DPGU

Dnyaan Prasad Global University

Dr. D. Y. Patil Unitech Society

Syllabus for PET Examination - PhD (Management)

Subject Specific

1. Operations and Supply Chain Management

- Operations Strategy & Design: Product and service design, Process selection and capacity planning, Production types, Facility location analysis (Factor rating, Center of Gravity), Plant layout (Product, Process, Fixed-position, Cellular). Strategic alignment, competitive priorities (cost, quality, flexibility, delivery), capacity strategy, process choice, and trade-off analysis.
- Production Planning & Control: Forecasting methods (Time-series, Moving averages, Exponential smoothing), Aggregate planning, Master Production Scheduling (MPS), MRP and ERP systems, JIT and Lean manufacturing.
- Logistics & Supply Chain Fundamentals: Drivers of supply chain performance, Role of distribution in SCM, Inbound/Outbound logistics, Bullwhip effect and its mitigation. Strategic fit, network design, outsourcing, push-pull systems, risk pooling and responsiveness-efficiency trade-offs. Global Supply Chains Global sourcing, trade regulations, currency and geopolitical risk, resilience and international network optimization. Sustainable and Digital Supply Chains, Green practices, circular economy, ESG integration, IoT, blockchain, AI and Industry 4.0 applications.
- Inventory Management: EOQ models, Safety stock and Re-order point, ABC, VED, and FSN analysis, multi-echelon inventory systems.
- Quality & Maintenance: TQM, Six Sigma (DMAIC), Total Productive Maintenance (TPM), ISO 9000/14000, Statistical Quality Control (X-bar, R, and P-charts), KAIZEN.
- Operations Research: Linear Programming (Graphical & Simplex), Transportation and Assignment models, Queuing theory, PERT/CPM for project scheduling.

Recommended Books:

1. Operations Management: Prof. Nigel Slack et al. (7th Edition).
2. Logistics and Supply Chain Management: Prof. Martin Christopher (2011).
3. Operations Management: Theory and Practice: B. Mahadevan (Pearson Education India).
4. Operations Research Methods for Supply Chain Management and Logistics: Dr. Fluturim Saliu et al. (Flipkart/Sultan Chand).

2. Data Analytics and Business Intelligence

- Foundations of Data Analytics**,** Mathematics & Statistics, Probability distributions, hypothesis testing, regression analysis, Multivariate statistics, ANOVA, time series analysis, Linear Algebra & Optimization, Matrix operations, eigenvalues/eigenvectors, Convex optimization, gradient descent, Data Management, Relational databases, SQL, Data warehousing concepts, ETL processes,
- Machine Learning & AI Applications, Supervised Learning, Classification (SVM, decision trees, ensemble methods), Regression models, Unsupervised Learning, Clustering (k-means, hierarchical, DBSCAN), Dimensionality reduction (PCA, t-SNE). Deep Learning, Neural networks, CNNs, RNNs, Applications in NLP and computer vision, Model Evaluation, Cross-validation, bias-variance trade-off, Performance metrics (precision, recall, F1-score, ROC-AUC)
- Business Intelligence & Decision Support, BI Tools & Platforms, Power BI, Tableau, QlikView, OLAP, dashboards, reporting systems, Enterprise Data Strategy, Data governance, master data management, Cloud-based BI solutions, Decision Support Systems, Predictive analytics, prescriptive analytics, Simulation and optimization models,
- Big Data Technologies, Data Ecosystem, Hadoop, Spark, Hive, NoSQL databases (MongoDB, Cassandra), Streaming & Real-Time Analytics, Kafka, Flink, Scalability & Performance, Distributed computing, parallel processing,
- Research & Emerging Trends, Data Ethics & Privacy, GDPR, data, anonymization, responsible AI, Advanced Topics, Explainable AI (XAI), Graph analytics, network science, Edge AI and IoT analytics, Research Methodology, Literature review, hypothesis formulation, Experimental design, reproducibility,
- Case Studies & Applications, Industry Applications, Finance: fraud detection, risk modelling, Healthcare: predictive diagnostics, patient analytics, Retail: recommendation systems, customer segmentation, Capstone Problem-Solving, End-to-end analytics pipeline design, Business intelligence strategy formulation.

References

1. *Data Analytics Essentials You Always Wanted to Know* – Vibrant Publishers (2024)
2. *Data Science and Analytics* – V.K. Jain (AICTE Recommended)
3. *Applied Multivariate Statistical Analysis* – Richard A. Johnson & Dean W. Wichern
4. *Introduction to Statistical Learning* – Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani
5. *Pattern Recognition and Machine Learning* – Christopher M. Bishop
6. *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow* – Aurélien Géron
7. *Deep Learning* – Ian Goodfellow, Yoshua Bengio, Aaron Courville
8. *Artificial Intelligence Trends for Data Analytics Using Machine Learning and Deep Learning Approaches* – K. Gayathri Devi, Mamata Rath
9. *Business Intelligence: A Managerial Approach* – Efraim Turban, Ramesh Sharda, Dursun Delen
10. *Data Warehousing Fundamentals* – Paulraj Ponniah

11. *Competing on Analytics: The New Science of Winning* – Thomas H. Davenport & Jeanne G. Harris
12. *Big Data: Principles and Best Practices of Scalable Real-Time Data Systems* – Nathan Marz & James Warren
13. *Learning Spark: Lightning-Fast Big Data Analysis* – Holden Karau, Andy Konwinski, Patrick Wendell, Matei Zaharia
14. *NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence* – Pramod J. Sadalage & Martin Fowler
15. *Research Methods for Business* – Uma Sekaran & Roger Bougie
16. Designing Data-Intensive Applications – Martin Kleppmann
17. Ethics of Artificial Intelligence and Robotics – Stanford Encyclopaedia of Philosophy (online reference)

3. Financial Management and Technology

- Fundamentals of Financial Management & Financial Analysis – Nature and scope of financial management, objectives and functions of financial management, time value of money (TVM), financial instruments and markets, ratio analysis, cash flow and funds flow analysis, trend analysis and forecasting.
- Investment Decisions & Risk Analysis – Capital budgeting concepts, techniques such as NPV, IRR, Payback Period and Discounted Payback Period, risk analysis in capital investment.
- Capital Structure, Cost of Capital & Dividend Policy – Capital structure theories including Net Income Approach, Net Operating Income Approach and MM Theory, determination and computation of cost of capital including Weighted Average Cost of Capital (WACC), dividend decisions and theories, factors affecting dividend policy and retained earnings.
- Working Capital Management – Concepts and objectives of working capital, working capital cycle and financing, management of cash, inventories and receivables.
- Technology in Finance & Financial Technology (FinTech) – Use of computers in financial decision making, Management Information Systems (MIS), Decision Support Systems (DSS), electronic payment systems, digital transactions and e-commerce, internet finance including online trading platforms, security and risk issues in digital finance.

Recommended Books:

1. Financial Management: Theory and Practice: Prasanna Chandra (Tata McGraw Hill).
2. Fundamentals of Financial Management: Dr. R.P. Rustagi.
3. International Financial Management: V.K. Bhalla.
4. Management Accounting: M.N. Arora.

4. Human Resource Management and Organizational Behaviour

- Organizational Behaviour: Evolution of HRM – Personnel to Strategic Human Resource Management, Personality (Big Five, Myers-Briggs); Perception and Attribution; Values and Attitudes; Motivation theories (Maslow, Herzberg, McClelland); Learning theories.
- Group Dynamics: Team building; Leadership styles and theories (Trait, Behavioral, Situational, Transformational); Conflict management; Organizational culture and climate, Talent Management & Skill Development
- Strategic HRM: HR planning and forecasting; Job analysis and design; Recruitment and Selection strategies; Competency mapping, Balanced Scoreboard, Career Planning and Development,
- HR Development: Training needs assessment; Methods of training; Performance appraisal (360-degree, MBO); Compensation and Benefit administration,
- Contemporary HR: Industrial relations, Trade Union Collective bargaining, Green HRM; Employee Engagement & Work Life Balance, Workplace diversity and inclusion. Industrial Relations: Disputes & Grievance Management, Labour Welfare and Social Security

Recommended Books:

1. Human Resource Management: Gary Dessler and Biju Varkey (Widely regarded as the "HR Bible").
2. Organizational Behaviour: Stephen P. Robbins (Essential for theory and group dynamics).
3. Armstrong's Handbook of Human Resource Management Practice: Michael Armstrong.
4. Essentials of Human Resource Management: Dr. S.D. Singh (January 2025 Edition).

5. Marketing Management

- Marketing Strategy: Marketing environment (PESTEL); Marketing mix (7Ps); Market segmentation, Targeting, and Positioning (STP); Competitive strategies. Service Marketing (GAP Model)– Managing Service Quality and Brands, Marketing Strategies of Service Firms.
- Product & Brand Management: Product Life Cycle (PLC); New product development; Branding strategies; Brand equity and positioning. Brand Equity, Equity Models, Brand Name Decisions, Brand Extensions and Loyalty.
- Pricing & Distribution: Pricing objectives and methods; Marketing channels and value networks; Wholesaling and Retailing; Logistics in marketing.
- Consumer and Industrial Buying Behaviour: Consumer buying process; Factors influencing behavior (Cultural, Social, Psychological); Theories and Models of consumer behavior, Types of Retail Outlets
- Digital & Modern Marketing: Social media marketing; Search Engine Optimization (SEO); CRM; Rural marketing; Ethical issues in marketing, Emerging Trends in Marketing, Concept of e-Marketing, Direct Marketing, Digital Marketing and Green Marketing, International Marketing.

Recommended Books:

1. Marketing Management: Philip Kotler and Kevin Lane Keller (The fundamental text for marketing).
2. Marketing Management: Global Perspective: V.S. Ramaswamy and S. Namakumari.
3. Consumer Behaviour: Leon Schiffman and Leslie Kanuk (or Ramesh Kumar & Wisenblit for Indian context).

6. General Management

- Management Thought: Evolution from Classical (Taylor, Fayol) to Neo-classical and Modern approaches (Systems, Contingency); Functions of management, Organisation Structure and Design – Types, Authority, Responsibility, Centralisation, Decentralisation and Span of Control
- Managerial Economics: Demand and Supply analysis; Elasticity of demand; Production function; Market structures (Perfect competition, Monopoly, Oligopoly); Inflation and Business cycles. Demand analysis – Utility Analysis, Indifference Curve, Elasticity & Forecasting, Market Structures, National Income, Inflation – Concept, Types and Measurement, Demand analysis – Utility Analysis, Indifference Curve, Elasticity & Forecasting, Corporate Governance, Role of International Financial Institutions – IMF and World Bank
- Strategic Management: Strategy formulation and implementation; SWOT and PEST analysis; Porter's Five Forces; BCG Matrix; Ansoff's Matrix. External Analysis, Internal Analysis – Resource Based Approach, Value Chain Analysis, Mckinsey 7s Framework
- Business Ethics & Governance: Corporate Social Responsibility (CSR); Corporate Governance codes; Business ethics and value-based management, Market Segmentation, Positioning and Targeting, Marketing channels and value networks, VMS, IMC, Advertising and Sales promotion,
- Entrepreneurship: Concept and types; Innovation and Intrapreneurship; Business plan preparation; Government support for MSMEs. Theories and Process, Developing Entrepreneurial Competencies, Women Entrepreneurship and Rural Entrepreneurship, Innovations in Business – Types of Innovations, Business Plan and Feasibility Analysis, Micro and Small-Scale Industries in India; Role of Government in Promoting SSI, Institutional Finance to Small Industries
- International Business – Managing Business in Globalization Era; Theories of International Trade; Balance of payment, Foreign Direct Investment, Multilateral regulation of Trade and Investment under WTO, International Trade Procedures and Documentation; EXIM Policies

Reference Books:

1. Management: A Global Perspective: Weihrich, Cannice, and Harold Koontz.
2. Strategic Management and Business Policy: Wheelen and Hunger.
3. Managerial Economics: T.R. Jain and Dr. O.P. Khanna.
4. Principles of Management: P. Durai.

7. Artificial Intelligence, Machine Learning & Data Science

- Artificial Intelligence Fundamentals: Intelligent agents and problem-solving, approaches, Search algorithms (BFS, DFS, A*), Knowledge representation and reasoning, Expert systems
- Data Science Concepts: Fundamentals of python, Numpy, Pandas, Matplotlib. Data preprocessing and data cleaning, Exploratory Data Analysis (EDA), Feature engineering and selection, Data visualization concepts, Handling missing and imbalanced data
- Machine Learning Basics:
  - Model evaluation and validation techniques, Bias-variance tradeoff, Confusion Metrics, Performance metrics (Accuracy, Precision, Recall, F1-score, ROC)
  - Supervised Learning Techniques: Regression, Linear and Logistic Regression, Decision Trees and Random Forest, Support Vector Machines, k-Nearest Neighbors, Naïve Bayes
  - Unsupervised Learning Techniques: Clustering (K-Means, Hierarchical, DBSCAN), Dimensionality Reduction (PCA), Association Rule Mining
  - Introduction of semi supervised and reinforcement learning.
- Deep Learning: Artificial Neural Networks and backpropagation, Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN, LSTM)
- Ethical and Responsible AI : Ethical issues and fairness in AI, Explainable and Responsible AI, Applications of AI in various domains

Reference Books:

1. Artificial Intelligence Fundamentals – Artificial Intelligence: A Modern Approach – Stuart Russell & Peter Norvig, Pearson Education, 4th Edition.
2. Data Science (Python, NumPy, Pandas, EDA, Visualization) – Python for Data Analysis – Wes McKinney, O'Reilly Media, 3rd Edition.
3. Machine Learning Basics (Supervised & Unsupervised) – Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow – Aurélien Géron, O'Reilly Media, 2nd Edition.
4. Deep Learning – Deep Learning – Ian Goodfellow, Yoshua Bengio & Aaron Courville, MIT Press.
5. Ethical and Responsible AI – Artificial Intelligence Basics: A Non-Technical Introduction – Tom Taulli, Apress.

8. Blockchain & Emerging Technologies

- Blockchain Fundamentals and Architecture : Distributed ledger technology, Structure of blocks and blockchain architecture, Cryptographic hash functions and Merkle trees, Types of blockchain: Public, Private, Consortium.
- Cryptography and Security Foundations: Symmetric and asymmetric encryption
- Digital signatures, Public Key Infrastructure (PKI), Role of cryptography in blockchain security.
- Smart Contracts and Development Concepts : Concept, features, and lifecycle of smart contracts, Overview of Solidity programming concepts, Smart contract execution environment, Deployment concepts using blockchain networks.
- Tokens, Digital Assets, and Decentralized Applications : Tokens and Digital Assets, Tokenization concepts - ERC standards (ERC-20, ERC-721), Fungible and Non-Fungible Tokens (NFTs), Applications of tokens and NFTs, Decentralized Applications (DApps), Architecture and components of DApps, Interaction between user interface, blockchain, and smart contracts,Role of wallets and blockchain nodes.
- Blockchain Platforms and Smart Contract Security : Blockchain Platforms and Infrastructure, Overview of major blockchain platforms: Ethereum, Polygon, Binance Smart Chain, Public test networks and their purpose, Blockchain network services and node providers (conceptual overview).
- Smart Contract Security and Best Practices: Common vulnerabilities (reentrancy, overflow/underflow, access control issues), Secure development principles, Role of standard libraries and security frameworks, Basic concepts of testing and auditing.

9. Emerging Technologies

- Image Processing and Computer Vision: Basics of digital image processing: image representation, enhancement, and filtering, Image segmentation and feature extraction techniques, Fundamentals of computer vision: object detection, image classification, and pattern recognition, Applications using machine learning and deep learning in medical imaging, surveillance, and autonomous system
- Internet of Things (IoT) : IoT architecture and components, Communication protocols, Security and privacy challenges.
- Cloud Computing : concept computer network, Service models (IaaS, PaaS, SaaS, Deployment models (Public, Private, Hybrid), Virtualization and containerization, Cloud security concepts
- Cybersecurity Fundamentals: Network security principles, Common threats and vulnerabilities, Risk management and security practices
- Big Data: Introduction to Big Data, Big Data architecture with distributed storage concepts like HDFS, Big Data Processing Frameworks, Big Data Analytics, Applications of Big Data in business and decision-making.

Reference Books:

1. Mastering Blockchain – Imran Bashir, Packt Publishing, 3rd Edition.
2. Blockchain Basics: A Non-Technical Introduction in 25 Steps – Daniel Drescher, Apress.
3. Mastering Ethereum – Andreas M. Antonopoulos & Gavin Wood, O'Reilly Media.
4. Hands-On Smart Contract Development with Solidity and Ethereum – Kevin Solorio, Randall Kanna & David Hoover, Packt Publishing.
5. Digital Image Processing – Rafael C. Gonzalez & Richard E. Woods, Pearson Education, 4th Edition.
6. Internet of Things: A Hands-On Approach – Arshdeep Bahga & Vijay Madisetti, Universities Press, 1st Edition.
7. Cloud Computing: Concepts, Technology & Architecture – Thomas Erl, Ricardo Puttini & Zaigham Mahmood, Prentice Hall/Pearson, 1st Edition.
8. Computer Security: Principles and Practice – William Stallings & Lawrie Brown, Pearson Education, 4th Edition
9. Hadoop: The Definitive Guide – Tom White, O'Reilly Media, 4th Edition
10. Quantum Computing for Computer Scientists – Noson S. Yanofsky & Mirco A. Mannucci, Cambridge University Press, 1st Edition.