SOMAIYA
VIDYAVIHAR UNIVERSITY

Dr. Shantilal K. Somaiya School of Commerce and Business Studies

QUESTION PAPERS

BRANCH: Bachelor of Business Management	SEM: VI
ATKT	JUN-2026

Sr. No.	Subject	Available
1.	131U06E603 – Technical Analysis of Financial Market	
2.	131U06E601 – Retail Management	
3.	Business Analytics	
4.	231U06C604 – Martech	
5.	231U07C605 – Indirect Taxation	
6.	Logistic & Supply Chain Management	
7.	Operation Research	
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

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Semester (November 2025 to March 2026) Examination: Supplementary Examination June 2026 (UG Programmes)		
Programme code: 06 **Programme: BBM**	**Class:** TYBBM	**Semester:** VI
Name of the Constituent College: SKSC	**Name of the Department** : Business Studies	
Course Code: 131U06E603	**Name of the Course:** Technical Analysis of Fin Markets	
Duration : 2 Hrs.	**Maximum Marks : 60**	
Instructions: 1) Kindly do the Markings On the Charts 2) Tie the charts with Answer Sheet if Part of Solution 3) Hollow candles indicate green candle and dark candle indicate Red Candle 4) Assume suitable data if necessary		

Question No.		Max. Marks	CO
Q.1. A	Your father is interested in beginning trading in the Indian equity markets. As a finance graduate, please outline and explain the core qualities that define a successful equity trader.	8	4
Q.1. B	You are an options trader looking to manage your portfolio using the Option Greeks. you have a call position open in Nifty 50, explain different greeks and their impact on your positions.	7	4
	OR		
Q.1. C	Your brother has just landed a job and is interested in financial markets. Explain to your brother the difference between the Cash market vs derivatives market.	8	4
Q.1. D	A client seeks guidance on initiating trading activities in the market. As an experienced trader, provide a comprehensive overview of the essential do's and don'ts for successful trading practices.	7	4
Q.2. A	Following is the weekly chart of Eicher Motors. Mark support, resistance and entry point on the graph and also explain your strategy. Include Entry, Exit and risk to reward ratio in your analysis.	8	3
Q.2. B	Following is the Daily chart of bajaj-Auto ltd. Using pattern trading mark pattern and entry point on the graph and also explain your strategy. Include Entry, Exit and risk to reward ratio in your analysis.	7	3
	OR	8	
Q.2. C	Explain moving averages and discuss its types and strategies.	8	3
Q.2. D	As a financial analyst, provide a detailed description and analysis of the various continuation patterns used in technical analysis, explaining their Strategy.	7	3
Q.3. A	Analyze the Daily chart of Gail LTd using Moving Average strategy and state your buying, Stop loss and target. Also explain your strategy in detail (Also mark it on chart) Line passing through the candle Indicate 50 SMA	8	2
Q.3. B.	Explain candlestick and discuss types of bullish and bearish candlestick patterns	7	1
	OR		
Q.3. C.	As a Technical Analyst Discuss Elliott wave theory in Detail. Also Mark Elliot waves in the chart.	8	2
Q.3. D	As a professor of Finance, explain Technical analysis and discuss their basic assumptions.	7	1
Q.4	Answer the following Concepts	15	
1	Dow Theory	5	1

2	Open interest	5	3
3	Resistance	5	4

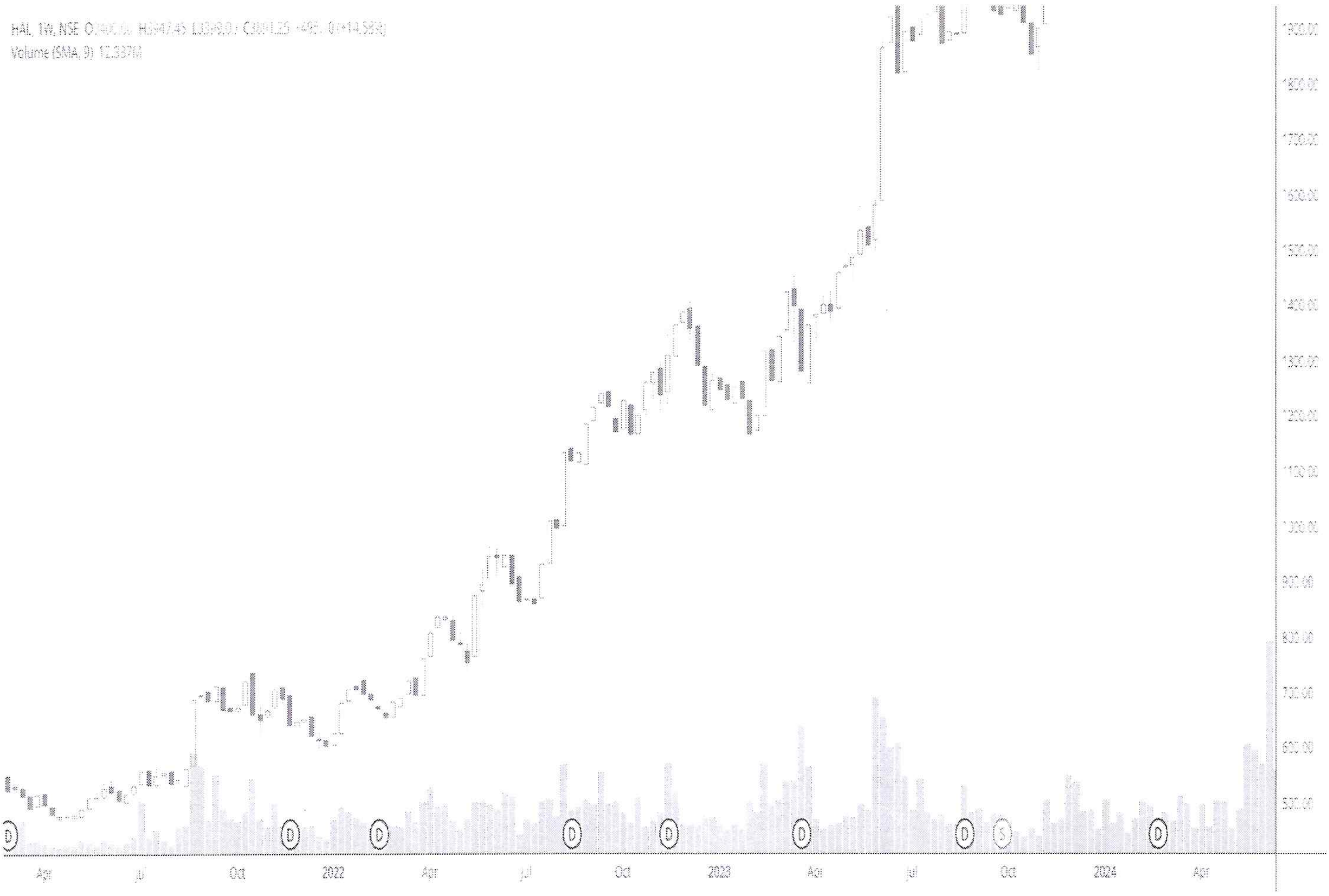
Q.2A.

Q.2.B.

Q.3A

SMMA(50, close) 176.01
96.00
94.00
92.00
90.00
88.00
86.00
84.00
82.00
80.00
78.00
76.00
74.00
72.00
Jun
16
Jul
Aug
Sep
16
Oct
Nov
Dec
16
2023
Feb

Q.3.C.



Volume (SMA, 9) 12.337M
1900.00
1800.00
1700.00
1600.00
1500.00
1400.00
1300.00
1200.00
1100.00
1000.00
900.00
800.00
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Apr
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Semester (JUNE 2026) Examination: ATKT End Semester Examination November 2026 (UG Programmes)		
Programme code: 06 Programme: BBM	Class: TY	Semester: VI
Name of the Constituent College: S K Somaiya College	Name of the Department: Business Studies	
Course Code: 131U06E601	Name of the Course: Retail Management	
Duration : 2 Hrs.	Maximum Marks : 60	
Instructions: 1)Draw neat diagrams 2)Assume suitable data if necessary		

Question No.		Max. Marks
Q.1. A	Analyze the strategic utility of the Forced Path Store Layout versus the Angular Store Layout for a high-end designer apparel brand looking to maximize in-store customer engagement. Which layout would you recommend to a retailer who wants to focus on an experiential retail model, and why?	15
	OR	
Q.1. B	Imagine you are the Head of Operations for a regional chain of Conventional Supermarkets. Due to the rapid expansion of food-based e-commerce platforms, your stores are facing a steady decline in footfall. Devise a comprehensive strategic plan to reverse this decline using the concepts of Scrambled Merchandising and Experiential Retail, as detailed in the retail life cycle framework.	15
Q.2. A	Evaluate the role of the Retailer in the Sorting Process within a distribution channel. How can a multi-unit fashion retailer leverage Automated Three-Way Verification in its purchase management software to minimize inventory risks and increase asset turnover?	15
	OR	
Q.2. B	Examine the potential conflicts that arise between a manufacturer and a retailer regarding profit allocation and product displays. Under what market conditions should a retail chain advocate for an Exclusive Distribution agreement over an Intensive Distribution strategy to protect its brand image?	15
Q.3. A.	Develop a retail pricing strategy for a newly launched organic cosmetics chain. Differentiate between a Market Penetration Pricing strategy and a Market Skimming Pricing strategy, and explain how the brand can legally execute a Price Matching Guarantee without violating federal guidelines on price advertising.	15
	OR	
Q.3. B.	An international hypermarket chain is planning to enter a highly price-sensitive urban market. The Chief Financial Officer wants to implement a Loss Leader Strategy to capture market share. Analyze the	15

	risks associated with this approach, specifically considering the impact of local Minimum Price Laws and the behavior of economic consumers.	
Q.4	Solve the following Case Study	15
	Organic Basket – Transitioning to Private Brands and Omnichannel Layouts Organic Basket is a well-established, independent gourmet food retailer in India that operates 15 brick-and-mortar stores catering to health-conscious, affluent consumers. Traditionally, the store's revenue has relied entirely on premium Manufacturer Brands. However, with the rise of digital grocery platforms and aggressive pricing from online conglomerates, Organic Basket is witnessing a contraction in its net profit margins, which currently hover around a modest 2%.To counteract this, the management has decided to implement a dual-pronged strategy:Brand Shifting: Introducing a dedicated private-label brand called "Purely Organic" for staples, teas, and packaged superfoods. Management plans to price these private labels 25% below national manufacturer brands while aiming for higher gross profit margins. In-Store Redesign: Transitioning their traditional Grid Store Layout to an Alcove/Boutique Store Layout to cross-sell related lifestyle items (e.g., placing organic honey right next to premium green teas) and foster an immersive, upscale orientation. Despite the excitement, the purchase department is struggling with the lead time required to restock shelves under the new private label setup. It takes 5 days to process an order and the new regional third-party suppliers take an additional 10 days to deliver the goods. Furthermore, long-time status-oriented consumers have raised concerns that the introduction of lower-priced private labels might dilute the store's premium, selective image. Case Study Questions: 5 marks each 1. Evaluate Organic Basket's decision to introduce the "Purely Organic" private label. What are the specific economic rewards and brand equity risks associated with this shift, considering the expectations of their existing status-oriented consumers? 2. Based on the lead time metrics provided in the case, determine the exact reorder point (in days) that Organic Basket must maintain to prevent stockouts of its private label products. Suggest how the integration of an RFID system could optimize their merchandise handling process. 3. Critique the shift from a Grid Layout to an Alcove/Boutique Layout for Organic Basket. How does this layout alteration complement their new market positioning, and what visual merchandising techniques should they use to maximize unplanned/impulse purchases?	

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Semester (November2025 to March 2026) Examination: End Semester Examination March/ April 2026 (UG Programmes)		
Programme code:06 Programme: BBM	Class: TYBBM	Semester: VI
Name of the Constituent College: Dr. Shantilal K Somaiya School of Commerce and Business studies.	Name of the Department: Business Studies	
Course Code:	Name of the Course: Business analytics	
Duration: 2 Hrs.	Maximum Marks: 60	
Instructions: 1) Draw neat and labelled diagrams		

Q. No.		Max. Marks	CO Attainment
Q.1.	**Chipotle Cooks Up Uniform KPIs:** Chipotle, the Mexican restaurant chain, implemented business intelligence solutions in order to increase operational efficiency, monitor store productivity, and standardize data reporting across their entire 2,400 locations. Using intricately designed dashboards, Chipotle can now monitor the operational efficiency of any individual location alongside a number of other metrics their dashboards are built to reflect. One of the key takeaways is the way in which Chipotle centralized their data ecosystem which in turn, allowed them to create uniform KPIs for tracking, reporting, and decision making. This also allowed the Mexican fast-food chain to more easily call-out high performers and share success stories across the brand.	15	CO4
	1. Explain the role of business intelligence solutions in improving operational efficiency at Chipotle.	8	

	2. Evaluate the benefits of dashboards in identifying high-performing stores and supporting managerial decision-making within Chipotle.	7	
Q.2.A	a) "A data mart is a specialized subset of a data warehouse focused on a specific functional area or department within the organization". Justify.	8	CO1
	b) Illustrate the working relationship between OLTP and OLAP systems.	7	CO1
	OR		
Q.2.B	a) Explain data attributes and its type with example.	8	CO2
	b) Write down prediction techniques and rules of prediction in data mining.	7	CO2
Q.3.A	a) Explain Ensemble Learning and three main types, and their business implications.	8	CO3
	b) Explain function of Fraud Detection and Prevention with Data Mining	7	CO3
	OR		
Q.3.B	a) Explain Big Data Analytics in Mobile Environments.	8	CO3
	b) Explain Ensemble Learning and three main types, and their business implications.	7	CO3
Q.4.A	a) Explain the purpose and Structure of Business Intelligence (BI) Systems.	8	CO4
	b) Define how Business Intelligence (BI) is applied across different functional areas and industries to drive value.	7	CO4
	OR		
Q.4.B	a) Explain Business Analytics (BA) and its three main types and highlight its role in modern data-driven decision-making.	8	CO4
	b) Define BI, explain its architectural components, its strategic importance, and how it differs from traditional data processing.	7	CO4

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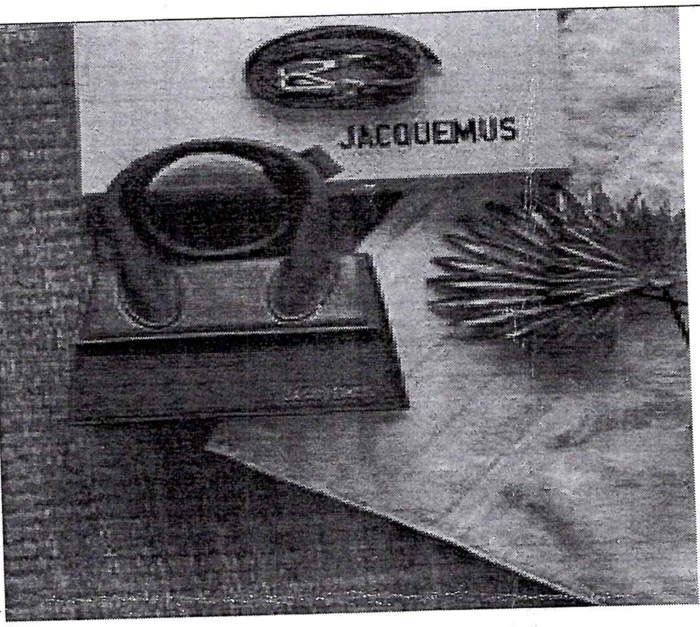
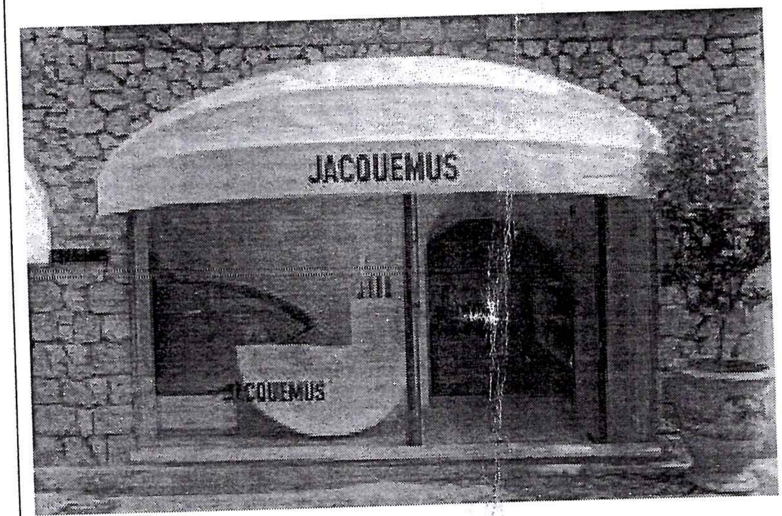
Semester (Niovember 2025 to March 2026) Examination: End Semester Examination April 2026 (UG Programmes)		
Programme code: 06/~~07~~ Programme: BBM/~~BBA~~	Class: TY	Semester: VI
Name of the Constituent College: Dr. S K Somaiya school of commerce and business studies	Name of the Department: Business Studies	
Course Code: 231U06C604/07	Name of the Course: MARTECH	
Duration : 2 Hrs.	Maximum Marks : 60	
Instructions: 1) Q.1 is without option, Q.2, Q.3 and Q.4 are with choice 2)Assume suitable data if necessary 3) Justify with example wherever necessary		

Question No.		Max. Marks	CO Attainment
Q.1.	Since its inception in 2009, Jacquemus has captured global attention with its unconventional approach to luxury fashion marketing. Founded by Simon Porte Jacquemus, the brand has managed to stand out in a competitive landscape by fusing personal storytelling, experiential campaigns, and cutting-edge digital strategies. Unlike traditional luxury houses, Jacquemus embraces a playful, human-centric approach, reimagining how brands interact with their audiences in the digital age. In 2011, Simon Porte Jacquemus, then a 21-year-old fashion school dropout, made headlines with a guerrilla marketing stunt at Vogue's "Fashion Night Out" party on Paris' Avenue Montaigne. He and his friends, donning his designs, staged a mock protest, grabbing attention with their playful and bold approach. This stunt propelled Jacquemus into the public eye, making him a household name in French fashion. Jacquemus' marketing strategy offers valuable insights for brands aiming to connect with modern audiences: Emotional Branding: Build a narrative that resonates deeply with your audience. Experiential Campaigns: Create memorable, shareable moments that extend the brand experience beyond products. Social Media Integration: Use platforms like Instagram not just for visibility but as a tool for meaningful engagement. Collaborative Growth: Partner strategically to enter new markets or demographics while staying true to your core identity. Sustainability: Align with global movements by integrating ethical practices into your brand story.	15	CO1

	  A. Assessing the information and graphic content available to you, List down the criteria or factors coming to play when a consumer decides to buy a luxury handbag. B. Provide an overview of martech and branding strategy used by Jacquemus to compete with Industry giants		
Q.2.A	Ms. Saniya wants to start an apparel brand using her creative pursuit for tattoos as a backdrop. Create a martech stack for her, using her skills as her forte and USP of the brand.	15	CO2
	OR		
Q.2.B	Justify the impact of digital and social media paltform in ruining or enhancing your viewing and shopping experience	15	CO3
Q.3.A.	Draw a comparison chart between experiential marketing and Agile marketing with elaborate examples for both.	15	CO1
	OR		
Q.3.B.	Draw a comparison chart between personalized and over personalized marketing with elaborate example for both.	15	CO3

Q.4.A.	Justify the impact of VR glasses in marketing of product and services and also provide examples of industries where it has been adopted effectively.	15	CO2
	OR		
Q.4.B.	Showcase the transition from tradition funnel to growth loop with example showing transition.	15	CO4

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March 2026 Examination: In Semester Examination (UG/PG Programmes)		
Programme code: 06 & 07 Programme: BBA | BBM	Class: TYBBA& TYBBM	Semester: VI
Name of the School: Dr. Shantilal K Somaiya School of Commerce and Business Studies	Name of the Department Business Studies	
Course Code: 231U06C605 / 231U07C605	Name of the Course: Indirect Taxation	
Duration : 2 Hrs	Maximum Marks : 60	
Instructions: 1)All Questions are Compulsory with internal options 2) Working notes should form part of your answer		

Question No.		Max. Marks	CO
Q1 A	i) Critically evaluate the impact of the Goods and Services Tax (GST) on the Indian economy	08	01
	ii) Discuss the following concepts with suitable examples: a) Goods b) E-Commerce operator c) Business d) Consideration	07	01
	OR		
B.	i) Solve (each case separately) a) A supplier sells goods worth **₹80,000**. The buyer pays **₹60,000 in cash** and gives an **old machine (market value of the machine is Rs. 15000) as balance payment.** Find the **value of supply**. b) Goods worth **₹40,000** are supplied. Later the supplier gives a **₹3,000 discount which was not agreed before supply**. Find the **taxable value.** c) A product price is **₹20,000**. Government subsidy received by supplier is **₹3,000**. Find the **value of supply**. d) Mr. Z distributes blankets outside a temple to needy people worth Rs.10,000. If GST rate is 18% on blankets, suggest the amount of tax payable by Mr. Z on this donation e) A farmer agrees to sell **standing timber for ₹50,000**, which will be **cut and removed by the buyer**. Is this treated as **goods under GST**? Justify f) A person transfers **government bonds worth ₹1,50,000** to another investor. Are **bonds treated as goods under GST**? Justify g) A bank charges **₹500 processing fee** for granting a loan. Is this considered **service under GST**? Justify h) A company rents a machine to another firm for **₹8,000 per month**. Is this treated as **goods or service under GST**? Justify	08	01

	ii)	**ABC Traders (Registered under GST) made the following supplies in February 2026:** **Transaction 1 – Combo Offer** Sold a **Smart TV (₹80,000)** along with: Wall mounting kit (₹5,000) Installation service (₹3,000) All supplied together for a **single price of ₹82,000**. These items are **normally supplied together**. GST rates: Smart TV – 18% Kit – 18% Installation – 18% **Transaction 2 – Festival Combo** Sold: Refrigerator (₹50,000) Microwave (₹20,000) Mixer Grinder (₹10,000) All together for **₹70,000**, though **not naturally bundled**. GST rates: Refrigerator – 18% Microwave – 12% Mixer – 28% **Transaction 3 – Separate Sale** Sold **100 LED bulbs at ₹150 each** with: 10% trade discount (mentioned in invoice). GST rate – 12% **Transaction 4 – Financial Charges** Received **₹5,000 interest** for delayed payment from a customer. Assume principal supply rate = **18%** Calculate GST payable for each of the above transactions	07	02, 03
Q 2	A	i) **Ramesh Traders** is a registered dealer in Maharashtra. The following details are given for FY 2025-26: **Business Details:** • **Turnover in previous financial year:** ₹1.45 crore • Supplies: 1. Intra-state supply of goods – ₹1,20,00,000 2. Exempt goods – ₹25,00,000 • Purchases from unregistered persons – ₹25,00,000 • GST rate applicable under normal scheme on goods sold – **18%** Ramesh opted for **Composition Scheme** at the beginning of the year. **Required:** 1. Is Ramesh eligible for the Composition Scheme? 2. Calculate the GST payable under Composition Scheme. 3. Calculate GST liability if he had opted for the Normal Scheme. 4. State two advantages and two restrictions of the Composition Scheme.	08	02
		ii) XYZ Enterprises (registered in Maharashtra) supplied the following	07	02, 03

during March 2026:

Transaction 1 – Supply of Goods (Intra-State)
Invoice issued on **10 May 2026**
Goods delivered on **8 May 2026**
Payment received on **20 May 2026**
GST rate: **18%**
Buyer located in **Maharashtra**
Value of goods: **₹1,00,000**

Transaction 2 – Supply of Goods (Inter-State)
Goods supplied from **Maharashtra to Karnataka**
Invoice issued on **5 June 2026**
Goods dispatched on **3 June 2026**
Payment received on **15 June 2026**
Value: **₹2,00,000**
GST rate: **12%**

Transaction 3 – Supply of Services (Advance Received)
Consultancy service provided
Service completed on **25 July 2026**
Advance received on **1 July 2026**
Invoice issued on **30 July 2026**
Value of service: **₹50,000**
GST rate: **18%**
Recipient located in **Delhi**

Required:
Determine the **Time of Supply** for each transaction.
Determine the **Place of Supply** for each transaction.
State whether CGST+SGST or IGST is applicable.
Calculate GST payable in each case.

OR

B — Discuss the provision under GST for determination of: — 15 — 02

a) Time of supply of goods and services
b) Place of supply of goods and services

Give suitable illustrations.

Q3. A — A manufacturer sells goods to a dealer. The following details are available: — 08 — 03

Particulars	**Amount (₹)**
Basic price of goods	5,00,000
Packing charges	30,000
Loading and handling charges	5,000
Freight charged in invoice	20,000
Insurance during transit	6,000
Municipal tax on sale	7,000
Commission paid to selling agent (charged to buyer)	9,000
Design and development charges	9,000
Subsidy received from private organization linked to price	12,000
Discount shown on invoice	32,000

Year-end discount agreed before supply and recorded in agreement	11,000
Interest for delayed payment	6,000

GST Rate = **18%**

Calculate:

1. **Transaction Value under GST**
2. **GST payable**
3. **Total invoice value**

B — 07 — 03

Q3

A registered dealer provides the following details for the month of June.

1. Input Tax Credit Available from Purchases

Particulars	**IGST (₹)**	**CGST (₹)**	**SGST (₹)**
Raw materials purchased from another state	90,000	–	–
Machinery purchased locally	–	40,000	40,000
Office furniture purchased locally	–	15,000	15,000
Stationery purchased locally	–	5,000	5,000
Spare parts purchased from another state	30,000	–	–
Total ITC Available	**1,20,000**	**60,000**	**60,000**

2. Output Tax Liability from Sales

Interstate Sales

Transaction	**IGST (₹)**
Machinery sold	80,000
Raw materials sold	40,000
Total IGST	**1,20,000**

Intrastate Sales

Transaction	**CGST (₹)**	**SGST (₹)**
Furniture sold	50,000	50,000
Electrical goods	40,000	40,000
Total	**90,000**	**90,000**

~~a~~ Calculate GST payable by the dealer — ~~08~~ — ~~03~~

OR

C
i) Discuss the provisions regarding adjustment of Input Tax Credit against GST liability payable by a dealer — 08 — 03

ii) Under what circumstances Input tax Credit is required to be reversed — 07 — 03

Q4 Write short notes: — 15

1. Suo Motu Registration — 04
2. Cancellation of Registration — 04
3. Casual Taxable person — 02

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Semester (November 2025 - March 2026) Examination: End Semester Examination March 2026 (UG Programmes)		
Programme code: 06 Programme: TY BBM	Class: TY	Semester: VI
Name of the Constituent College: Dr. Shantilal K Somaiya School of C and B.S.	Name of the Department: Business Studies	
Course Code:	Name of the Course: Logistics & Supply Chain Management	
Duration : 2 Hrs.	Maximum Marks: 60	
Instructions: 1)Draw neat diagrams 2)Assume suitable data if necessary 3) Give examples		

Question No.	Attempt following questions	Max. Marks	CO Attainment
Q.1	**Solve the following Case Study**	15	
	This case study examines the challenges faced by a global manufacturing company, "TechProd Inc.," in its supply chain operations. TechProd Inc. produces electronic components and devices with a worldwide customer base. The case study highlights how the company can optimize its supply chain management to enhance efficiency, reduce costs, and improve customer satisfaction. **Background:** TechProd Inc. is a renowned global manufacturing company specializing in electronic components and devices. It operates several manufacturing facilities across different countries and serves a diverse range of customers, from large multinational corporations to individual consumers. Despite its global success, TechProd Inc. faces several supply chain-related challenges. **Offer viable solution(s) to overcome problems mentioned below:**		
	Supplier Management: Tech-Prod Inc. relies on a vast network of suppliers across the globe, making supplier performance monitoring and quality control a significant challenge. Inconsistent quality, delays, and supplier dependencies affect production schedules.	04	CO4
	Inventory Control: The company often experiences issues related to excess or insufficient inventory. This results in carrying costs, obsolescence, and production delays due to unavailability of essential components.	04	CO1
	Transportation and Distribution: The transportation and distribution network lacks optimization, leading to high freight costs and long lead times. There are occasional issues with damaged or lost goods during transit.	04	CO2
	Demand Forecasting: Inaccurate demand forecasting results in production inefficiencies, including overproduction and underproduction. This affects customer satisfaction as products may not be readily available or may result in excess inventory.	03	CO3
Q.2. A	Define Logistics. Model integrated logistics to achieve 2 important	07	CO1

	functions of logistics. Explain with neat n clear diagram how different departments can support the flow of materials.		
B	Enumerate the importance of Material Management (MM) w.r.t. its important principles (at least 10). Explain without diagrams equipment used for MM	**08**	**CO1**
	OR		
Q.2. C	Define Supply Chain Management. Enumerate the SCM participants. Evaluate participants' role in goal achievement. Discover the concept of Bull whip effect and its repercussions.	**07**	**CO4**
D	Justify, how study of Commercial geography is important for development of any region. Illustrate logistics role in economic development of major industrial sectors in India (any 4)	**08**	**CO3**
Q.3. A	Classify different types of vessels and vessels operators. Justify the role of Freight forwarder and NVOCC in International trade. Explain FF can perform role of NVOCC but vice versa is not possible	**07**	**CO2**
B	Evaluate Weber's assumptions and limitations in today's world. Explain how Weber can help in plant selection. Define material index.	**08**	**CO3**
	OR		
Q.3. C	Classify different factors of best transportation selection. Examine the effectiveness of multimodal transportation. Distinguish between different modes of transportation.	**07**	**CO2**
D	Explain current and modern logistical infrastructure in India and global level include block chain technology in it .	**08**	**CO4**
Q.4. A	Evaluate the need for MMTG Act. Bring out the main provisions of MMTG Act from different stakeholders' perspectives.	**07**	**CO2**
B	Explain – Green Logistics, LASH, and 4PL and Golden quadrilateral	**08**	**CO1**
	OR		
Q.4. C	Explain benefits of Warehousing (WH)? What are the different types of WH, classify w.r.t. common factors	**07**	**CO4**
D	Bring out the role of logistics in strategy. Also enumerate different objectives of Logistics along with its features.	**08**	**CO1**

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Semester (June 2026) Examination: ATKT Examination June 2026 (UG Programmes)		
Programme code: 6 / 7 Programme: BBA / BBM	Class: TY	Semester: 6th
Name of the Constituent College: Dr. Shantilal K. Somaiya School of Commerce & Business Studies	Name of the Department: Business Studies	
Course Code:	Name of the Course: Operation Research	
Duration : 2 Hrs.	Maximum Marks: 60	
Instructions: 1) Draw neat diagrams 2) Use of Simple Calculator is allowed		

Question No.		Max. Marks	CO Attainment
Q.1.	**A**. Solve the following LPP using **Simplex Method** Z max = 15X1 + 6X2 + 9X3 + 2X4 Subject to – 1) 2X1 + X2 + 5X3 + 6X4 <= 20 2) 3X1 + X2 + 3X3 + 25X4 < = 24 3) 7X1 + 7X2 <= 70 and X1, X2, X3 & X4 > = 0	**15**	**CO1**
	OR		
Q. 1	A manufacturer of a line of patent medicines is preparing a production plan on medicines A and B. There are sufficient ingredients available to make 20,000 bottles of A and 40, 000 bottles of B but there are only 45, 000 bottles into which either of the medicines can be put. Furthermore, it takes 3 hours to prepare enough material to fill 1000 bottles of A, it takes one hour to prepare enough material to fill 1000 bottles of B and there are 66 hours available for this operation. The profit is Rs. 8 per bottle for A and Rs. 7 per bottle for B. Solve the problem to maximize the profit Formulate and find out total profit with the help of Graphical Method	**15**	**CO 1**
Q.2.A	i) Solve the Given problem of Transportation using **North-West corner Method.**	**07**	**CO 2**

Origin / Dest	D1	D2	D3	Supply
O1	5	8	4	50
O2	6	6	3	40
O3	3	9	6	60
Demand	20	95	35	150

ii) Find the Cost of Transportation using **MODI** method.

Origin / Dest	D1	D2	D3	D4	Supply
O1	21	16	25	13	11
O2	17	18	14	23	13
O3	32	27	18	41	19
Demand	6	10	12	15	

08 CO 2

OR

Q.2.B

i) Calculate the total cost required by machines to complete the given jobs using **Hungarian method** of assignment. — 08 — CO 2

	Machines				
Jobs	A	B	C	D	E
1	13	8	16	18	19
2	9	15	24	9	12
3	12	9	4	4	4
4	6	12	10	8	13
5	15	17	18	12	26

ii) Solve the Given problem of Transportation using **VAM** — 07 — CO 2

Origin / Dest	D1	D2	D3	Supply
O1	3	5	7	90
O2	2	4	1	50
O3	6	8	9	40
Demand	80	60	40	

Q.3.A.

A. Six jobs I, II, III, IV,V and VI are to be processed on three machines A,B and C in the same order — 09 — CO 3

Processing time (in hours)

Jobs	Machine A	Machine B	Machine C
I	5	6	7
II	4	7	10
III	5	8	8
IV	3	10	6

V	2	9	11
VI	4	5	4

1. Find the optimal sequence
2. Find the total minimum elapsed time
3. Find the idle times for each machine.

B. A small project consists of the following activities. Construct a network diagram for the project and identify the critical path and project duration. — 06 — CO 3

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Duration (hrs)	2	2	1	4	8	5	3	1	5	4	3

1. Find all the time estimates EST, EFT, LST and LFT.
2. Find all the floats.
3. Find all the slacks

OR

Q.3 C. The project consists of the following activities. Answer the following. — 09 — CO 3

Activity	Normal Time (days)	Crash Time (days)	Normal Cost (Rs)	Crash Cost (Rs)
1-2	3	2	90	100
1-3	4	2	250	370
2-5	5	3	150	300
3-4	6	4	100	140
3-6	8	8	400	400
4-5	3	2	120	170
5-7	5	3	200	400
6-7	3	1	200	280

Overhead cost is Rs 70 per day.

1. Draw the project network.
2. Find the optimal project cost and optimal project duration.
3. How many critical paths are there when project cost is optimum. Is the minimum project duration different than the optimal project duration?

D. 1. Draw the PERT network for the project & identify CP — 06 — CO 3

2. Calculate Estimate time, S.D. and Variance

3. if 21 weeks is the deadline is imposed, what is the probability that the project will be finished within that time?

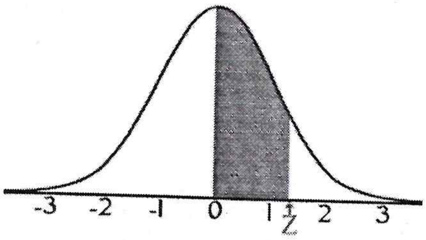
Activities	Optimistic time	Most likely time (in weeks)	Pessimistic time

	1-2	1	3	5		
	1-3	2	4	6		
	2-5	3	5	7		
	2-4	5	6	7		
	5-6	5	7	9		
	4-6	6	8	10		
	3-6	7	9	11		
	6-7	2	3	4		

Q.4.A	**Attempt following**	**15**	
	A) There are 7 different products in a machine shop. Their manufacturing time in Hrs of Machines 1 and 2 given in the table. Sequence of the machine is 1 – 2 **FIND: a) Total Elapsed Time b) Total elapsed time for optimum sequence C) Calculated idle time for both the machines**	**05**	**CO4**

Products	Processing Time (Mins.)	
	Machine A	Machine B
A	25	15
B	40	25
C	15	45
D	20	30
E	75	35
F	100	40
G	60	45

	B) Apply **Graphical** to find Z value Zmax = 2x1 + 10x2 Subject to – 1) 2x1 + 5x2 <= 16 2) 6x1 + 0x2 < = 30 Whereas X1, X2 >= 0	**05**	**CO1**
	C) Define OR, Write any 3 features and 2 applications of OR	**05**	**CO1**



STANDARD NORMAL TABLE (Z)

Entries in the table give the area under the curve between the mean and z standard deviations above the mean. For example, for $z = 1.25$ the area under the curve between the mean (0) and z is 0.3944.

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0190	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2969	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3513	0.3554	0.3577	0.3529	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998