

UNIVERSITY OF MUMBAI

No. UG/24 of 2018-19

CIRCULAR:-

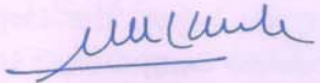
Attention of the Principals of the affiliated Colleges and Directors of the recognized Institutions in Science & Technology Faculty is invited to this office Circular No. UG/108 of 2010, dated 29th May, 2010 relating to syllabus of the Bachelor of Science (B.Sc.) degree course.

They are hereby informed that the recommendations made by the Board of Studies in Statistics at its meeting held on 3rd May, 2018 have been accepted by the Academic Council at its meeting held on 5th May, 2018 **vide** item No. 4.70 and that in accordance therewith, the revised syllabus as per the (CBCS) for the T.Y.B.Sc. in Statistics (Sem -V & VI) of Applied Component in the subject of Elements of Operation Research – I & II and Practical's based on theory, has been brought into force with effect from the academic year 2018-19, accordingly. (The same is available on the University's website www.mu.ac.in).

MUMBAI – 400 032

14th June, 2018

To


(Dr. Dinesh Kamble)
I/c REGISTRAR

The Principals of the affiliated Colleges & Directors of the recognized Institutions in Science & Technology Faculty. (Circular No. UG/334 of 2017-18 dated 9th January, 2018.)

A.C/4.70/05/05/2018

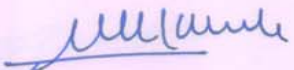
No. UG/24 -A of 2018

MUMBAI-400 032

14th June, 2018

Copy forwarded with Compliments for information to:-

- 1) The I/c Dean, Faculty of Science & Technology,
- 2) The Chairman, Board of Studies in Statistics,
- 3) The Director, Board of Examinations and Evaluation,
- 4) The Director, Board of Students Development,
- 5) The Co-Ordinator, University Computerization Centre,


(Dr. Dinesh Kamble)
I/c REGISTRAR

UNIVERSITY OF MUMBAI



**Syllabus for the T.Y.B.Sc.
Programme: B.Sc.**

Sem. V & Sem. VI

Course: Elements of Operations Research

(APPLIED COMPONENT)

(As per Credit Based Choice System
with effect from the academic year 2018–2019)

T.Y.B.Sc. : ELEMENTS OF OPERATIONS RESEARCH – I
(APPLIED COMPONENT) : USACOR501
SEMESTER V

Course Code	Title	Credits
USACOR501	<u>ELEMENTS OF OPERATIONS RESEARCH – I</u>	2.5 Credits (60 lectures)
<u>Unit I : LINEARPROGRAMMING PROBLEM</u> Mathematical Formulation : Maximization and Minimization type problems. Concepts of solution, Feasible solution, Basic solution, Basic feasible solution, Optimal solution. Graphical solution to problems. Simplex method of solving problems with two or more variables. Big M method. Concept of Duality, Properties of Duality. Its use in solving L.P.P. Relationship between optimum solutions to Primal and Dual. Economic interpretation of Dual.		15 Lectures
<u>Unit II : LINEAR PROGRAMMING PROBLEM II</u> Dual Simplex Method Algorithm. Solution of LPP using Dual Simplex Algorithm. Integer programming problem (IPP) : Introduction, solution of IPP using (i) Graphical method, (ii) Gomory’s Method.		15 Lectures
<u>Unit III: PROBABILITY AND PROBABILITY DISTRIBUTIONS</u> Random experiment, sample space, event, addition law of probability, conditional law of probability. Random variables : Discrete, Continuous. Mean and Variance of : (1) Uniform Distribution, (2) Binomial Distribution, (3) Poisson Distribution, (4) Exponential Distribution, (5) Normal Distribution. Simple problems based on above distributions.		15 Lectures
<u>Unit IV: Computation Using R and MsExcel</u> Simulation from distributions, computations of probabilities, cumulative probabilities, quantiles and drawing random sample using d,p,q,r functions of R as well as Excel for following distributions: Binomial,Poisson,Hypergeometric,normal,exponential,gamma,Cauchy,Lognormal, Weibull, uniform,laplace ,Graphs of pmf/pdf by varying parameters for above distributions. Fitting of Poisson and normal distribution, LPP, transportation and Assignment problems using Solver and Ip Solve.		15 Lectures

REFERENCES :

1. Vora N. D. : Quantitative Techniques in Management, Third edition, GcGraw Hill Companies.
2. Kantiswarup, P. K. Gupta, Manmohan : Operations Research, Twelfth edition, Sultan Chand & sons.
3. Sharma S. D. : Operations Research, Eighth edition, KedarnathRamnath& Co.
4. TahaHamdyA. : Operations Research : Eighth edition, Prentice Hall of India Pvt. Ltd.
5. Vora N. D. ; Quantitative Techniques in Management, Third edition, McGraw Hill Companies.

USACOR5P1 :PRACTICALS BASED ON THEORY

SEMESTER VI :USACOR601

Course Code	Title	Credits
USACOR601	<u>ELEMENTS OF OPERATIONS RESEARCH – II</u>	2.5 Credits (60 lectures)
<u>Unit I : INFORMATION THEORY</u> Introduction. Fundamental Theorem of Information Theory. Measures of Information. Properties of Entropy Function. Communication System. Memory less channel, Binary Symmetric channel, channel matrix, joint, marginal and conditional Entropies. $H(X, Y)=H(X/Y) + H(Y) = H(Y/X) + H(X)$ $H(X) \geq H(X/Y)$ Channel capacity, Efficiency and Redundancy, Encoding, Shannon – Fano Encoding Procedure.		15 Lectures
<u>Unit II : DECISION THEORY</u> Decision making under uncertainty : Laplace criterion, Maximax (Minimin) criterion, Maximin (Minimax) criterion, Hurwitz α criterion, Minimax Regret criterion. Decision making under risk :Expected Monetary Value criterion, Expected Opportunity Loss criterion, EPPI, EVPI. Decision Tree, Bayesian Decision rule for Posterior probabilities. All the above using Ms Excel and R software		15 Lectures

<p><u>Unit III: MATHEMATICS OF FINANCE –I</u> Simple and compound interest, Present value, Annuities, Present value of Annuities with all variations/types. Application to investment decisions (1) Payback Method, (2) Net present value Method (NPV), (3) Internal Rate of Return Method.(4) Average Rate of Return All the above using Ms Excel and R software</p>	15 Lectures
<p><u>Unit IV: MATHEMATICS OF FINANCE-II</u> Securities Market : Concept of stock market, share, face value, market value, dividend, equity share, preferential share, bonus and right shares. Initial Public offer (IPO), Earning per share (EPS), price earnings ratio (PE). Index, nifty, beta value. Simple problems. Mutual Funds (M.F.) : Introduction, Types of M.F., Net Asset Value (NAV), entry, exit loads. Classification of M.Fs. Option plans given by M.Fs. Evaluation of M.Fs. Advantages and Disadvantages of M.Fs. Simple problems on calculation of Net income after considering entry load, dividend, change in NAV and exit load. Introduction to :Investment Plans (i) Averaging of price under the systematic Investment Plan (SIP), (ii) Systematic Withdrawal Plan (SWP), (iii) Systematic Transfer Plan (STP)</p>	15 Lectures

REFERENCES :

1. Vora N. D. : Quantitative Techniques in Management, Third edition, GcGraw Hill Companies.
2. Kantiswarup, P. K. Gupta, Manmohan : Operations Research, Twelfth edition, Sultan Chand & sons.
3. Sharma S. D. : Operations Research, Eighth edition, KedarnathRamnath& Co.
4. TahaHamdyA. : Operations Research : Eighth edition, Prentice Hall of India Pvt. Ltd.
5. Vora N. D. ; Quantitative Techniques in Management, Third edition, McGraw Hill Companies.
6. Barlow R. E. and ProchanFrank : Statistical Theory of Reliability and Life Testing Reprint, First edition, Holt, Reinhart and Winston.
7. Mann N. R., Schafer R. e., Singapurwalla N. D. : Methods for Statistical Analysis of Reliability and Life Data. First edition, John Wiley & Sons.
8. ShankaranSunder : Indian mutual funds handbook. A guide for industry professionals and intelligent investors.
9. Kapoor V. K. : Operation research technique for management 7th edition.
10. Gupta R. K. : Linear Programming, 2nd Edition.
11. Gupta M. P. and Sharma J. K. : Linear programming for management : 1st edition national publishing house.
12. Shrinath L. S. : Principles and application : PERT and CPM : Affiliated East West press pvt ltd.

13. Hogg R. V. & Tanish E. A. : Probability and Statistical inference : 3rd edition. Collier and McMillan Publishers.
14. Blake Ian F. : Theory of Probability :
15. Ingels Franklin M : Information and Coding Theory : Intext Educational Publishers.
16. Crawley, M. J. (2006). Statistics - An introduction using R. John Wiley, London
17. Purohit, S.G.; Gore, S.D. and Deshmukh, S.R. (2015). Statistics using R, second edition. Narosa Publishing House, New Delhi.
18. Shahababa , B. (2011). Biostatistics with R, Springer, New York
19. Verzani, J. (2005). Using R for Introductory Statistics, Chapman and Hall /CRC Press, New York
20. Asha Jindal (Ed.)(2018), Analysing and Visualising Data with R software- A Practical Manual, Shailja Prakashan, K.C.College
21. Statistical Analysis with Excel, Vijay Gupta, VJ books inc., Canada, vol. 1-6.

USACOR6P2 : PRACTICALS BASED ON THEORY
DISTRIBUTION OF TOPICS FOR PRACTICALS

	<u>SEMESTER-V</u> <u>COURSE CODE USACOR5P1</u>		<u>SEMESTER-VI</u> <u>COURSE CODE USACOR6P1</u>
Sr.No.	Name of the Topic	Sr.No	Name of the Topic
1	L.P.P.	1	INFORMATION THEORY
2	PROBABILITY I	2	DECISION THEORY
3	PROBABILITY II	3	DECISION THEORY with Ms Excel and R
4	DUAL SIMPLEX METHOD	4	MATHEMATICS OF FINANCE –I with MS-Excel
5	INTEGER PROGRAMMING	5	MATHEMATICS OF FINANCE –I with R
6	Computation with Ms Excel	6	INVESTMENT ANAYSIS
7	Computation with R	7	SECURITIES MARKET & MF

Semester End Examination

Theory : At the end of the semester, examinations of **three hour** duration and 100 marks based

on the four units shall be held for each course.

Pattern of **Theory question** paper at the end of the semester for **each course** :

There shall be **Five** compulsory Questions of **20** marks each with internal option. Question 1 based on Unit I, Question 2 based on Unit II, Question 3 based on Unit III, Question 4 based on Unit IV and Question 5 based on all four Units combined.

Practicals : Total evaluation is of **100** marks per semester :

1. Journal **[10 Marks]**
2. Practical problems using R Software/MSExcel (solver)/other statistical software.
[10 Marks]

3. At the end of semester examination of 3 hours duration.

[80 Marks]

Pattern of **Practical questionpaper** at the end of the semester.

There shall be **FOUR** compulsory unit wise questions of **20** marks each with internal option.

Workload

Theory : 4 lectures per week.

Practicals: 1 practical of four periods per week per batch.

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