

SVKM's NMIMS  
Mukesh Patel School of Technology Management & Engineering

<b>Program:</b> B. Tech (Computer Science and Business Systems)				<b>Semester:</b> VIII	
<b>Course :</b> Services Science & Service Operational Management				<b>Code:</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Fundamentals of Management, Operations Research					
<b>Course Objective:</b> The objective of the course is to understand the growing significance and impact of services on the growth and economy and the scientific ways to run the operations so as to optimize the business and brand returns.					
<b>Course Outcomes:</b> After completion of the course, student will be able to- <div><div>1. Understand concepts about Services and distinguish it from Goods</div><div>2. Able to identify characteristics and nature of Services</div><div>3. Comprehend ways to design Services and evaluate them using Service qualities</div><div>4. Understand how various methods can be used to operate and manage Service businesses</div><div>5. Understand how innovation can be approached from Services point of view</div></div>					
<b>Detailed Syllabus:</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Introduction:</b> Introduction to the course, Introduction to service operations, Role of service in economy and society, Introduction to Indian service sector.				10
	<b>Nature of Services and Service Encounters:</b> Differences between services and operations, Service package, characteristics, various frameworks to design service operation system, Kind of service encounter, importance of encounters.				
	<b>Service-Dominant Logic:</b> From Goods-Dominant logic to Service-Dominant logic, Value Co-creation.				

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2	<b>Service Strategy and Competitiveness:</b> Development of Strategic Service Vision (SSV), Data Envelopment Analysis.	12
	<b>New Service Development:</b> NSD cycle, Service Blueprinting, Elements of service delivery system.	
	<b>Service Design:</b> Customer Journey and Service Design, Design Thinking methods to aid Service Design.	
	<b>Locating facilities and designing their layout:</b> models of facility locations (Huff's retail model), Role of service-scape in layout design.	
	<b>Service Quality:</b> SERVQUAL, Walk through Audit, Dimensions of Service quality & other quality tools.	
3	<b>Service Guarantee &amp; Service Recovery:</b> How to provide Service guarantee? How to recover from Service failure?	3
4	<b>Forecasting Demand for Services:</b> A review of different types of forecasting methods for demand forecasting.	10
	<b>Managing Capacity and Demand:</b> Strategies for matching capacity and demand, Psychology of waiting, Application of various tools used in managing waiting line in services.	
	<b>Managing Facilitating Goods:</b> Review of inventory models, Role of inventory in services.	
	<b>Managing service supply relationship:</b> Understanding the supply chain/hub of service, Strategies for managing suppliers of service.	
	<b>Vehicle Routing Problem:</b> Managing after sales service, Understanding services that involve transportation of people and vehicle, Techniques for optimizing vehicle routes.	
5	<b>Service Innovation:</b> Services Productivity, Need for Services Innovation.	10
	<b>Student Project:</b> Option 1: Choose any service organization around and present it from the perspective of: nature of service, classification of service, blueprint or service	

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	design analysis, service quality, and any additional perspective you would like to add. Option 2: Choose any latest research paper in services and explain your understanding and feedback on the same.	
	<b>Total</b>	<b>45</b>

**Text Books:**

1. Fitzsimmons & Fitzsimmons, "Service Management: Operations, Strategy, Information Technology", McGraw Hill publications, 7<sup>th</sup> edition, 2017

**References:**

**Reference Books:**

1. Wilson, A., Zeithaml, V. A., Bitner, M. J., & Gremler, D. D., "Services marketing: Integrating customer focus across the firm", McGraw Hill, 7<sup>th</sup> edition, 2018
2. Lovelock C., "Services Marketing", Pearson Education India, 7<sup>th</sup> Edition, 2011
3. Reason, Ben, and Lovlie, Lavrans, "Service Design for Business: A Practical Guide to Optimizing the Customer Experience", Pan Macmillan India, 2016
4. Chesbrough, H., "Open services innovation: Rethinking your business to grow and compete in a new era", John Wiley & Sons, 2010.

**Reference Papers:**

1. Karmarkar, U. (2004). Will you survive the services revolution? Harvard Business Review, 100-107.
2. Vargo, S. L., & Lusch, R. F. (2008). From goods to service (s): Divergences and convergences of logics. Industrial marketing management, 37(3), 254-259.
3. Vargo, S. L., & Lusch, R. F. (2008). "Service-Dominant Logic: Continuing the Evolution," Journal of the Academy of Marketing Science (36:1), pp. 1-10
4. Silvestro, R., Fitzgerald, L., Johnston, R., & Voss, C. (1992). Towards a classification of service processes. International journal of service industry management, 3(3), 62-75.
5. Vargo, S. L., Maglio, P. P., & Akaka, M. A. (2008). On value and value co-creation: A service systems and service logic perspective. European management journal, 26(3), 145-152.
6. Shostack, G.L., (1984), "Designing Services That Deliver," Harvard Business Review, January-February 1984, pp. 132-139
7. Evenson, S., & Dubberly, H. (2010). Designing for service: Creating an experience advantage. Introduction to service engineering, 403-413.
8. Edvardsson, B., & Olsson, J. (1996). Key concepts for new service development. Service Industries Journal, 16(2), 140-164.
9. Goldstein, S. M., Johnston, R., Duffy, J., & Rao, J. (2002). The service concept: the missing link in service design research? Journal of Operations management, 20(2), 121-134.
10. Kumar, A., Zope, N. R., & Lokku, D. S. (2014, April). An approach for services design by understanding value requirements, identifying value carriers, developing value proposition,

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and subsequently realizing value. In Global Conference (SRII), 2014 Annual SRII (pp. 298-304). IEEE.

11. Parasuraman, A., Zeithaml, V.A., and Berry, L.L., (1985), "A Conceptual Model of Service Quality and Its Implications for Future Research," The Journal of marketing, Vol. 49, No. 4, pp. 41-50
12. Cronin, J.J., and Taylor, S.A., (1992), "Measuring Service Quality: A Reexamination and Extension," The Journal of Marketing, Vol. 56, No. 3, pp. 55-68
13. Van Ree, H. J., (2009), Service Quality Indicators for Business Support Services, Ph.D. Thesis, University College London, London.
14. Zope, N. R., Anand, K., & Lokku, D. S. (2014, April). Reviewing Service Quality for IT Services Offerings: Observations in the Light of Service Quality Models & Determinants. In Global Conference (SRII), 2014 Annual SRII (pp. 43-49). IEEE.
15. Heskett, J.L., Jones, T.O., Loveman, G.W., Sasser, W.E., and Schlesinger, L.A., (2008), "Putting the Service-Profit Chain to Work," Best of HBR, Harvard Business Review, July-August 2008, pp. 118-128
16. Clatworthy, S. (2011). Service innovation through touch-points: Development of an innovation toolkit for the first stages of new service development. International Journal of Design, 5(2).
17. Barras, R. (1986). "Towards a Theory of Innovation in Services," Research Policy (15), pp. 161-173.
18. Gustafsson, A., and Johnson, M. (2003). Competing in a Service Economy: How to Create a Competitive Advantage Through Service Development and Innovation, San Francisco: Jossey-Bass.
19. Barrett, M., Davidson, E., Prabhu, J., & Vargo, S. L. (2015). "Service innovation in the digital age: key contributions and future directions". Mis Quarterly, 39(1), 135-154.
20. Lusch, R. F., and Nambisan, S. (2015). "Service Innovation; A Service-Dominant Logic Perspective," MIS Quarterly (39:1), pp.155-175

**Laboratory / Tutorial work**

8 to 10 experiments (and a practicum where applicable) based on the syllabus.

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<b>Program:</b> B. Tech (Computer Science and Business Systems)				<b>Semester:</b> VIII	
<b>Course:</b> IT Project Management				<b>Code:</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Software Engineering, Software Design with UML					
<b>Course Objective:</b> The objective of the course is to impart the knowledge of stages in the system development lifecycle and the activities that are carried out to implement an IT application. Students will be able to manage scope, time and budgets for IT projects, evaluate agile project management techniques for IT projects and learn why automation, culture, and metrics are essential to a successful DevOps project					
<b>Course Outcomes:</b> After completion of this course, student will be able to <ol style="list-style-type: none"> <li>1. Learn the techniques to effectively plan, manage, execute, and control projects within time and cost targets with a focus on Information Technology and Service Sector</li> <li>2. Apply agile project management techniques such as Scrum and DevOps on real time projects</li> </ol>					
<b>Detailed Syllabus:</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Project Overview and Feasibility Studies:</b> Identification, Market and Demand Analysis, Project Cost Estimate, Financial Appraisal				5
2	<b>Project Scheduling:</b> Project Scheduling, Introduction to PERT and CPM, Critical Path Calculation, Precedence Relationship, Difference between PERT and CPM, Float Calculation and its importance, Cost reduction by Crashing of activity.				5
3	<b>Cost Control and Scheduling:</b> Project Cost Control (PERT/Cost), Resource Scheduling & Resource Levelling				4
4	<b>Project Management Features:</b> Risk Analysis, Project Control, Project Audit and Project Termination				4
5	<b>Agile Project Management:</b> Introduction, Agile Principles, Agile methodologies, Relationship between Agile Scrum, Lean, DevOps and IT Service Management (ITIL).				7
6	<b>Scrum:</b>				8



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	Various terminologies used in Scrum (Sprint, product backlog, sprint backlog, sprint review, retro perspective), various roles (Roles in Scrum), Best practices of Scrum.	
7	<b>DevOps:</b> Overview and its Components, Containerization Using Docker, Managing Source Code and Automating Builds, Automated Testing and Test Driven Development, Continuous Integration, Configuration Management, Continuous Deployment, Automated Monitoring.	8
8	<b>Other Agile Methodologies:</b> Introduction to XP, FDD, DSDM, Crystal.	4
	<b>Total</b>	<b>45</b>
<b>Text Books:</b> <ol style="list-style-type: none"> <li>1. Mike Cohn, "Succeeding with Agile: Software Development Using Scrum", Addison-Wesley, 2010</li> <li>2. Schwalbe, "Information Technology Project Management", Course Technology Inc, 9th Edition, 2018.</li> </ol>		
<b>References:</b> <ol style="list-style-type: none"> <li>1. Roman Pichler, "Agile Product Management with Scrum", Pearson Education, 2011</li> <li>2. Ken Schwaber, "Agile Project Management with Scrum (Microsoft Professional)", Microsoft Press, 2004</li> <li>3. Hughes, "Project Management for IT-related Projects", BCS Publications, 3<sup>rd</sup> Edition, 2019</li> <li>4. Wysocki, "R Effective Project Management: Traditional, Agile, Extreme" Wiley, 8<sup>th</sup> Edition, 2019</li> </ol>		
<b>Laboratory / Tutorial work</b> 8 to 10 experiments (and a practicum where applicable) based on the syllabus.		

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<b>Program:</b> B. Tech (Computer Science and Business Systems)				<b>Semester : VIII</b>	
<b>Course:</b> Marketing Research & Marketing Management				<b>Code:</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
3	0	0	3	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Business Strategy, Business Communication & Value Science					
<b>Course Objective:</b> The objective of the course is to give theoretical clarity on Marketing as a Business function, understand and analyse the relevance of Marketing in the corporate world. The course will equip learners to frame marketing strategies for effective and efficient decision making for traditional and new age businesses. The course will also demonstrate the ability to apply advanced research techniques for taking sound marketing decisions.					
<b>Course Outcomes:</b> Students will be able to <ol style="list-style-type: none"> <li>1. Understand basic marketing concepts</li> <li>2. Comprehend the dynamics of marketing and analyse how its various components interact with each other in the real world</li> <li>3. Leverage marketing concepts for effective decision making</li> <li>4. Understand basic concepts and application of statistical tools in Marketing research.</li> </ol>					
<b>Detailed Syllabus:</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Marketing Concepts and Applications:</b> Introduction to Marketing & Core Concepts, Marketing of Services, Importance of marketing in service sector.				3
	<b>Marketing Planning &amp; Environment:</b> Elements of Marketing Mix, Analyzing needs & trends in Environment - Macro, Economic, Political, Technical & Social				3
	<b>Understanding the consumer:</b> Determinants of consumer behavior, Factors influencing consumer behavior				3

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	<b>Market Segmentation:</b> Meaning & Concept, Basis of segmentation, selection of segments, Market Segmentation strategies, Target Marketing, Product Positioning	5
2	<b>Product Management:</b> Product Life cycle concept, New Product development & strategy, Stages in New Product development, Product decision and strategies, Branding & packaging.	5
3	<b>Pricing, Promotion and Distribution Strategy:</b> Policies & Practices - Pricing Methods & Price determination Policies. Marketing Communication - The promotion mix, Advertising & Publicity, 5 M's of Advertising Management. Marketing Channels, Retailing, Marketing Communication, Advertising	8
4	<b>Marketing Research:</b> Introduction, Type of Market Research, Scope, Objectives & Limitations Marketing Research Techniques, Survey Questionnaire design & drafting, Pricing Research, Media Research, Qualitative Research. <b>Data Analysis:</b> Use of various statistical tools - Descriptive & Inference Statistics, Statistical Hypothesis Testing, Multivariate Analysis - Discriminant Analysis, Cluster Analysis, Segmenting and Positioning, Factor Analysis	8
5	<b>Internet Marketing:</b> Introduction to Internet Marketing. Mapping fundamental concepts of Marketing (7Ps, STP); Strategy and Planning for Internet Marketing	5
6	<b>Business to Business Marketing:</b> Fundamental of business markets. Organizational buying process. Business buyer needs. Market and sales potential. Product in business markets. Price in business markets. Place in business markets. Promotion in business markets. Relationship, networks and customer relationship management. Business to Business marketing strategy	5
	<b>Total</b>	<b>45</b>
<b>Text Books:</b> <ol style="list-style-type: none"> <li>Philip Kotler, "Marketing Management: Analysis, Planning, Implementation and Control", Prentice Hall, 9<sup>th</sup> Edition, 1997</li> <li>William J. Stanton, "Fundamentals of Marketing", McGraw-Hill, 3<sup>rd</sup> Edition, 1994</li> </ol>		

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3. V.S. Ramaswamy and S. Namakumari, "Marketing Management", Macmillan Education, 4<sup>th</sup> Edition, 2009
4. Rajendra Nargundkar, "Marketing Research", McGraw Hill, 4<sup>th</sup> Edition, 2019
5. G.C. Beri, "Marketing Research", Mc Graw Hill, 6<sup>th</sup> Edition, 2020
6. Cooper & Schindler, "Marketing Research: Concepts, & Cases", Tata McGraw Hill Education, 2005

**References:**

1. Rajan Saxena, "Marketing Management", Mc Graw Hill, 6<sup>th</sup> Edition, 2019
2. S.A. Sherlekar, "Marketing Management", Himalaya Publishing House, 2019
3. S.M. Jha, "Service Marketing", Himalaya Publishing House, 2015
4. Journals - The IUP Journal of Marketing Management, Harvard Business Review
5. Paul Green, Donald, Tull, "Research for Marketing Decisions", Prentice-Hall, 4<sup>th</sup> Edition, 1978
6. David M Levine et al., "Business Statistics: A First Course", Pearson Publication, 8th Edition, 2020

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<b>Program:</b> B. Tech (Computer Science and Business Systems)				<b>Semester : VIII</b>	
<b>Course:</b> Behavioral Economics(Elective V)				<b>Module Code:</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
2	2	1	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Finance & Cost Accounting					
<b>Course Objective:</b> To understand human behaviour through the lens of social preferences, heuristics and norms and its application in decision making in contrast to neo-classical / standard model.					
<b>Course Outcomes:</b> <ol style="list-style-type: none"> <li>1. To understand how individuals behave and how thoughts and emotions affect individual decision-making.</li> <li>2. To examine how beliefs, heuristics and biases affect decisions.</li> <li>3. To Understand aspects of decision-making under uncertainty and solve analytical problems.</li> <li>4. To analyse individual preferences in social context.</li> </ol>					
<b>Detailed Syllabus:</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Introduction</b> The neoclassical/standard model and behavioral economics in contrast; historical background; behavioral economics and other social sciences; theory and evidence in the social sciences and in behavioral economics; applications – gains and losses, money illusion, charitable donation.				4
2	<b>Basics of choice theory</b> Revisiting the neoclassical model; utility in economics and psychology; models of rationality; connections with evolutionary biology and cognitive neuroscience; policy analysis – consumption and addiction, environmental protection, retail therapy; applications – pricing, valuation, public goods, choice anomalies				4
3	<b>Beliefs, heuristics and biases:</b> Revisiting rationality; causal aspects of irrationality; different kinds of biases and beliefs; self-evaluation and self-projection; inconsistent and biased beliefs; probability estimation; trading applications – trade in counterfeit goods, financial trading behavior, trade in memorabilia				4



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4	<b>Choice under uncertainty:</b> Background and expected utility theory; prospect theory and other theories; reference points; loss aversion; marginal utility; decision and probability weighting; applications – ownership and trade, income and consumption, performance in sports.	5
5	<b>Intertemporal choice:</b> Geometric discounting; preferences over time; anomalies of inter-temporal decisions; hyperbolic discounting; instantaneous utility; alternative concepts – future projection, mental accounts, heterogeneous selves, procedural choice; policy analysis – mobile calls, credit cards, organization of government; applications – consumption and savings, clubs and membership, consumption planning	5
6	<b>Strategic choice:</b> Review of game theory and Nash equilibrium – strategies, information, equilibrium in pure and mixed strategies, iterated games, bargaining, signaling, learning; applications – competitive sports, bargaining and negotiation, monopoly and market entry	4
	Individual preferences; choice anomalies and inconsistencies; social preferences; altruism; fairness; reciprocity; trust; learning; communication; intention; demographic and cultural aspects; social norms; compliance and punishment; inequity aversion; policy analysis – norms and markets, labor markets, market clearing, public goods; applications – logic and knowledge, voluntary contribution, compensation design	4
	<b>Total</b>	<b>30</b>
<b>Text Books:</b> 1. An Introduction to Behavioral Economics, by N. Wilkinson and M. Klaes		
<b>References:</b> 1. Colin Cramer, George Loewenstein, Mathew Rabin, Advances in Behavioral Economics, Princeton University Press		
<b>Laboratory / Tutorial work</b> 8 to 10 experiments (and a practicum where applicable) based on the syllabus.		

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<b>Program:</b> B. Tech (Computer Science and Business Systems)				<b>Semester:</b> VIII	
<b>Course:</b> Computational Finance & Modeling (Elective-V)				<b>Code:</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
2	2	1	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Business Strategy, Financial & Cost Accounting, Financial Management					
<b>Course Objective:</b> This course will help the students to get an overview of the traditional financial theories of portfolio management, calculus models, and optimization techniques.					
<b>Course Outcomes:</b> After successful completion of this course, student will be able to: <ol style="list-style-type: none"> <li>1. Understand existing financial models in a quantitative and mathematical way.</li> <li>2. Apply these quantitative tools to solve complex problems in the areas of portfolio management, risk management and financial engineering.</li> <li>3. Explain the approaches required to calculate the price of options.</li> <li>4. Identify the methods required to analyse information from financial data and trading systems.</li> </ol>					
<b>Detailed Syllabus:</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	Numerical methods relevant to integration, differentiation and solving the partial differential equations of mathematical finance: examples of exact solutions including Black Scholes and its relatives, finite difference methods including algorithms and question of stability and convergence, treatment of near and far boundary conditions, the connection with binomial models, interest rate models, early exercise, and the corresponding free boundary problems, and a brief introduction to numerical methods for solving multi-factor models.				06
2	Black-Scholes framework: Black-Scholes PDE: simple European calls and puts; put-call parity. The PDE for pricing commodity and currency options. Discontinuous payoffs - Binary and Digital options. The Greeks: theta, delta, gamma, vega & rho and their role in hedging. The mathematics of early exercise - American options: perpetual calls				07

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	and puts; optimal exercise strategy and the smooth pasting condition. Volatility considerations - actual, historical, and implied volatility; local vol and volatility surfaces.	
	Simulation including random variable generation, variance reduction methods and statistical analysis of simulation output. Pseudo random numbers, Linear congruential generator, Mersenne twister RNG. The use of Monte Carlo simulation in solving applied problems on derivative pricing discussed in the current finance literature. The technical topics addressed include importance sampling, Monte Carlo integration, Simulation of Random walk and approximations to diffusion processes, martingale control variables, stratification, and the estimation of the "Greeks."	05
3	Financial Products and Markets: Introduction to the financial markets and the products which are traded in them: Equities, indices, foreign exchange, and commodities. Options contracts and strategies for speculation and hedging.	03
4	Application areas include the pricing of American options, pricing interest rate dependent claims, and credit risk. The use of importance sampling for Monte Carlo simulation of VaR for portfolios of options.	03
5	Statistical Analysis of Financial Returns: Fat-tailed and skewed distributions, outliers, stylized facts of volatility, implied volatility surface, and volatility estimation using high frequency data.	04
6	Copulas, Hedging in incomplete markets, American Options, Exotic options, Electronic trading, Jump Diffusion Processes, High-dimensional covariance matrices, Extreme value theory, Statistical Arbitrage.	02
	<b>Total</b>	<b>30</b>
<b>Text Books:</b> <ol style="list-style-type: none"> <li>1. R. Seydel: Tools for Computational Finance, 2nd edition, Springer-Verlag, New York, 2004.</li> <li>2. P. Glasserman: Monte Carlo Methods in Financial Engineering, Springer-Verlag, New York, 2004.</li> </ol>		
<b>References:</b> <ol style="list-style-type: none"> <li>1. W. Press, S. Teukolsky, W. Vetterling and B. Flannery, Numerical Recipes in C: The Art of Scientific Computing, 1997. Cambridge University Press, Cambridge, UK. Available on-line at: <a href="http://www.nr.com/">http://www.nr.com/</a></li> </ol>		

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2. A. Lewis: Option Valuation under Stochastic Volatility, Finance Press, Newport Beach, California, 2000.
3. A. Pelsser: Efficient Methods for Valuing Interest Rate Derivatives, Springer-Verlag, New York, 2000.
4. D. Ruppert, Statistics and Data Analysis for Financial Engineering
5. R. Carmona: Statistical Analysis of Financial Data in S-Plus
6. N. H. Chan, Time Series: Applications to Finance
7. R. S. Tsay, Analysis of Financial Time Series
8. J. Franke, W. K. Härdle and C. M. Hafner, Statistics of Financial Markets: An Introduction.

**Laboratory / Tutorial work**

8 to 10 experiments (and a practicum where applicable) based on the syllabus.

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SVKM's NMIMS  
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<b>Program:</b> B. Tech (Computer Science and Business Systems)				<b>Semester:</b> VIII	
<b>Course:</b> Industrial Psychology (Elective V)				<b>Code:</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
2	2	1	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Introduction to Innovation, IP Management & Entrepreneurship					
<b>Course Objective:</b> To introduce students to the content areas of industrial psychology and the application of psychological theory to organizational issues. Topics include employment law, job analysis, recruitment and selection, training, performance appraisal and discipline, employee motivation, and workplace safety. Using an applied approach, this course will help prepare students for their roles as employees and managers.					
<b>Course Outcomes:</b> After completion of this course, Student will be able to <ol style="list-style-type: none"><li>1. Become conversant about the major content areas of Industrial Psychology (i.e., job analysis, recruitment, selection, employment law, training, performance management, and health/ well-being issues in the workplace).</li><li>2. Gain further comfort with statistical concepts in the context of making personnel decisions to reinforce content learned in PSY203 or an equivalent introductory statistics course.</li><li>3. Gain practical experience by completing a series of hands-on projects involving job analysis, selection decisions, training programs, and employee well-being.</li><li>4. Deepen your understanding of tests and measurements so that you can collect accurate information and make sound data-based decisions.</li><li>5. Prepare for other focused seminar courses in Industrial/Organizational Psychology or Human Resource Management.</li></ol>					
<b>Detailed Syllabus:</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	What is I/O Psychology? Research Methods, Statistics, and Evidence-based Practice,				06
	Introduction & Legal Context of Industrial Psychology, Job Analysis & Competency Modeling, Job Evaluation & Compensation, Job Design & Employee Well-Being, Recruitment.				

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2	Identifying Criteria & Validating Tests and Measures, Screening Methods, Intensive Methods,	04
3	Performance Goals and Feedback, Performance Coaching and Evaluation, Evaluating Employee Performance.	06
4	Employee Motivation, Satisfaction and Commitment, Fairness and Diversity	05
5	Leadership, Organizational Climate, Culture, and Development, Teams in Organizations, The Organization of Work Behavior	05
6	Stress Management: Demands of Life and Work	04
	<b>Total</b>	<b>30</b>
<b>Text Books:</b> 1. Landy, F. J. and Conte, J. M., Work in the 21st Century , Oxford: Blackwell Publishing, 4 <sup>th</sup> Edition, 2013		
<b>References:</b> 1. 'Introduction to Industrial and Organizational Psychology' by Ronald E. Riggio, 6 <sup>th</sup> Edition. Pearson 2. 'Psychology Applied to Work, Paul M. Muchinsky and Satoris S. Culbertson, Hypergraphic Press, 11th edition , 2015		
<b>Laboratory / Tutorial work</b> 8 to 10 experiments (and a practicum where applicable) based on the syllabus.		

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<b>Program:</b> B. Tech (Computer Science and Business Systems)				<b>Semester : VIII</b>	
<b>Course/Module :</b> Advance Finance (Elective VI)				<b>Module Code:</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
2	2	1	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Financial & Cost Accounting, Financial Management					
<b>Course Objective:</b> The objective of the course is to understand the concepts of financial management with efficient use of resources. The course will help the students to develop the knowledge of funds, planning, profits and understanding capital markets.					
<b>Course Outcomes:</b> This course will help students to develop in-depth knowledge about the financial techniques and instruments. The students will learn to <ol style="list-style-type: none"> <li>1. Imbibe knowledge about the decisions and decision variables involved with financial activities of the firm.</li> <li>2. Develop skills for interpretation business information and application of financial theory in corporate investment decisions, with special emphasis on working capital management.</li> <li>3. Familiarizing the students with the corporate and financial restructuring.</li> </ol>					
<b>Detailed Syllabus:</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Sources of Funds (including regulatory framework)</b> Types of securities, Issuing the capital in market, Pricing of issue Valuation of Stocks and bonds				04
2	<b>Dividend Decisions:</b> Traditional Approach, Dividend Relevance Model, Miller and Modigliani Model, Stability of Dividends, Forms of Dividends, Issue of bonus shares, Stock Split				04
3	<b>Evaluation of Lease Contracts</b>				04
4	<b>Corporate Restructuring:</b>				04

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	Mergers and Acquisitions- Types of Mergers, Evaluation of Merger Proposal, Take-over, Amalgamation, Leverage buy-out, Management buy-out, Corporate Failure and Liquidation	
5	<b>Financial Restructuring:</b> Share Split, Consolidation, Cancellation of Paid-up Capital, Other Mechanisms	04
6	<b>Working Capital Management:</b> Working Capital Planning, Monitoring and Control of Working Capital, Working Capital Financing, Managing the Components of Working Capital, Cash Management, Receivable Management, Inventory Management	05
7	<b>Introduction to derivatives:</b> Basics of Futures, Forwards, Options, Swaps, Interest rate Payoff Diagrams, Pricing of Futures, Put Call Parity, Option Pricing using Binomial Model and Black Scholes Model, Use of Derivatives for Risk-Return Management- Credit Default Swaps	05
	<b>Total</b>	<b>30</b>

**Text Books:**

1. Brealey, Myers and Allen, Principles of Corporate Finance, 11<sup>th</sup> edition, 2017

**References:**

1. M.Y. Khan & P.K. Jain, Financial Management, 6<sup>th</sup> Edition, TMH, 2011
2. Prasanna Chandra, Financial Management, 8<sup>th</sup> Edition, TMH, 2011.
3. Ravi M. Kishore, Financial Management: Comprehensive Text Book with Case Studies, 7<sup>th</sup> Edition Taxmann.

**Laboratory / Tutorial work**

8 to 10 experiments (and a practicum where applicable) based on the syllabus.

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<b>Program:</b> B. Tech (Computer Science and Business Systems)				<b>Semester:</b> VIII	
<b>Course/Module :</b> Image Processing and Pattern Recognition (Elective VI)				<b>Module Code:</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
2	2	1	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Calculus and probability, Basic programming skills					
<b>Course Objective:</b> To be familiar with processing of images, recognition of the pattern and their applications.					
<b>Course Outcomes:</b> <ol style="list-style-type: none"> <li>1. Understand the fundamentals of image processing.</li> <li>2. Compute and analyse effects of various image transformation techniques in spatial domains and colour image processing.</li> <li>3. Analyse images using image segmentation and morphological operations.</li> <li>4. Analyse images using the concept of image registration.</li> </ol>					
<b>Detailed Syllabus:</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Introduction:</b> Image processing systems and its applications. Basic image file formats				02
2	<b>Image formation:</b> Geometric and photometric models; Digitization - sampling, quantization; Image definition and its representation, neighbourhood metrics.				02
3	<b>Intensity transformations and spatial filtering:</b> Enhancement, contrast stretching, histogram specification, local contrast enhancement; Smoothing, linear and order statistic filtering, sharpening, spatial convolution, Gaussian smoothing, DoG, LoG.				05
4	<b>Segmentation:</b> Pixel classification; Grey level thresholding, global/local thresholding; Optimum thresholding - Bayes analysis, Otsu method; Derivative based edge detection operators, edge detection/linking, Canny edge detector; Region growing, split/merge techniques, line detection, Hough transform.				06
5	<b>Image/Object features extraction:</b>				04

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	Textural features - gray level co-occurrence matrix; Moments; Connected component analysis; Convex hull; Distance transform, medial axis transform, skeletonization/thinning, shape properties.	
6	<b>Registration:</b> Mono-modal/multimodal image registration; Global/local registration; Transform and similarity measures for registration; Intensity/pixel interpolation.	05
7	<b>Colour image processing:</b> Fundamentals of different colour models - RGB, CMY, HSI, YCbCr, Lab; False colour; Pseudo colour; Enhancement; Segmentation.	03
8	<b>Morphological Filtering Basics:</b> Dilation and Erosion Operators, Top Hat Filters.	03
	<b>Total</b>	<b>30</b>

**Text Books:**

1. Digital Image Processing. R. C. Gonzalez and R. E. Woods, Prentice Hall, 4<sup>th</sup> Edition, 2018

**References:**

1. Image Processing: The Fundamentals. Maria Petrou and Panagiota Bosdogianni, John Wiley & Sons, Ltd.
2. Digital Image Processing. K. R. Castleman, Prentice Hall, Englewood Cliffs.
3. Visual Reconstruction. A. Blake and A. Zisserman, MIT Press, Cambridge.
4. Digital Pictures. A. N. Netravali and B. G. Haskell, Plenum Press.
5. Digital Images and Human Vision. A. B. Watson, MIT Press, Cambridge.

**Laboratory / Tutorial work**

8 to 10 experiments (and a practicum where applicable) based on the syllabus.

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<b>Program:</b> B. Tech (Computer Science and Business Systems)				<b>Semester:</b> VIII	
<b>Course:</b> Enterprise Systems (Elective-VI)				<b>Code:</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture (Hours per week)</b>	<b>Practical (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks -50)</b>	<b>Term End Examinations (TEE) (Marks -100 in Question Paper)</b>
2	2	1	4	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Nil					
<b>Course Objective:</b> The course will serve as an introduction to the implementation of enterprise systems within organizations. Functionalities and purposes of enterprise systems will be presented and analyzed, including enterprise resource planning (ERP) systems, customer relationship management (CRM) systems, and supply chain management (SCM) systems. The course will, in particular, introduce enterprise systems, examine the implementation process of ERP systems, covering business processes, ERP architecture, ERP usage, implementation tools and methodology, project.					
<b>Course Outcomes:</b> Understand basic elements of Enterprise systems. Develop skills in understanding architecture and non-functional. requirements in developing Enterprise system development and their deployment Understand and modern Understand future trends in Enterprise architectures.					
<b>Detailed Syllabus:</b>					
<b>Unit</b>	<b>Description</b>				<b>Duration</b>
1	<b>Introduction to Modern Enterprise Systems:</b>  Introduction to enterprise systems. Elements of enterprise systems – Business Information system, Decision support systems, Knowledge management systems, Financial and human resource systems. Kinds of Enterprise systems- B2C and B2B models.  <b>Components of Enterprise systems:</b>  Channels (Mobile, web, desktop, partner integration), Data management, workflow, Controlling and Auditing, Accounting etc.				5

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	<b>Sample Enterprise systems:</b> ERP, SCM, CRM, Product Life cycle management (PLM), HR Systems (HRM), GL systems.	
2	<b>Key characteristics Enterprise systems and architectures:</b> Distributivity, Managed redundancy, Exception processing, Collaboration, Data transformation. Batch processing, Monolithic, client server, ecommerce, service oriented, micro service, and cloud architectures	4
3	<b>Introduction to Enterprise Application architectures &amp; Application architecture Patterns:</b>  Layer Architecture, Event driven Architecture, Service oriented Architecture, Micro service architecture, Plug-in architecture. Layering, Organizing domain logic, Mapping to database, Web Presentation, Concurrency.	4
4	<b>Enterprise Application Integration &amp; Enterprise Integration patterns:</b> Introduction to Enterprise Integration, different integration styles. Elements of messaging-based Integration. Modern service integration techniques. Introduction to WSDL, SOAP. Introduction Restful web services integration. Differences between SOAP and REST.	5
5	<b>Deployment of Enterprise applications:</b> Key requirements in deployment - Stability, capacity, Security, availability, Network, Availability, and Transparency	3
6	<b>Concepts of Cloud computing, cloud platforms and their role in Enterprise systems: Core Concepts</b> - Types of Cloud: Private, public, and Hybrid clouds. Advantage of cloud computing - Scaling, Availability, and cost. Disadvantages - Technology overload, Security, Monitoring and troubleshooting, Testing, Latency etc. Cloud service models: - Infrastructure, platform, Software as a Service in Cloud Computing. Major public clouds: Google cloud, AWS, Azure.  Application development and deployment in cloud - Dockers, micro services, Kubernetes, Server less. Continuous Integration/Continuous Delivery	5
7	<b>Introduction to Enterprise Architecture:</b>  Importance of Enterprise Architecture. Enterprise architecture models. Zach man Framework, TOGAF Framework	4
	<b>Total</b>	<b>30</b>

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**Text Books:**

1. Ralph Stair, George Reynold, "Principle of Information Systems", 10 ed., 2016
2. Martin Fowler et al, "Pattern of Enterprise Application Architecture", Addison-Wesley, 2012
3. Gregor Hohpe, Bobby Woolf, "Enterprise Integration Patterns: Designing, Building, and Deploying Messaging Solutions", Addison-Wesley, 9<sup>th</sup> ed., 2004
4. Mark Richards, "Software Architecture patterns", O'Reilly, 2015.
5. Sam Newman, "Building Microservices", O'Reilly, 2015.
6. David Farley, Jez Humble, "Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation", Pearson, Jan 2016

**References:**

1. Brendan Burns, "Designing Distributed Systems", O'Reilly, 2016
2. Gregor Hohpe, Bobby Woolf, "Enterprise Integration Patterns - Messaging Patterns Overview", Addison-Wesley, 2004
3. Bass L, "Software architecture in Practice "3rd edition, 2014

**Laboratory / Tutorial work**

8 to 10 experiments (and a practicum where applicable) based on the syllabus.

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<b>Program:</b> B Tech (Computer Science and Business Systems)				<b>Semester :</b> VIII	
<b>Course :</b> Project Evaluation- II				<b>Code :</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>	
<b>Lecture Hours per week</b>	<b>Practical Hours per week</b>	<b>Tutorial Hours per week</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) As per Institute Norms (100 marks)</b>	<b>Term End Examinations Theory</b>
0	4	0	2	Scaled to 100 marks	--
<b>Pre-requisite:</b> Courses covered in the earlier semesters which impart knowledge of Problem Identification, Definition, Analysis, Design and Implementation of various tools and technologies.					
<b>Course Objective:</b> This course prepares students to develop self learning attitude and working skills through software project development. Development of the document preparation skills using standard practices					
<b>Course Outcomes -</b> After successful completion of this course, student will be able to 1. Implement the Working model derived from Project Phase -I. 2. Document the project work as per the standard guidelines. 3. Create working model/ product or publish research paper based on the work. 4. Evaluate working model /product.					
<b>Detailed Syllabus:</b>					
The selected problem definition for the project in the previous semester needs to be now converted to a working model using the appropriate programming language based on the application					
<b>Evaluation:</b> Each group is expected to maintain the log book. The log book needs to be evaluated by the mentor every week as the part of continuous evaluation. Each group must demonstrate the working project, submit the report and do the ppt presentation at the end of the semester as the part of semester end exam. The exam can be taken by two examiners: one internal and one external examiner.					
<b>Project Report must contain:</b> The sequence in which the project report material should be arranged and bound is as follows: 1. Cover Page & Title page 2. Certificate by the Guide 3. Declaration by the Student 4. Acknowledgment 5. Abstract (1-2 pages long) 6. Organization of report 7. Table of Contents 8. List of figures 9. List of tables					

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- 10. abbreviations
- 11. Chapters
- 12. References
- 13. Appendices

**Term Work:** Details of Internal Continuous Assessment (ICA)

Evaluation Phases	Evaluation	Marks
Weekly Log book	Weekly Progress Report	20
MidTerm Evaluation	Presentation / Viva and Report	30
Final	Presentation / Viva and Report	50
<b>Total Marks</b>		<b>100</b>

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