Course Code	**EM 527**
Course Title	**Operations Research I**
No. of Credits	**3**
Pre-requisites	**-**
Compulsory/Optional	**Optional**

Aim(s): To introduce various engineering and management related problems and their mathematical modelstogether with the appropriate algorithms and techniques employed in solving them in achieving effective decision making

Intended Learning Outcomes:

On successful completion of the course, the students should be able to;

- Construct mathematical models of standard problems of operations research.
- Select suitable standard algorithms and apply them in solving problems given in the mathematical, graphical or tabular forms.
- Apply similar algorithms in solvinga variety of multidisciplinary problems.

Time Allocation (Hours): Lectures 36Tutorials 9Assignments

Course content/Course description:

- **Introduction to Operations Research.**
- **Introduction to Linear Programming (LP):** General form of LP problem, graphical method, duality, feasible region, redundant constraints.
- **Analytical Methods for LP Problem: S**implex, slack and artificial variables, simplex method, dual simplex method, big-M method, use of Matlab in solving LPPs.
- **Transportation Problem:** Mathematical model, tabular representation, north-west corner method, table minimum method, Vogel method, stepping stone algorithm.
- **Transshipment Problem**: Comparison of transportation and transshipment problems, case of sources and destinations acting as intermediate nodes, case of auxiliary nodes acting as intermediate nodes.
- **Assignment Problem:** Balanced and unbalanced assignment problems, methods of row and column reduction, Hungarian algorithm.
- **Network Techniques:**Minimum spanning tree problem, Kruskal algorithm, hhortestdistance problem by systematic approach, maximum flow problem, labeling technique, minimum-cut maximum flow theorem.
- **Inventory Control:** Inventory models, inventory models for manufacturing organizations, Economic Order Quantity(EOQ), frequency of ordering.
- **Queuing Theory:** Kendall's notation, M/M/1 and M/G/1 queues, average waiting times, servicing times.
- **Dynamic Programming (DP):** States and stages of DP, Knapsack problem, Shortest distance problem.

Recommended Texts :

- F.S. Hillier and G.J. Lieberman, Introduction to Operations Research, 7th edition,2001, McGraw-Hill Inc. NY.
- F.S. Hillier and G.J. Lieberman,Introduction to Mathematical rogramming,2nd edition, 1995, McGraw-Hill Inc. NY.
- H.A.Taha,Operations research an introduction, 10th edition,2010, Pearson.

Assessment	Percentage Mark
In-course Tutorials Mid-semester	 20 30
End-semester	50