of the modern-day business traveler and leisure traveler. (15 Marks)

Question 07

(a) Human Resource Manager from ABM company states that it is more beneficial to arrange their overseas travel by going through a travel agent. Agree or disagree. Explain your answer. (10 Marks)

(b) Human factors is a multidisciplinary field devoted to optimizing human performance and reducing human error. Explain factors that affects human performance in aviation with examples. (15 Marks)

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

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Year 3 Semester I

SEMESTER END EXAMINATION

Supply Chain Modelling and Analysis – BSCM3302

- This paper consists of EIGHT (08) questions on ELEVEN (11) pages.
- Answer FIVE (05) 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.
- Write Legibly.
- Supporting documents attached

Date: 2022.09.13 Pass mark: 40% Time: 03 Hours

Question 01 - Compulsory

- The Question consists of ten (10) short answer writing questions
- All questions must be answered (02*10 Marks)

(a) Briefly describe the IPO model in Corporate Finance Models

(b) What is mean by Multicollinearity?

(c) Write a suitable hypothesis for a two tailed test

(d) What are the four (04) major data types used in data analysis? Give one (01) example each

(e) Distinguish between American Call and European Put options

(f) What are the four (04) selection methods of Multiple Regression data in SPSS?

(g) What are the four (04) diagnostic tests used in Simple Regression Analysis?

(h) Briefly explain the characteristics of Job shop Scheduling

(i) What is meant by a Multi-echelon Inventory system?

(j) Write two (02) factors that effect on trip production of a considered study zone

Question 02

The below data shows the daily dispatch volumes of a PPC (Portland Porcelana Cement) bags in two Warehouses in Colombo and Kurunagala for 20 consecutive days in the month of August

Table 2.1 : Daily dispatch of PPC in Colombo (C) and Kurunegala (K)
D = Days

Days	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
C	228	285	292	253	232	219	297	291	285	287
K	223	236	298	202	279	259	271	260	218	275

Days	D11	D12	D13	D14	D15	D16	D17	D18	D19	D20
C	245	285	210	236	237	222	212	285	229	298
K	298	262	298	285	257	241	272	229	229	220

(i) Identify the Mode for Colombo and Kurunegala Warehouses (02 Marks)

(ii) Calculate the Median for each Warehouse (04 Marks)

(iii) Calculate the Arithmetic mean for each Warehouse (04 Marks)

(iv) Calculate the covariance between C and K considering data as a sample (07 Marks)

(v) Draw the data of C or K in using a suitable method of data representation (03 Marks)

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Question 03

(a) Write down the common model equation for a Simple and a Multiple Linear Regression Analysis with suitable parameters. (03 Marks)

(b) A Business Analyst working for a consultancy firm has analysed the impact towards the Sales of a particular product manufactured in a company and the investments on 04 different types of promotion campaigns. The explanation of variables in building the model is given below:

Y = Units sold of Product A for each month
X1 = Investment on Paper advertisements (per month)
X2 = Investment on Television and Radio Advertisements (per month)
X3 = Investment on Social Media promotions (per month)
X4 = Investment on Posters and Cut outs (per month)

The results after analysing the data using SPSS are given in the following tables. Interpret the results of Table 3.1, Table 3.2, Table 3.3 and Table 3.4. Write a brief report to be submitted to the client, while interpreting the results.

(17 Marks)

Table 3.1 : Correlations

		Y	X1	X2	X3	X4
Y	Pearson Correlation	1	.731**	.816**	-.535	-.821**
	Sig. (2-tailed)		.005	.001	.060	.001

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	N	13	13	13	13	13
X1	Pearson Correlation	.731**	1	.229	-.824**	-.245
	Sig. (2-tailed)	.005		.453	.001	.419
	N	13	13	13	13	13
X2	Pearson Correlation	.816**	.229	1	-.139	-.973**
	Sig. (2-tailed)	.001	.453		.650	.000
	N	13	13	13	13	13
X3	Pearson Correlation	-.535	-.824**	-.139	1	.030
	Sig. (2-tailed)	.060	.001	.650		.924
	N	13	13	13	13	13
X4	Pearson Correlation	-.821**	-.245	-.973**	.030	1
	Sig. (2-tailed)	.001	.419	.000	.924	
	N	13	13	13	13	13

Table 3.2 : ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1831.896	1	1831.896	22.799	.001b
	Residual	883.867	11	80.352		
	Total	2715.763	12			
2	Regression	2641.001	2	1320.500	176.627	.000c

	Residual	74.762	10	7.476		
	Total	2715.763	12			

a. Dependent Variable: Y

b. Predictors: (Constant), X4

c. Predictors: (Constant), X4, X1

Table 3.3 : Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.821a	.675	.645	8.96390	
2	.986b	.972	.967	2.73427	1.788

a. Predictors: (Constant), X4

b. Predictors: (Constant), X4, X1

Table 3.4 : Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	117.568	5.262		22.342	.000		
	X4	-.738	.155	-.821	-4.775	.001	1.000	1.000
2	(Constant)	103.097	2.124		48.540	.000		

	X4	-.614	.049	-.683	-12.621	.000	.940	1.064
	X1	1.440	.138	.563	10.403	.000	.940	1.064

Question 04

(Note : All the interpretation requires an appropriate hypothesis testing)

(a) The below figure , 4.1 depicts the scatter plot between fuel price and the number of customers travelled using their own private vehicle to a company. Interpret the figure (04 Marks)

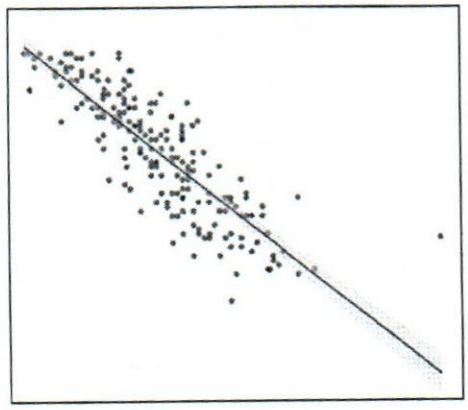

Figure 4.1

(b) The summary of a result obtained using SPSS for correlation analysis for height and weight is given below. Interpret the results appropriately. (06 Marks)

Pearson correlation – 0.888*
Significance (2-tailed) – 0.002*
N - 55

(c) Interpret the below model summary results obtained using SPSS for a regression done for :

X1: Gold demand and Supply
X2: Interest Rates
X3: Inflation Rate
Y: Gold Price

R : 0.808
R^2 : 0.751
Adjusted R^2 : 0.795
DW statistics: 1.998

(04 Marks)

(d) Interpret the below results (06 Marks)

Table 4.1 : Normality Test

Data	Shapiro – Wilk Test	Kolmogorov – Smimo Test
Height of the students in SCM batch 20-04	0.200	0.321
Height of the students in SCM batch 20-04	0.002	0.004

Question 05

Write short notes on any four (04) of the following (05 Marks * 04)

(a) Stationary Time Series
(b) Non-linear regression models
(c) Aggregate planning
(d) Deterministic and Stochastic models
(e) Trip Distribution Models

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Question 06

(a) Copy the table below in your answer scripts fill the table appropriate for the answers

(10 Marks)

Table 6.1 – Trading options

	Exercising rule	**Pay off**	**Profit**	**Payoff Graph**	**Profit Graph**
Call Option + Holder					
Call Option + Writer					
Put Option + Holder					
Put Option + Writer					

(b) Consider a European put option having below information:

- The risk free rate = 8% p.a
- Termination time period = 4 months
- Exercise Price = 98 LKR
- Up/ down jump = 10%
- Current Stock Price = 100 LKR

Using the one step Binomial Asset Pricing Model, calculate

(i) The Risk Natural Probability (05 Marks)

(ii) The Fair price of the Put Option (03 Marks)

If the data is same for a European call option, then calculate

(iii) The Fair price of the call option (02 Marks)

Question 07

(a) Derive the Basic Economic Order Quantity Model using the Total Inventory Cost Function. Write all the assumptions used in derivation of the model equation. (06 Marks)

(b) State two (02) extension models to the Basic EOQ model (02 Marks)

(c) The Procurement Manager of 'AVNI' which is a world-renowned brand name for wrist watches, is evaluating the options of purchasing the leather belts from a foreign supplier, which has predicted an annual demand of 10,500 units for the coming year. The foreign supplier, in his agreement has agreed on giving quantity discounts based on the lot size of purchasing

Considering the information and quantity discount schedules given below, calculate the 'Optimum Order Quantity' that minimizes the total cost. (Note - All the steps in calculating must be included)

Table 7.1 : Discounts Schedule

Discount Quantity	0 - 999	1000 - 1999	>2000
Discount	0%	5%	10%

The supplier has given the price of a leather belt as 50$ per unit, and the inventory carrying cost / holding cost is charged as a percentage of the price per unit at 20%. Ordering cost is 150$ per order.

If the procurement manager is deciding to go on purchasing higher quantities to get the advantage of discounts, advice on the suitability of the decision.

(12 Marks)

Question 08

(a) Briefly explain as to why it is important to link the aspects of operations management with supply chain management (04 Marks)

(b) State four (04) factors each, that affects the decisions of:

(i) Location Allocation

(ii) Transportation (04 Marks)

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(c) Considering the cost of assigning facilities to customer sites, build a Binary Integer Liner programme for the given matrix, by defining the binary decision variable.

$$\begin{bmatrix} C11 & C12 & C13 \\ . & . & . \\ . & . & C33 \end{bmatrix}$$

(06 Marks)

(d) Assumes the below table gives the distance data (in kms) for 05 different Economic Centers in Sri Lanka

Table 8.1 : The distance data for the wholesale points
Economic Centre = EC

	EC1	EC2	EC3	EC4	EC5
EC1	-	120	110	135	130
EC2	120	-	117	115	132
EC3	110	117	-	112	110
EC4	135	115	112	-	100
EC5	130	132	110	100	-

Give the most suitable point to establish a goods processing center, by using the 1-median location allocation model. (06 Marks)

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

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Year 3 Semester I
SEMESTER END EXAMINATION
Supply Chain Modelling and Analysis – BSCM3302

- Attachment

Use appropriate equations where necessary

$$\sqrt[n]{x1 * x2 * x3 * \ldots . xn}$$

$$\frac{x1+x2+x3+\cdots+xn}{n}$$

$$\left(\frac{n+1}{2}\right)^{th} term$$

$$\frac{\left(\frac{n}{2}\right)^{th} term + \left(\frac{n}{2}+1\right)^{th} term}{2}$$

$$\frac{\Sigma (x_i - \bar{x}) * (y_i - \bar{y})}{N}$$

$$\frac{\Sigma (x_i - \bar{x}) * (y_i - \bar{y})}{(N-1)}$$

$$\frac{\{S_0 * e^{rT} - S_0 d\}}{\{S_0 u - S_0 d\}}$$

$$e^{-rT} \{q * f_u + (1-q) * f_d\}$$

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Year 3 Semester I

REPEAT EXAMINATION

Production and Operations Management – BSCM3201

- This paper consists of SEVEN (07) questions on EIGHT (08) pages.
- Answer FOUR (04) 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.
- Write legibly.
- Formulae sheet is attached

Date: 2021.04.02 Pass mark: 40% Time: 02 Hours

Question 01 (Compulsory)

(a) Cosmetics sales firm over the last 10 weeks are shown in the table below. Determine the equation of the rend line, and preidct for weeks 11 and 12.

Week	Unit Sales	Week	Unit Sales
1	700	6	742
2	724	7	758
3	720	8	750
4	728	9	770
5	740	10	775

(10 Marks)

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(b) Using the following information, the Branch Manager of a Tourist Centre wants to predict the first quarter of next year demand for the purpose of writing a report to Top Management.

Month	Seasonal Relative	Month	Seasonal Relative
Jan	1.2	Jul	0.8
Feb	1.3	Aug	0.6
Mar	1.3	Sep	0.7
Apr	1.1	Oct	1.0
May	0.8	Nov	1.1
Jun	0.7	Dec	1.4

The monthly forecast equation being used is:

$F_t = 402 + 3t$

Where

t_0 = January of last year

F_t = Number of arrivals

Determine the number of arrivals of the first three months of next year. (15 Marks)

Question 02

(a) Discuss the difference between the cost of inputs and the value or price of outputs in operations management. (06 Marks)

(b) Define the term "Value Added" in Operations Management. (07 Marks)

(c) Identify the three major types of production facilities and describe each of them. (12 Marks)

Question 03

(a) Identify the main advantage and disadvantage of stadardisation. (05 Marks)

(b) Identify the term "Modular Design" and briefly explain the advantages of modular design. (08 Marks)

(c) Contrast applied research and basic research. (12 Marks)

Question 04

(a) Southern Oklahoma State University's business programme has the facilities and faculty to handle an enrollment of 2,000 students per semester. However in an effort to limit class sizes to a "reasonable" level" (under 200, generally), dean placed a ceiling on enrollment of 1,500 students. Although there was ample demand for business course last semester, conflicting schedules allowed only 1,450 students to

take business course. What are the utilization and efficiency of this system?

(07 Marks)

(b) A product at ABC Company has enjoyed reasonable sales volumes, but its' contribution to profits has been disappointing. Last year, 17,500 units were produced and sold. The selling price is Rs.22.00 per unit. Variable cost and fixed costs are Rs.8.00 and Rs. 80,000 respectively.

(i) What is the breakeven quantity? Explain your answer using an appropriate graph. (08 Marks)

(ii) Management of the "ABC" Company believes that sales can be increased by 30% or that variable cost can be reduced to 85% of its current level. Which alteration will be the best (increasing sales or reducing variable cost) if both alternations are equally cost to implement? (10 Marks)

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Question 05

(a) A large manufacturer of erasers is planning to add a new line of erasers, and you have been asked to balance the process, given the following task times and precedence relationships. Assume that cycle time is to be the minimum possible.

Table 5:1 – Task Time

Task	Lenghth (Minutes)	Immediate Follower
a	0.2	b
b	0.4	d
c	0.3	d
d	1.3	g
e	0.1	f
f	0.8	g
g	0.3	h
h	1.2	end

(i) Draw the precedence diagram. (03 Marks)

(ii) Assign tasks to stations in order of greatest number of following tasks. (09 Marks)

(iii) Determine the percentage of idle time. (03 Marks)

(iv) Compute the rate of output that could be expected for this line assuming a 420-minute working day. (05 Marks)

(v) What is the shortest cycle time that will permit use of only two workstations? Is this cycle time feasible? (05 Marks)

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Question 06

Now juice, Inc., produces bottled pickle juice. A planner has developed an aggregate forecast for demand (in cases) for the next six months.

Month	May	Jun	Jul	Aug	Sep	Oct
Forecast	4000	4800	5600	7200	6400	5000

Use the following information to develop aggregate plans

Regular Production cost	Rs. 10 per case
Regular Production capacity	5, 000 cases
Overtime Production cost	Rs. 16 per case
Subcontracting cost	Rs. 20 per case
Holding cost	Rs. 10 per case per month
Beginning Inventory	0 units

Develop an aggregate plan using a combination of overtime (500 cases per period maximum), inventory, and subcontracting (500 cases per period maximum) to handle variations in demand. (25 Marks)

Question 07

(a) Breifly explain the need for methods analysis. (03 Marks)

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(b) Breifly describe two charts that are used in method analysis. (07 Marks)

(c) Breifly explain the motion study principles. (07 Marks)

(d) How to identify a qualified worker? (08 Marks)

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

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Formula Sheet

Simple Moving Average

$$F_{t+1} = \frac{D_t + D_{t-1} + \ldots + D_{t-n+1}}{n}$$

D_t : actual demand in period *t*

n : number of periods in the average

1. **Weighted Moving Average**

$$T_{t+1} = W_1D_1 + W_2D_{t-1} + \ldots + W_nD_{t-n+1}$$

2. **Exponential Smoothing**

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

F_t = new forecast

F_{t-1} = previous forecast

α = smoothing (or weighting) constant ($0 \leq \alpha \geq 1$)

4. **Trend Projections**

$y = a + bx$

y = computed value of the variable to be predicted

a = y-axis intercept

b = slope of the regression line

x = the independent variable

$$b = \frac{\Sigma xy - n\bar{x}\bar{y}}{\Sigma x^2 - n\bar{x}^2} \qquad a = \bar{y} - b\bar{x}$$

5. **Exponential Smoothing with Trend Adjustment**

$$F_t = \alpha (A_{t-1}) + (1- \alpha) (F_{t-1} + T_{t-1})$$

$$T_t = \beta (F_t - F_{t-1}) + (1-\beta) T_{t-1}$$

$$FIT_t = F_t + T_t$$

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Year 3 Semester I
REPEAT EXAMINATION
Supply Chain Modelling and Analysis – BSCM3302

- This paper consists of EIGHT (08) questions on NINE (09) pages.
- Answer FIVE (05) 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.
- Write legibly.
- Supporting documents are attached.

Date: 2021.04.02 Pass mark: 40% Time: 03 Hours

Question 01: (Compulsory)

Write short answers. All questions must be answered (02*10 Marks)

(i) Describe briefly the Type I and Type II errors in Hypothesis testing

(ii) List down four (04) non-probability sampling techniques.

(iii) Briefly describe the 'IPO' model in Financial planning

(iv) What is mean by Multicollinearity?

(v) Give another name for Intrinsically Linear Models

(vi) Distinguish between the population and a sample

(vii) Write down the 04 diagnostic test for testing residuals in a SLR analysis with the appropriate tests used in SPSS.

(viii) Write down the common model of a Simple Linear Regression defining suitable parameters

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(ix) What are the variable selection methods used in SPSS for model building in a Multiple Regression Analysis?

(x) Write an example hypothesis for a two-tailed hypothesis testing

Question 02

(a) Given in the table 2.1 below is an SPSS output taken for the data of the production volumes of a particular production line of 'soap' in an FMCG company. Perform a suitable hypothesis testing and interpret the results with the decision and conclusion. (06 Marks)

Table 2.1 : One-Sample Test for production line data

	Test Value = 120					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Production_Line (Fragranced Soap)	-11.856	11	.000	-39.417	-46.73	-32.10

(b) Given in the table 2.2 below is an SPSS output taken for the data of the production volumes of a particular production line before and after expansion of the production line. Perform a suitable hypothesis testing and interpret the results with the decision and conclusion. (06 Marks)

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Table 2.2 : Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Before Expansion _ After Expansion	-10.867	14.035	3.624	-18.639	-3.094	-2.999	14	.010

(c) Given in the table 2.3 below given the results of an 'independent sample t test' done for two production lines (Production line 1 and Production line 2) of fragranced soap. Perform a suitable hypothesis testing and interpret the results with the decisions and conclusions. (Hint : You must first test for the Levene's test of homogeneity of variance)

(08 Marks)

Table 2.3: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Production _Line_1_Vs.	Equal variances assumed	3.016	.093	2.787	28	.009	10.867	3.899	2.881	18.852

_Production _Line_2	Equal variances not assumed			2.787	23.358	.010	10.867	3.899	2.809	18.925

Question 03

(a) What are the summary statistics that are represented in a box plot? Illustrate five (05) of them using a suitable figure (05 Marks)

(b) Illustrate the negatively and positively skewed box plots. (05 Marks)

(c) The below data shows the daily dispatch volumes of pallets in three Warehouses in 2 Locations for 15 consecutive days.

D = Days and W = Warehouse

Days	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
W1	428	485	332	353	332	319	297	291	484	387
W2	423	302	298	302	279	459	271	302	318	475

Days	D11	D12	D13	D14	D15
W1	445	485	410	436	337
W2	392	262	405	302	457

(i) Calculate the Mode and Median for each warehouse (03 Marks)

(ii) Calculate the Arithmetic Mean of Dispatch volumes for each warehouse (02 Marks)

(iii) Calculate the Covariance between W1 and W2 considering data as a sample (05 Marks)

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Question 04

(a) List down four (04) most common types of Corporate Financial Models (02 Marks)

(b) Distinguish between American Put, European Put, American Call and European Call options (06 Marks)

(c) Fill in the table with appropriate details with the knowledge of trading options for stocks using the below notations. (Copy the table to the answer booklet) (12 Marks)

(i) Strike Price = S_T
(ii) Exercise Price = K
(iii) Premium for call = c
(iv) Premium for put = p

Table 4.1 : Trading Options

Option	Party involved in trading options	Exercising rule	Payoff for the option	Profit for the option	Profit graph against the strike price
Put Option	Seller				
Call Option	Seller				
Call Option	Buyer				
Put Option	Buyer				

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Question 05

(a) State the model assumptions of an Economic Order Quantity Model (06 Marks)

(b) Derive the below equation for the Economic Order Quantity, using the total inventory cost function (with differentiation technique) under suitable interpretations

$$Q^* = \sqrt{\frac{2DS}{H}}$$

(06 Marks)

(c) A fast food outlet uses an average of 45 cans of 'Fruit Juice Powder-FJP' each week. Weekly usage of FJP has a STD of 3 cans. The manger is willing to accept no more than a 5% percent risk of stockout during lead time, which is 2 weeks in average and with a STD of 1 week. Determine the ROP using the details by assuming the demand (usage) in Normally distributed.
The Normal Distribution table value at $\alpha = 5\%$ is 1.64 (08 Marks)

Question 06

Write Short Notes on any four (05) of the following (05*04 Marks)

(a) Single Echelon and Multi Echelon inventory systems
(b) Types of Transport Surveys
(c) Statistical Inferences
(d) Factors Influencing Modal Choice
(e) Cost Benefit Analysis and Benefit to Cost Ratio

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Question 07

(a) Interpret the correlation results in the below table (table 7.1) obtained from an analysis of SPSS. Use appropriate hypothesis (04 Marks)

Table 7.1 : Correlations

		Student admissions to BSCM degree programme _ A/L Mathematics Stream	Student admissions to BSCM degree programme _ A/L Commerce Stream
Student admissions to BSCM degree programme _ A/L Mathematics Stream	Pearson Correlation	1	.090
	Sig. (2-tailed)		.106
	N	300	300
Student admissions to BSCM degree programme _ A/L Commerce Stream	Pearson Correlation	.090	1
	Sig. (2-tailed)	.106	
	N	300	300

(b) Interpret the R^2 results in the below table (table 7.2) obtained from an analysis in SPSS (03 Marks)

Table 7.2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.573[a]	.328	.327	22.490

a. Predictors: (Constant), Average Distance Travelled

(c) Interpret the model justification using the results in the below table (table 7.3) using suitable hypothesis. (05 Marks)

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Table 7.3 : ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	112039.795	1	112039.795	221.508	.000[b]
	Residual	229129.950	453	505.806		
	Total	341169.745	454			
a. Dependent Variable: Distribution Cost per unit						
b. Predictors: (Constant), Average Distance Travelled						

(d) Interpret the coefficients of the model using the results in the below table (table 7.4) using suitable hypothesis. (06 Marks)

Table 7.4 : Coefficients						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	95.679	3.170		30.185	.000
	Average Distance Travelled	-34.137	2.294	-.573	-14.883	.000
a. Dependent Variable: Distribution Cost per unit						

(e) Write the model for the above results (02 Marks)

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Question 08

(a) Briefly explain on the characteristics of production decisions and location decisions in Supply Chain Decision making (06 Marks)

(b) Identify the Objective function and constraints of an assignment model related to location allocation decisions. Illustrate with an appropriate matrix. (06 Marks)

(c) Determine the solution for the best location to fix a Central Distribution Center considering the distance data (for 05 Wholesaler Points-WSP) given below using 1-median location allocation model. (08 Marks)

Table 8.1 : Distance data for 05 Wholesaler points

	WSP1	WSP2	WSP3	WSP4	WSP5
WSP1	-	100.5	150	160	122.5
WSP2	100.5	-	180	140.5	160
WSP3	150	180	-	200.75	160
WSP4	160	140.5	200.75	-	130
WSP5	122.5	160	160	130	-

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

Attachment
Formulae Sheet

Select and Apply the Appropriate Formulae where Necessary

$$\text{Mean} = \frac{X_1+X_2+X_3+\cdots+X_n}{n}$$

$$\text{Mean} = \sqrt[n]{X_1 + X_2 + X_3 + \cdots + X_n}$$

$$\text{Median} = \left(\frac{n+1}{2}\right) th\ term$$

$$\text{Median} = \frac{\left(\frac{n}{2}\right) th\ Term + \left(\frac{n}{2}+1\right) th\ Term}{2}$$

$$Cov\ (x,y) = \frac{\sum\{\ (x_i - \bar{x}) * (y_i - \bar{y})\}}{(n-1)}$$

$$Cov\ (x,y) = \frac{\sum\{\ (x_i - \bar{x}) * (y_i - \bar{y})\}}{(N)}$$

$$s^2 = \frac{\sum\{\ (x_i - \bar{x})^2\}}{(n-1)}$$

$$\sigma^2 = \frac{\sum\{\ (x_i - \mu)^2\}}{(N)}$$

$$ROP = (d * l)$$

$$ROP = (\mu_D * \mu_L) + Z\alpha * \sqrt{(\mu_L * \sigma_D^2 + (\mu_D * \sigma_L^2)}$$

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Year 3 Semester I
SEMESTER END EXAMINATION
Transport Planning and Logistics Management – BSCM3208

- This paper consists of SEVEN questions on SIX (06) pages.
- Answer FOUR 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.
- Write Legibly.

Date: 2020.09.29 Pass mark: 40% Time: 02 Hours

Question 01: (Compulsory)

(a) State briefly the role of planning transportation in logistics management.

(03 Marks)

(b) Briefly explain the implication on economic rationality behind choices of freight movement.

(06 Marks)

(c) Define the following terminologies commonly used in transportation network.

I. Link
II. Node
III. Flow
IV. Path
V. Cycle
VI. Tree

(06 Marks)

(d) Briefly explain the usage of Dijkstra's algorithm in transportation network.

(04 Marks)

(e) Briefly explain the conservation law on transportation network taking into consideration the flows of network. (Hint – both centroid and intermediate nodes have to be considered)

(02 Marks)

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(f) Briefly discuss the term 'generalized cost' in terms of freight transportation that is highly useful for planning trip distribution and mode choice.

(04 Marks)

Question 02

(a) State each example for the following transportation networks

I. Linear network

II. Grid network

(04 Marks)

(b) Explain two (02) advantages of hub and spoke network.

(06 Marks)

(c) Describe three (03) indexes that can be used to measure the efficiency of the transport network.

(06 Marks)

(d) Explain how can road pricing be a solution to reduce traffic congestion in cities.

(05 Marks)

(e) Discuss two advantages of having an efficient freight transport systems through railways in Sri Lanka.

(04 Marks)

Question 03

(a) Assume that the number of truck trips at a given location on an average weekday was 10,000 in 2005 and 15,000 in 2010. Estimate the number of truck trips for the year 2020. (Hint - Use simple growth factor method based on historic traffic trends)

(04 Marks)

(b) Find the total flow through the network shown in Q3-b when the node 1 is the source and node 4 is the sink. Flows between nodes are shown in the figure.

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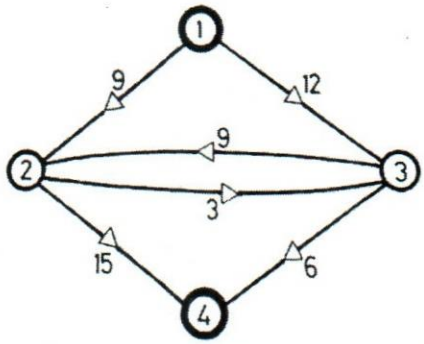

Figure Q3-b: Transportation network flow conservation law to be applied

(03 Marks)

(c) Determine the Minimum Spanning Tree (MST) for the transportation network shown in figure Q3-c.

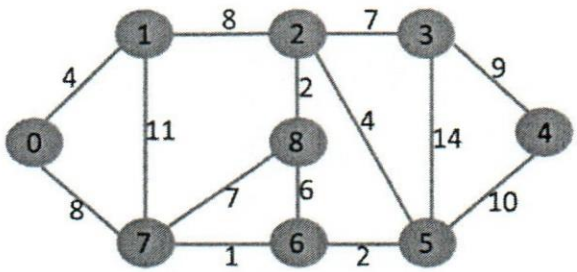

Figure Q3-c: Transportation network to which MST to be found

(15 Marks)

(d) State three practical application of MST.

(03 Marks)

Question 04

(a) State two functionalities of transportation in terms of freight movement.

(02 Marks)

(b) Find the shortest route from the origin O to the destination T for the network shown in figure Q4-b using Dijkstra's Algorithm. The travel cost between nodes are stipulated in the figure.

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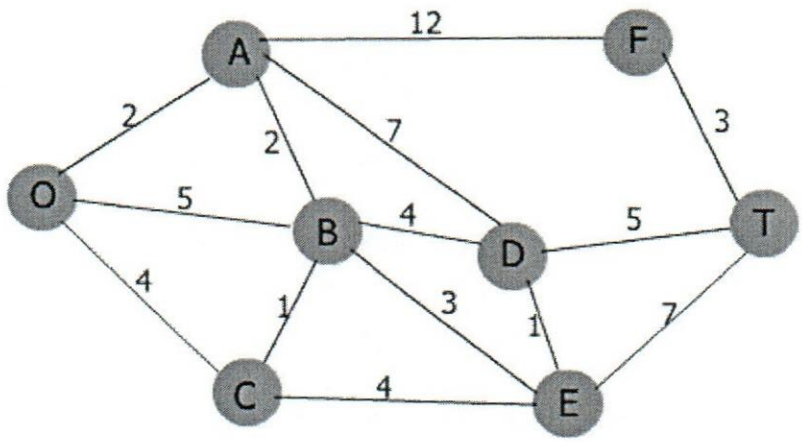

Figure Q4-b: Network to which shortest paths to be found out using Dijkstra Algorithm

(17 Marks)

(c) Identify three contributions that containerization has made to the change of era in international trade.

(06 Marks)

Question 05

(a) Fill the table Q5-a shown below using the modal characteristics of transportation modes.

Table Q5-a: Table to be filled

Mode	Advantage (01)	Disadvantage (01)
Rail		
Highway		
Water		
Pipeline		
Air		

(05 Marks)

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(b) Determine the maximum flow between node s and node t of the transportation network shown in figure Q5-b. Capacities of individual branches are shown on the figure.

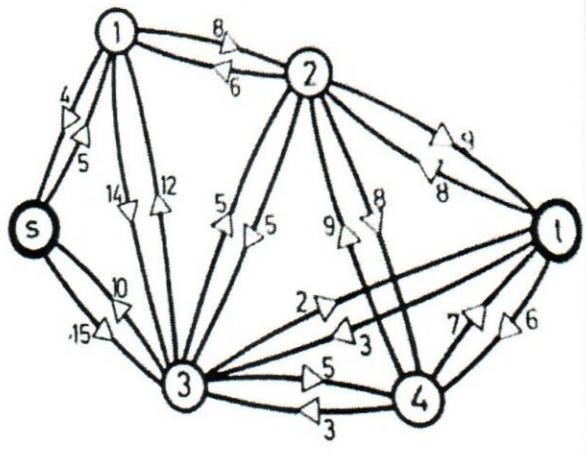

Figure Q5-b: The transportation network for which maximum flow to be found between node s and node t

(20 Marks)

Question 06

(a) Identify two factors that contribute for the economic development of a country.

(02 Marks)

(b) Find a tour which starts and finishes at node A using Chinese Postman Problem for an oriented network.

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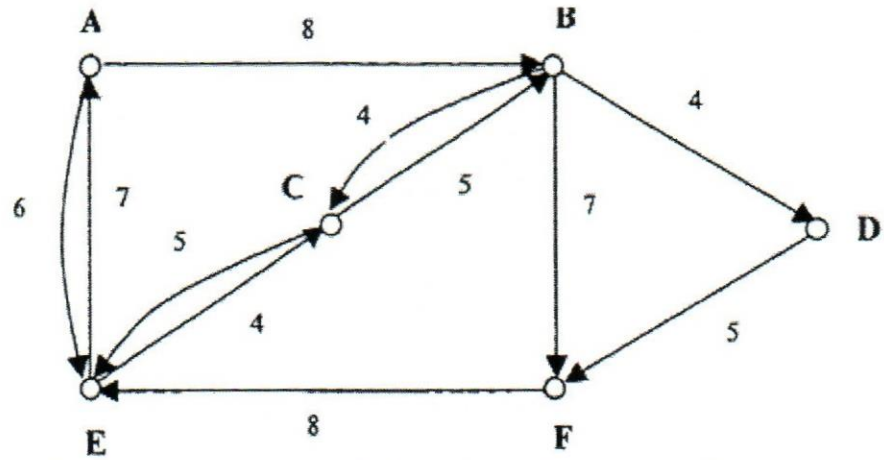

Figure Q6-b: Oriented network for solving the Chinese Postman problem

(17 Marks)

(c) State three ways that freight transportation helps for the economic development.

(06 Marks)

Question 07

Briefly describe the practical method of calculating the following transport network cost.

(a) Fuel cost
(b) Delay cost due to road condition such as congestion
(c) Tyre cost
(d) Vehicle depreciation cost
(e) Vehicle repair cost

(5X5 Marks)

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

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence Level										

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Year 3 Semester I

SEMESTER END EXAMINATION

Customs and Commodity Inspections Operations – BSCM3207

- This paper consists of SEVEN questions on FOUR (04) pages.
- Answer FOUR 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.
- Write Legibly.
- Required documents are attached.

Date: 2020.09.27 Pass mark: 40% Time: 02 Hours

Question 01 (Compulsory)

Nikko Best (Pvt) Ltd has imported 01 unit of used Toyota Aqua hybrid car (model NHP10) fitted with a 1,490 cc hybrid engine from Japan. The price agreed was JPY 1,400,000 Ex Works. In addition to that Nikko Best (Pvt) Ltd has paid JPY 35,000 as local handling charges to a handling company in Japan. However according to the list of minimum values published by the Sri Lanka Customs the minimum FOB price of Toyota Aqua NHP10 is JPY 1,895,000.

Ms. NYK Line Lanka (Pvt) Ltd has endorsed on the copy of the Bill of Lading that their standard freight cost is USD 65 per CBM. The volume of a Toyota Aqua car is 14.55 CBM.

The marine insurance has been obtained locally from the Sri Lanka Insurance Corporation for Rs. 7,250/=.

According to the Sri Lanka Tariff Guide 2016 the hybrid motor cars having a spark-ignition internal combustion reciprocating piston engine with a capacity less than 1500cc are classified within HS Code 8703.22.51 and the following taxes are payable to Sri Lanka Customs at the time of clearance.

(A)Customs Duty	- 25%
(B) VAT	- 11%
(C)PAL	- 5%
(D)NBT	- 2%
(E) Excise (SP) Duty	- 92% or Rs. 1,750/= per cubic centimetre of engine.

Exchange Rates are Rs. 145.8899 per US Dollar and Rs. 1.2416 per Japanese Yen.

Calculate all five taxes payable for the subject vehicle. Formulas are provided in the attached document to this question paper.

(25 Marks)

Question 02

Grand International Group is a multinational company based in the USA and the rights holder of several world renowned brands including "Walker" and "Bee" brands.

Great Walker Ltd is a Shoe manufacturing company based in China. They manufacture "Walker" brand Shoes according to the specified quality of Grand International Group and supply the same only to the buyers nominated by Grand International Group. Grand International Group holds 63% of shares of Great Walker Ltd and several Directors of Great Walker Ltd are also Directors of Grand International Group.

Grand Lanka Ltd is a Sri Lankan trading company registered under the Companies Act. However, Grand International Group holds 98% of shares of Grand Lanka Ltd. Several Directors including the Managing Director of Grand Lanka Ltd are also Directors of Grand International Group. Grand Lanka Ltd has been appointed by Grand International as their Sole-Agent in Sri Lanka for the sale of "Walker" brand Shoes. In addition to the Sole-Agency Agreement Grand Lanka Ltd has also entered into an agreement with Grand International Group termed as Royalty Agreement. According to this Royalty Agreement, Grand Lanka has to pay 5% of the Ex-Work price as Royalty to Grand International Group for the "Walker" brand Shoes purchased from Great Walker Ltd.

Grand Lanka has imported a shipment of 01x20' container said to contain 5,000 pairs of "Walker" brand Shoes from Great Walker Ltd. The Ex-Work price agreed is USD 2.50 per pair of Shoes. Grand Lanka has entrusted the transportation of the said

container from China to the Port of Colombo to a Freight Forwarding company namely Sea-Sky Lanka Ltd. They have issued a quotation containing the following charges.

Charges at Origin

Sea Freight	- USD 1285
Packing Cost	- USD 315
Inland Transport	- USD 725
Handling Charges	- USD 165

Charges at Destination

Terminal Handling (THC)	- USD 250
Container Deposit	- Rs. 5750
Container Washing	- Rs. 1150

In addition to the above charges the Sea-Sky Lanka Ltd has also charged USD 150 as Bunker Adjustment Fee (BAF) and USD 110 as Currency Adjustment Fee (CAF) on the arrival of the container. The marine insurance has been obtained locally from Sri Lanka Insurance Company on payment of Rs. 16,875/= for the whole shipment. The Exchange Rate is Rs. 135.00 per US Dollar.

(a) Calculate the **Cost of Transport** of the subject shipment from the warehouse of Great Walker Ltd to the Port of Colombo in **USD** (08 Marks)

(b) Calculate the amount of **Royalty** payable to Grand International Group by Grand Lanka Ltd against the subject shipment in **USD** (08 Marks)

(c) Calculate the **Customs Value** of the subject shipment in **Sri Lankan Rupees** (09 Marks)

Question 03

Write an essay describing the structure, functions, objectives and the legal framework of the Sri Lanka Customs (25 Marks)

Question 04

(a) Name the **6 methods** given in the WTO Valuation Agreement to determine the Customs (12 Marks)

(b) Explain the **method 1** and the adjustments to be made to the value so determined (13 Marks)

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Question 05

(A) Name the documents required to clear the imported goods through Customs.

(B) Explain in details the steps you should follow in clearing imported goods through Customs.

(25 Marks)

Question 06

Explain in detail the 6 General Rules for the interpretation of Harmonized System (GRI) with suitable examples.

(25 Marks)

Question 07

Select 05 topics from the following topics and write 05 short essays

(A) Customs Ordinance
(B) Imports and Exports (Control) Act
(C) Methods of payment in international trade
(D) Bill of Lading/ Airway Bill
(E) Non-Tariff Barriers
(F) General Agreement on Tariff and Trade (GATT)
(G) Section 10 of the Customs Ordinance of Sri Lanka

(25 Marks)

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

Computation formulae for imported goods

Where

v	=	CIF value in Rupee
c	=	Cess levy under Sri Lanka Export Development Act
d	=	Customs Duty
e	=	Excise (Special Provisions) Duty (ED)
t	=	Value Added Tax (VAT)
n	=	Nation Building Tax
p	=	Port and Airport Development Levy (PAL)
r_e	=	Rate of Excise (Special Provisions) Duty (ED)
r_t	=	Rate of Value Added Tax (VAT)
r_n	=	Rate of Nation Building Tax

- Customs Duty (d) = (CIF value) × (Customs duty rate)
  or
  = (quantity) × (unit rate of customs duty)

- Value Added Tax (t) = (v + 10% of v + d + c + p + e) × r_t

- Cess Levy (c) = (v + 10% of v) × (Cess levy rate)
  or
  = (quantity) × (unit rate of Cess levy)

- Port and Airport Development Levy (p) = (CIF value) × (PAL rate)

- Excise (Special Provisions) Duty (e) = (v + 15% of v+ d + c + p)× r_e
  or
  = (quantity) × (unit rate of Excise Duty)

- Special Commodity Levy = (Quantity) × (unit rate of Special Commodity Levy)

- Nation Building Tax (n) = (v +10%v + d + c + p + e) r_n

Schedule

Rates of Exchange Effective From 26.08.2019 to 01.09.2019

	Country	Country Code	Currency	Currency Code	Rate of Exchange (Rs.)
1	Australia	AU	Dollar	AUD	122.5013
2	Bahrain	BH	Dinar	BHD	480.7536
3	Bangladesh	BD	Taka	BDT	2.1472
4	Brazil	BR	Brazil Real	BRL	44.5388
5	Brunei	BN	Brunei Dollar	BND	130.7519
6	Canada	CA	Canadian Dollar	CAD	136.1082
7	China	CN	Renminbi	CNY	25.5432
8	China	CN	Offshore	CNH	25.5238
9	Czechoslovakia	CZ	Koruna	CZK	7.7845
10	Denmark	DK	Kroner	DKK	26.9204
11	Egypt	EG	Pound	EGP	10.9379
12	Euro Zone		Euro	EUR	200.7161
13	Ghana	GH	Cedi	GHS	33.2554
14	Hongkong	HK	Dollar	HKD	23.1213
15	Hungary	HU	Forint	HUF	0.6116
16	India	IN	Rupee	INR	2.5197
17	Indonesia	ID	Rupiah	IDR	0.0127
18	Iran	IR	Riyal	IRR	0.0043
19	Japan	JP	Yen	JPY	1.7013
20	Jordan	JO	Dinar	JOD	255.6300
21	Korea	KR	Won	KRW	0.1492
22	Kuwait	KW	Dinar	KWD	595.8958
23	Macau	MO	Pataca	MOP	22.4448
24	Malaysia	MY	Ringgit	MYR	43.2609
25	Maldives	MV	Rufiya	MVR	11.7233
26	Mauritius	MU	Rupee	MUR	5.0067
27	Myanmar	MM	Kyat	MMK	0.1192
28	Nepal	NP	Rupee	NPR	1.5773
29	New Zealand	NZ	Dollar	NZD	115.8316
30	Nigeria	NG	Naira	NGN	0.5914
31	Norway	NO	Kroner	NOK	20.1745
32	Oman	OM	Riyal	OMR	470.7515
33	Pakistan	PK	Rupee	PKR	1.1363
34	Papua New Guinea	PG	Kina	PGK	53.3757
35	Philippines	PH	Peso	PHP	3.4601
36	Poland	PL	Zloty	PLN	46.0407
37	Qatar	QA	Riyal	QAR	49.7780
38	Russia	RU	Rouble	RUB	2.7635
39	Saudi Arabia	SA	Riyal	SAR	48.3266
40	Seychelles	SC	Rupee	SCR	13.2584
41	Singapore	SG	Dollar	SGD	130.7519
42	South Africa	ZA	Rand	ZAR	11.8970
43	Sweden	SE	Krona	SEK	18.7291
44	Switzerland	CH	Francs	CHF	184.1045
45	Taiwan	TW	Dollar	TWD	5.7701
46	Thailand	TH	Baht	THB	5.8854
47	U.A.E.	AE	Dirham	AED	49.3423
48	United Kingdom	GB	Sterling Pound	GBP	221.7855
49	United States of America	US	Dollar	USD	181.2417
50	Zambia (Old)	ZM	Kwacha	ZMK	0.0349
51	Zambia (New)	ZM	Kwacha	ZMW	13.8247
52	Zimbabwe	ZW	Dollar	ZWD	0.4776

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Year 3 Semester I
SEMESTER END EXAMINATION
Operational Research – BSCM3203

- This paper consists of SEVEN questions on TWELVE (12) pages.
- Answer FOUR 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.
- Write Legibly.

Date: 2020.09.25 Pass mark: 40% Time: 02 Hours

Question 01 (Compulsory)

(a) Hynas International is a firm produces an alloy having the following specifications:

- Specific Gravity <= 0.98
- Chromium >= 8%
- Melting point >= 450 ^{0}C

Three raw materials namely P, Q and R having the properties shown in the table 1.01, can be used to make the alloy.

Property	P	Q	R
Specific Gravity	0.92	0.97	1.04
Chromium	7%	13%	16%
Melting Point	440^{o}C	490^{o}C	480^{o}C

Costs of the raw materials per ton are LKR 900, LKR 2800 and LKR 400 for P, Q and R respectively.

Formulate a LP model to find the proportions in which P,Q and R be used to obtain an alloy of desired properties while the cost of raw materials is minimum.

(10 Marks)

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(b) Answer the MCQ questions given below. Write the correct answer on the answer book (15 Marks)

1. Operations Research approach is ……..,
   A. Multi-disciplinary
   B. Scientific
   C. Intuitive
   D. Collect essential data

2. A feasible solution to a linear programming problem ……..
   A. Must satisfy all the constraints of the problem simultaneosly
   B. Need not to satosfy all the constraints but only some of them
   C. Must be a corner point of the feasible region
   D. Must optimize the value of the objective function

3. An optimal solution to a linear programming problem ……..
   A. Must satisfy all the constraints of the problem simultaneosly
   B. Must be a corner point of the feasible region
   C. Must optimize the value of the objective function
   D. All of the above.

Consider the LP problem given below. Question 4,5 and 6 based on this LP problem

Min Z = 5 X1 + 7 X2
Subject to constraints
2X1 + 3 X2 >= 42
X1 + X2 >= 18
X1, X2 >= 0

4. What is the dual objective function of the above primal problem?
   A. Min Z = 42Y1 + 18 Y2
   B. Max Z = 7Y1 + 5 Y2
   C. Max Z = 42 Y1 + 18 Y2
   D. Min Z = 42 Y1 – 18 Y2

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5. Consider the statements given below.
   a. There exit two decision variables in the dual problem
   b. One constraint can be written as 2Y1 + Y2 >= 5
   c. Primal problem can be solved using Dual Simplex algorithm

   What is the correct statement/s?

   A. a. only
   B. a. and b. only
   C. a. and c. only
   D. all of the above

6. Constaints of the dual problem are,
   A. 2Y1 + Y2 <=5 and 3Y1 + Y2 >= 7
   B. 2Y1 + Y2 <=5 and 3Y1 + Y2 <= 7
   C. 2Y1 + Y2 >=5 and 3Y1 + Y2 <= 7
   D. 2Y1 + Y2 >=5 and 3Y1 + Y2 >= 7

Table given below is an initial table of a Linear programming problem with maximization objective function and Two-phase method is used to solve the LP Problem. Question 7 and 8 are based on the below table.

BASIC	X1	X2	X3	S1	S2	R1	VALUE	RATIO
S1	2	1	1	1	0	0	2	
R1	3	3	2	0	-1	1	8	
Z	-2	-2	-4	0	0	0	0	
F	3	4	2	0	-1	0	8	

7. What is the entering variable of the above table according to Two-phase method.
   A. S1
   B. X1
   C. X2
   D. X3

8. What is the leaving variable of the above table according to Two-phase method?
   A. X1
   B. X2
   C. S1
   D. R1

9. The purpose of the method of Multipliers is to
   A. assist one in moving from an initial feasible solution to the optimal solution.
   B. determine whether a given solution is feasible or not
   C. identify the relevant costs in a transportation problem.
   D. develop the initial solution to the transportation problem.

10. An initial transportation solution appears in the table given below.

	C	D	Factory Capacity
A	10	0	10
B	15	25	40
Warehouse Demand	25	25	50

Can this solution be improved if it costs $5 per unit to ship from A to C; $7 per unit to ship from A to D; $8 to ship from B to C; and $9 to ship from B to D?

A. Yes, the initial solution can be improved by $10.
B. No, this solution is optimal.
C. Yes, this solution can be improved by $50.
D. Yes, this solution can be improved by $100.

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11. What is the cost of the transportation solution shown in the table?

	W	X	Y	Supply
A	$3 20	$5 50	$9 0	70
B	$5 0	$4 30	$7 0	30
C	$10 40	$8 0	$3 80	120
Demand	60	80	80	220

A. $1350

B. $1070

C. $1230

D. $1150

12. In order for a linear programming problem to have a unique solution, the solution must exist .....

A. at the intersection of the nonnegativity constraints.

B. at the intersection of two or more constraints.

C. at the intersection of a nonnegativity constraint and a resource constraint.

D. at the intersection of the objective function and a constraint.

13. Unboundedness is usually a sign that the LP problem

A. has finite multiple solutions
B. is degenerate.
C. contains too many redundant constraints.
D. has been formulated improperly.

14. The transportation method assumes that .....

A. there are no economies of scale if large quantities are shipped from one source to one destination.
B. the number of occupied squares in any solution must be equal to the number of rows in the table plus the number of columns in the table plus 1
C. there is only one optimal solution for each problem.
D. the number of dummy sources equals the number of dummy destinations.

15. if the feasible region of a LP model is empty, the solution is,

A. infeasible
B. unbounded
C. alternative
D. degeneracy

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Question 02

Use graphical method to solve the following LP model. (25 Marks)

Max Z = 7X1 + 3X2
Subject to
X1 + 2X2 ≥ 3
X1 + X2 ≤ 4
X1≤ 3
X2 ≤ 2
X1, X2 ≥ 0

Question 03

Solve below LP model using Simplex method. (25 Marks)
Max Z = 4X1 + 3X2
Subject to constraints
2X1 + X2 <= 1000
X1 + X2 <= 800
X1 <= 400
X2 <= 700
X1, X2 >=0

Question 04

Solve below LP Model using Two Phase Method. Clearly mention the Phase I Objective function. (25 Marks)
Min Z = 5 X1 + 7 X2
Subject to constraints
2X1 + 3 X2 >= 42
X1 + X2 >= 18
X1, X2 >= 0

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Question 05

Consider the LP model given below

Minimize Z = 6X1 + 4X2

Subject to constraints

4X1 + X2 >= 2

3X1 + 2X2 >=3

X1 + 5X2 >= 1

X1,X2 >= 0.

(a) Find the dual problem of this primal problem (05 Marks)

(b) Solve the primal problem using dual simplex method. (10 Marks)

(c) Solve the dual proble obtained in part (a) using any appropriate method. (10 Marks)

Question 06

Mr. Silva is the Managing Director of Sewana Cement Manufacturing company is concerned with the problem of distributing the cement from three factories to four distribution centers. The supplies of Cement in each factory is as follows.

Table 6.01

Factory Name	Supply Tonnes per week
Factory 1	20,000
Factory 2	38,000
Factory 3	16,000

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The demand at four distribution centers are as follows

Table 6.02

Distribution Centre	Demand Tonnes per week
A	10,000
B	18,000
C	22,000
D	24,000

The transportation cost is USD 0.5 per tonne per kilometre. The distance between the Factories and the distribution centers is as given below.

Table 6.03

	A	B	C	D
Factory 1	50	60	100	50
Factory 2	80	40	70	80
Factory 3	90	70	30	50

(a) Find the initial solution using North West Corner Method (05 Marks)
(b) Find the initial transportation cost. (02 Marks)
(c) Find the Optimal Solution using method of multipliers. (12 Marks)
(d) Find the optimal transportation cost (02 Marks)
(e) Show the optimal transportation schedule in a diagram. (04 Marks)

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Question 07

LMS is software solutions that manage administration, monitoring, and reporting of online courses and training programs within an organization. It serves as a **virtual classroom** where teachers can interact with their students and conduct learning activities online.

CINEC LMS had one system administrator and students contact the system administrator to assist their LMS related problems.

Time between students' requests and service time of the system administrator is shown in below tables.

Table 7.1: distribution of time between arrivals (students' requests)

Time between arrivals (in minutes)	Probability
1	0.25
2	0.40
3	0.20
4	0.15

Table 7.2: distribution of service time of System Administrator

Service time (in minutes)	Probability
2	0.30
3	0.28
4	0.25
5	0.17

During the lockdown period of COVID-19 pandemic in Sri Lanka, CINEC decided to recruit assistant system administrator as one person cannot assist all students' request as LMS was the only one option for staff and students to continue their academic work. Efficiency of the assistant system administrator is not as good as the system administrator, so system administrator is preferred when both of them are available. Service time of the assistant system administrator is given below.

Table 7.3: distribution of service time of B

Service time (in minutes)	Probability
3	0.35
4	0.25
5	0.20
6	0.20

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Consider the following random numbers and simulate the above and discuss the followings;

1. Distribution of each student delay to get the service and the average waiting time of students
2. Probability of waiting time
3. Probability of waiting time for both A and B

Random numbers for arrivals (Students' requests):

89, 24, 56, 60, 34, 92, 45, 40, 8, 73, 15

Random numbers for service time of system administrator:

88, 63, 23, 94, 74, 17, 11, 41

Random numbers for service time of assistant system administrator:

42, 53, 93, 24, 51, 16, 41

(25 Marks)

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

Library

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Year 3 Semester I
SEMESTER END EXAMINATION
Supply Chain Modelling and Analysis – BSCM3302

- This paper consists of EIGHT (08) questions on TEN (10) pages.
- Answer FIVE (05) 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.
- Write legibly.
- Supporting documents are attached.

Date: 2020.09.19 Pass mark: 40% Time: 03 Hours

Question 01: (Compulsory)

Write short answers. All questions must be answered (2*10 Marks)

(i) What is mean by Multicollinearity?

(ii) Distinguish between the population and sample

(iii) List down four (04) probability sampling techniques.

(iv) Briefly describe the 'IPO' model in Financial planning

(v) Distinguish between a Single Echelon Inventory System and a Multi Echelon Inventory

(vi) Distinguish between the stochastic models and deterministic models of inventory management

(vii) Describe briefly the Type I and Type II errors in Hypothesis testing

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(viii) Write down the 04 diagnostic test for testing residuals in a SLR analysis with the appropriate tests used in SPSS.

(ix) Write down the common model of a Multiple Linear Regression with suitable parameters

(x) Write an example hypothesis for a two-tailed hypothesis testing

Question 02

(a) Given in the table 2.1 below is an SPSS output taken for the data of the production volumes of a particular production line of yoghurt in an FMCG company. Perform a suitable hypothesis testing and interpret the results with the decision and conclusion. (06 Marks)

Table 2.1 : One-Sample Test for production line data

	Test Value = 120					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Production_Line_1	-11.856	11	.000	-39.417	-46.73	-32.10

(b) Given in the table 2.2 below is an SPSS output taken for the data of the production volumes of a particular production line before and after giving a training to the line managers. Perform a suitable hypothesis testing and interpret the results with the decision and conclusion. (06 Marks)

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Table 2.2 : Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Before_Trainning - After_Trainning	-10.867	14.035	3.624	-18.639	-3.094	-2.999	14	.010

(c) Given in the table 2.3 below given the results of an 'independent sample t test' done for two production lines (Production line 1 and Production line 2) of yoghurt. Perform a suitable hypothesis testing and interpret the results with the decisions and conclusions. (Hint : You must first test for the Levene's test of homogeneity of variance) (08 Marks)

Table 2.3: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
Production_Line_1_Vs._Production_Line_2	Equal variances assumed	3.016	.093	2.787	28	.009	10.867	3.899	2.881	18.852
	Equal variances not assumed			2.787	23.358	.010	10.867	3.899	2.809	18.925

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Question 03

(a) The figure 3.1 below represents the box plot for the Production data of a Cement manufacturing plant. Copy the box plot given below in your answer booklet and illustrate the summary statistics data represented. (05 Marks)

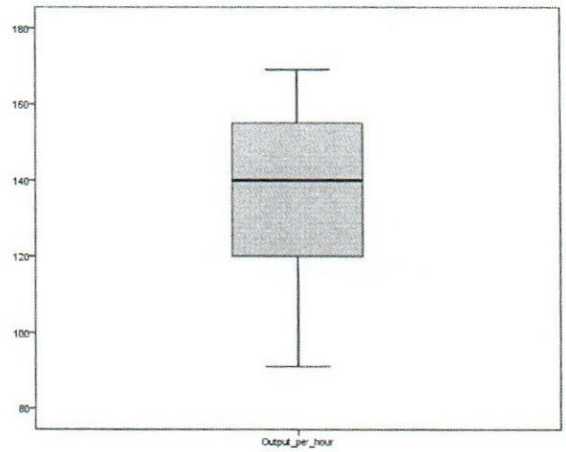

Figure 3.1 : The box plot for the production data in a cement manufacturing plant

(b) Illustrate the negatively and positively skewed box plots. (05 Marks)

(c) The below data shows the daily dispatch volumes of pallets in three Warehouses in 3 Locations for 20 consecutive days.

D = Days and W = Warehouse

Days	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
W1	428	485	332	353	332	319	297	291	484	387
W2	423	302	298	302	279	459	271	302	318	475
W3	488	280	397	344	292	399	251	485	280	290

Days	D11	D12	D13	D14	D15	D16	D17	D18	D19	D20
W1	445	485	410	436	337	332	312	389	329	298
W2	392	262	405	302	457	441	472	429	435	302
W3	280	293	425	453	280	303	298	331	421	382

(i) Calculate the Mode and Median for each warehouse (03 Marks)
(ii) Calculate the Arithmetic Mean of Dispatch volumes for each warehouse (02 Marks)
(iii) Calculate the Covariance between W2 and W3 considering data as a sample (05 Marks)

Question 04

(a) Briefly explain the importance of using Financial Models in Supply Chain Modelling (05 Marks)

(b) List down four (04) most common types of Corporate Financial Models (02 Marks)

(c) Distinguish between American Put, European Put, American Call and European Call options (05 Marks)

(d) Fill in the table with appropriate details with the knowledge of trading options for stocks using the below notations. (Copy the table to the answer booklet) (08 Marks)

(i) Strike Price = S_T
(ii) Exercise Price = K
(iii) Premium for call = c
(iv) Premium for put = p

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Table 4.1 : Trading Options					
Option	**Party involved in trading options**	**Exercising rule**	**Payoff for the option**	**Profit for the option**	**Profit graph against the strike price**
Call Option	Buyer				
Call Option	Seller				
Put Option	Buyer				
Put Option	Seller				

Question 05

(a) State the model assumptions of an Economic Order Quantity Model (06 Marks)

(b) Derive the below equation for the Economic Order Quantity, using the total inventory cost function (with differentiation technique) under suitable interpretations

$$Q^* = \sqrt{\frac{2DS}{H}}$$

(05 Marks)

(c) List down four (04) extension models to the EOQ model (02 Marks)

(d) A fast food outlet uses an average of 45 cans of 'Fruit Juice Powder-FJP' each week. Weekly usage of FJP has a STD of 3 cans. The manger is willing to accept no more than a 5% percent risk of stockout during lead time, which is 2 weeks in average and

with a STD of 1 week. Determine the ROP using the details by assuming the demand (usage) in Normally distributed.
The Normal Distribution table value at $\alpha = 5\%$ is 1.64 (07 Marks)

Question 06

Write Short Notes on any Five (05) of the following (4*5 Marks)

(a) Data Mining
(b) Types of Transport Surveys
(c) Statistical Inferences
(d) Integrated Supply Chain Planning
(e) Factors Influencing Modal Choice
(f) Cost Benefit Analysis and Benefit to Cost Ratio

Question 07

(a) Interpret the correlation results in the below table (table 7.1) obtained from an analysis of SPSS. Use appropriate hypothesis (05 Marks)

Table 7.1 : Correlations

		Graduate Students admitted to CINEC_Male	Graduate Students admitted to CINEC_Female
Graduate Students admitted to CINEC_Male	Pearson Correlation	1	.090
	Sig. (2-tailed)		.116
	N	305	305
Graduate Students admitted to CINEC_Female	Pearson Correlation	.090	1
	Sig. (2-tailed)	.116	
	N	305	305

with a STD of 1 week. Determine the ROP using the details by assuming the demand (usage) in Normally distributed.
The Normal Distribution table value at $\alpha = 5\%$ is 1.64 (07 Marks)

Question 06

Write Short Notes on any Five (05) of the following (4*5 Marks)

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	Sig. (2-tailed)		.116
	N	305	305
Graduate Students admitted to CINEC_Female	Pearson Correlation	.090	1
	Sig. (2-tailed)	.116	
	N	305	305

Table 7.4 : Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	95.679	3.170		30.185	.000
	X2	-34.137	2.294	-.573	-14.883	.000
a. Dependent Variable: Y						

(e) Write the model for the above results (02 Marks)

Question 08

(a) Briefly describe the concept of Just-in-Time production (02 Marks)

(b) Briefly explain on the characteristics of production decisions and location decisions in Supply Chain Decision making (06 Marks)

(c) Identify the Objective function and constraints of an assignment model related to location allocation decisions. Illustrate with an appropriate matrix. (06 Marks)

(d) Determine the solution for the best location to fix a warehouse considering the distance data (for 05 Wholesaler Points-WP) given below using 1-median location allocation model. (06 Marks)

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Table 8.1 : Distance data for 05 Wholesaler points					
	WP1	WP2	WP3	WP4	WP5
WP1	-	20.5	15	16	21.5
WP2	20.5	-	18	14.5	16
WP3	15	18	-	20.75	16
WP4	16	14.5	20.75	-	13
WP5	21.5	16	16	13	-

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

Attachment
Formulae Sheet

Select and Apply the Appropriate Formulae where Necessary

$$\text{Mean} = \frac{X_1+X_2+X_3+\cdots+X_n}{n}$$

$$\text{Mean} = \sqrt[n]{X_1 + X_2 + X_3 + \cdots + X_n}$$

$$\text{Median} = \left(\frac{n+1}{2}\right) th\ term$$

$$\text{Median} = \frac{\left(\frac{n}{2}\right) th\ Term + \left(\frac{n}{2}+1\right) th\ Term}{2}$$

$$Cov\ (x,y) = \frac{\sum\{\ (x_i - \bar{x}) * (y_i - \bar{y})\}}{(n-1)}$$

$$Cov\ (x,y) = \frac{\sum\{\ (x_i - \bar{x}) * (y_i - \bar{y})\}}{(N)}$$

$$s^2 = \frac{\sum\{\ (x_i - \bar{x})^2\}}{(n-1)}$$

$$\sigma^2 = \frac{\sum\{\ (x_i - \mu)^2\}}{(N)}$$

$$ROP = (d * l)$$

$$ROP = (\mu_D * \mu_L) + Z\alpha * \sqrt{(\mu_L * \sigma_D^2 + (\mu_D * \sigma_L^2)}$$

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Year 3 Semester I

SEMESTER END EXAMINATION

Entrepreneurship Development – BSCM3205

- This paper consists of SEVEN (07) questions on FIVE (05) pages.
- Answer FOUR (04) 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.
- Write legibly.

Date: 2020.09.15 Pass mark: 40% Time: 02 Hours

Question 01: (Compulsory)

Which Form Is Best ? - "Children's parties"

Watoma Kinsey and her daughter Katrina are about to launch a business that specializes in children's parties. Their target audience is upscale families who want to throw unique, memorable parties to celebrate special occasions for their children between the ages of 5 and 15. The Kinseys have leased a large building and have renovated it to include many features designed to appeal to kids, including special gym equipment, a skating rink, an obstacle course, a mockup of a pirate ship, a ball crawl, and even a moveable haunted house. They can offer simple birthday parties (cake and ice cream included) or special theme' parties as elaborate as the customer wants. Their company will provide magicians, clowns, comedians, jugglers, tumblers, and a variety of other entertainers.

Watoma and Katrina have invested $45,000 each to get the business ready to launch.

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Based on the quality of their business plan and their preparation, the Kinseys have negotiated a $40,000 bank loan. Because they both have families, the Kinseys want to minimize their exposure to potentiallegal and financial problems. A large portion of their start-up costs went to purchase a liability insurance policy to cover the Kinseys in case a child is injured at a party. If their business plan is accurate, the Kinseys will earn a small profit in their first year (about $1,500) and a more attractive profit of $16,000 in their second year of operation. Within five years, they expect their company to generate as much as $50,000 in profits. The Kinseys have agreed to split the profits-and the workload-equally. If the business is as successful as they think it will be, the Kinseys eventually want to franchise their company. That, however, is part of their long-range plan. For now, they want to perfect their business system and prove that it can be profitable before they try to duplicate it in the form of franchises.

As they move closer to the launch date for their business, the Kinseys are reviewing the different forms of ownership.

a) Briefly explain the process of calculating the **Net Profit** of a small-medium enterprise. (You may take hypothetical values to quote your answer) (05 Marks)

b) Which form(s) of ownership would you recommend to the Kinseys? Briefly Explain. (06 Marks)

c) Which form(s) of ownership would you recommend the Kinseys to ***avoid?*** Briefly Explain. (07 Marks)

d) What factors should the Kinseys consider as they try to choose the form of ownership that is best for them? (07 Marks)

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Question 02

a) Define the term of "Drone Entrepreneur". (03 Marks)

b) Define the Entrepreneurial traits with the aid of an example. (05 Marks)

c) Define the term of "Entrepreneurial Mind Set" with the aid of an example. (05 Marks)

d) Identify the factors impacting to emergence of entrepreneurship. (05 Marks)

e) "An entrepreneur is playing a pivotal role in the socio- economic environment". Analyse the statement with aid of an example. (07 Marks)

Question 03

a) Identify the external and internal methods of entrepreneurial idea generation. (05 Marks)

b) Briefly explain the entrepreneurship process with the aid of an example. (05 Marks)

c) Innovation and Creativity is absolutely important for an emerging entrepreneur. Briefly explain the statement. (05 Marks)

d) Briefly explain the two sources of entrepreneurial idea generation with the aid of an example. (05 Marks)

e) "Identifying the business opportunities in the business environment is very important for the future sustainability". Explain the statement with aid of an example. (05 Marks)

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Question 04

a) Describe the differences between equity capital and debt capital with the aid of an example. (06 Marks)

b) "Entrepreneurship is the creation or extraction of economic value of a product or service " . Analyze the statement with the aid of an example. (07 Marks)

c) What skills required to become a successful entrepreneur in the modern business world ? Analyze the statement with the aid of an example. (07 Marks)

d) Taking Business Risk is always a decisive factor. Briefly explain the statement with aid of an example. (05 Marks)

Question 05

a) Briefly explain the elements of a solid Financial Plan. (05 Marks)

b) Briefly explain the advantages of Business Buying Out. (05 Marks)

c) Identify the Characteristics of Public Limited Liability Company. You may take suitable example to quote your answer. (05 Marks)

d) Briefly explain the term of "Organic Growth" with the aid of an example. (05 Marks)

e) Briefly explain the significance of SWOT analysis of a Business Plan. (05 Marks)

Question 06

a) Briefly explain the importance of intellectual property rights for an emerging entrepreneur. (06 Marks)

b) Briefly explain **two points** of legal issues that the entrepreneurs face in the modern business environment. (06 Marks)

c) Identify the characteristics of a Franchise. Quote a suitable example. (05 Marks)

d) "Youth entrepreneur development is much needed for an economic growth of a country". Analyze the statement by highlighting the youth entrepreneur development of a country. (08 Marks)

Question 07

Briefly explain the following terms. You may quote suitable examples to support your answer. **Answer only 5 questions.**

a) Corporate Entrepreneur
b) Entrepreneurial Myths
c) QUEST Analysis
d) Copy Rights
e) Comprehensive Income Statement
f) Risk Mitigation
g) Intellectual Property Rights
h) Business Merger
i) Partnership Agreement
j) Cash flow Statement (5*5 Marks)

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

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Year 3 Semester I

SEMESTER END EXAMINATION

Production and Operations Management – BSCM3201

- This paper consists of SEVEN (07) questions on EIGHT (08) pages.
- Answer FOUR (04) 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.
- Write legibly.
- Formulae sheet is attached

Date: 2020.09.13 Pass mark: 40% Time: 02 Hours

Question 01 (Compulsory)

(a) A building contractor's records during the last five weeks indicate the number of job requests:

Table 1:1-Job Requests

Week	1	2	3	4	5
Requests	20	22	18	21	22

Predict the number of requests for week 6 using exponential smoothing with α = 0.3. Use 20 for week 2 forecast. (05 Marks)

(b) Air travel on Mountain Airlines for the past 18 weeks was as below

Table 1:2 – Passengers

Week	Passengers	Week	Passengers
1	405	10	440
2	410	11	446
3	420	12	451
4	415	13	455
5	412	14	464
6	120	15	466
7	124	16	474
8	433	17	476
9	438	18	482

Use the trend projection technique to develop a forecast for the next three weeks.

(10 Marks)

(c) Using the following information, the Branch Manager of a Tourist Centre wants to predict the first quarter of next year demand for the purpose of writing a report to Top Management.

Table 1:3 – Seasonal Relatives

Month	Seasonal Relative	Month	Seasonal Relative
Jan	1.2	Jul	0.8
Feb	1.3	Aug	0.6
Mar	1.3	Sep	0.7
Apr	1.1	Oct	1.0
May	0.8	Nov	1.1
Jun	0.7	Dec	1.4

The monthly forecast equation being used is:

$F_t = 402 + 3t$

Where

t_0 = January of last year

F_t = Number of arrivals

Determine the number of arrivals of the first three months of next year. (10 Marks)

Question 02

(a) Discuss the difference between the cost of inputs and the value or price of outputs in operations management. (06 Marks)

(b) Define the term "Value Added" in Operations Management. (07 Marks)

(c) Identify the three major types of production facilities and describe each of them.

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(12 Marks)

Question 03

(a) Identify the four trends of product and service design. (05 Marks)

(b) Breifly explain two activities of product and service design. (08 Marks)

(c) Identify the five reasons for product and service design and explain two.

(12 Marks)

Question 04

(a) A small firm produces and sells automotive items in a five-state area. The firm, expects to consolidate assembly of its battery charges line at a single location. Currently, operations are in three widely scattered locations. The leading candidate for location will have a monthly fixed cost of $42,000 and variable costs of $3 per charger. Charges sell for $7 each.

(i) Perepare a table that shows total profits, fixed costs, variable costs, and revenues for monthly volumes of 10,000, 12,000, and 15,000 units. (04 Marks)

(ii) What is the break-even point? (03 Marks)

(ii) Determine profit when volume equals 22,000 units. (04 Marks)

(b) The owner of Old-Fashioned Berry Pies, S. Simon, is contemplating adding a new line of pies, which will require leasing new equipment for a monthly payment of $6000. Variable costs would be $2.00 per pie, and pies would retail for $7.00 each.

(i) How many pies must be sold in order to break even? (03 Marks)

(ii) What would the profit (loss) be if 1,000 pies are made and sold in a month? (03 Marks)

(iii) How many pies must be sold to realize a profit of $4,000? (04 Marks)

(iv) If 2,000 can be sold, and a profit target is $5,000, what price should be charged per pie? (04 Marks)

Question 05

For the set of tasks given below, do the following:

(a) Develop the precedence diagram. (03 Marks)

(b) Determine the minimum and maximum cycle times in seconds for a desired output of 500 units in a 7-hour day. Why might a manager use a cycle time of 50 seconds? (04 Marks)

(c) Determine the minimum number of workstations for output of 500 units per day. (03 Marks)

(d) Balance the line using the largest popsitional weight heuristic. Break ties with the most following tasks heuristic. Use a cycle time of 50 seconds. (12 Marks)

(e) Calclate the percentage idle time for the line. (03 Marks)

Table 5:1-Task Time

Task	Task Time (Seconds)	Immediate Predecessors
A	45	-
B	11	A
C	9	B
D	50	-
E	26	D
F	11	E
G	12	C
H	10	C
I	9	F, G, H
J	10	I
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Question 06

SummerFun, Inc., produces a variety of recreation and leisure products. The production manager has developed an aggregate forecast:

Month	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Forecast	50	44	55	60	50	40	51	350

Use the following information to develop aggregate plans.

Regular Production cost	Rs. 80 per Unit
Overtime Production cost	Rs. 120 per Unit

Regular capacity	40 units per month
Overtime capacity	8 units per month
Subcontracting cost	Rs. 140 per Unit
Subcontracting capacity	12 units per month
Holding cost	Rs. 10 per unit per month
Back -order cost	Rs. 20 per Unit
Beginning Inventory	0 units

Develop an aggregate plan using regular production. Supplement using inventory, overtime and subcontracting as needed. No backlogs allowed. (25 Marks)

Question 07

(a) Breifly explain the need for methods analysis. (03 Marks)

(b) Breifly describe two charts that are used in method analysis. (07 Marks)

(c) Breifly explain the motion study principles. (07 Marks)

(d) How to identify a qualified worker? (08 Marks)

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

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Formula Sheet

Simple Moving Average

$$F_{t+1} = \frac{D_t + D_{t-1} + \ldots.. + D_{t-n+1}}{n}$$

D_t : actual demand in period *t*

n : number of periods in the average

1. **Weighted Moving Average**

$$T_{t+1} = W_1D_1 + W_2D_{t-1} + \ldots + W_nD_{t-n+1}$$

2. **Exponential Smoothing**

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

F_t = new forecast

F_{t-1} = previous forecast

α = smoothing (or weighting) constant ($0 \leq \alpha \geq 1$)

4. **Trend Projections**

$y = a + bx$

y = computed value of the variable to be predicted

a = y-axis intercept

b = slope of the regression line

x = the independent variable

$$b = \frac{\Sigma xy - n\bar{x}\bar{y}}{\Sigma x^2 - n\bar{x}^2} \qquad a = \bar{y} - b\bar{x}$$

5. **Exponential Smoothing with Trend Adjustment**

$$F_t = \alpha (A_{t-1}) + (1- \alpha) (F_{t-1} + T_{t-1})$$

$$T_t = \beta (F_t - F_{t-1}) + (1-\beta) T_{t-1}$$

$$FIT_t = F_t + T_t$$

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Year 3 Semester I

SEMESTER END EXAMINATION

Environmental and Social Impacts of Logistics and Transport – BSCM3204

- This paper consists of SEVEN (07) questions on TWO (02) pages.
- Answer FOUR (04) 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.
- Write legibly.

Date: 2020.09.10 Pass mark: 40% Time: 02 Hours

Question 01 (Compulsory)

Along with a brief description to below, list down 6 threats each may contribute to damage the marine environment

(a) Dry Cargo Ships
(b) Tankers ships
(c) RoRo ships
(d) Passenger Ships

(25 marks)

Question 02

Under Coastal Management Systems in Sri Lanka, give brief introductions to the following, their importance and the threats they face upon in the event of a maritime deserter.

(a) Lagoons
(b) Estuaries
(c) Seagrass Beds
(d) Mangroves
(e) Coral Reefs
(f) Salt Marshes (25 marks)

Question 03

Give brief elaborated introductory explanation on the following:

(a) MARPOL
(b) Ballast water management
(c) Polar code (25 marks)

Question 04

What is meant my GHG, and how one would reason out its adverse effects.
(25 marks)

Question 05

A resent incident off the east coast of Sri Lanka, was that the engine room of a cargo, laden VLCC caught fire after an explosion.
List down the threats that to the economy and environment that could be anticipated.
(25 Marks)

Question 06

Discuss how sound triggered by maritime transportation could pollute and effect the marine environment? (25 Marks)

Question 07

How would ballast water be of a harm the seas / maritime waters? (25 Marks)

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