

Ph. D. ADMISSION ANNOUNCEMENT
DEPARTMENT OF OPERATIONAL RESEARCH
UNIVERSITY OF DELHI
Admission to Ph.D. Programme 2015-16

The Department of Operational Research invites applications for Full Time Ph.D. programme for the academic year 2015-16.

Seats: A total of 18 seats are available in the Department of Operational Research for the academic year 2015-16. The major thrust areas include: (i) Mathematical Programming (ii) Inventory and Production Management (iii) Reliability (iv) Supply Chain Management (v) Marketing (vi) Software Reliability (vii) Queuing Systems.

Eligibility: The candidate should have a minimum of 55% marks (or equivalent CGPA score) in Master's Degree/M.Phil. in Operational Research or in an allied subject with at least two papers in Operational Research with 60% or above marks from a recognized university/institute. 5% relaxation will be given for OBC/SC/ST and Persons with Disability.

How to apply: All candidates should submit duly filled application form available at the office of the department on all working days between 9.30 am to 5.30 pm.

Selection procedure:

- Candidates will be selected on the basis of an Entrance Test comprising Written Test followed by an Interview.
- Written Test will be of 180 minutes duration based on both Multiple Choice Questions and Descriptive Type Questions carrying weightage of 40% and 60%, respectively.
- Candidate must secure minimum 25% marks in both multiple choice questions and descriptive type questions with overall minimum 40% marks for qualifying the written test.
- Candidates holding (i) a valid national level research fellowship (ii) fellowships/research positions in research projects (iii) awarded lectureship in the CSIR-UGC NET (or equivalent examination) or (iv) permanent faculty position in the University of Delhi with a minimum of two year's teaching/research experience are exempted from the written test, but will be required to appear for the interview for selection to the Ph.D. course. For further details on exemption, one may refer to Amendment to Ordinance VI-B of the Ordinances of University of Delhi related to Doctorate of Philosophy dated 5th August 2015.
- Candidates appearing for the written examination will be short-listed for interview. The list of short-listed candidates will be valid until the next written test for Ph.D. admissions or one year, whichever is earlier.
- Admission to the Ph.D. programme is further based on candidate's suitability to specific specializations and also subject to fulfilling all other conditions laid down in the Ordinance VI-B of the University of Delhi.
- Candidates admitted to the Ph.D. program, who do not have fellowship, may be provided Non-NET UGC fellowship based on its availability as per guidelines issued by the university time to time.
- The fee for the entrance test is Rs. 800/400 for General/SC, ST, OBC.
- The written test and interview will be held at Department of Operational Research, University of Delhi, Delhi-110007.
- No TA/DA will be paid for attending the written test and interview.

Syllabus for Ph.D. Entrance Examination: The syllabus for the written examination is from the following areas. The descriptive type questions will be asked only from the Operational Research syllabus.

Operational Research Definition and scope of operations research, Formulation of simple linear programming problems, Simplex method, Duality, Complementary slackness theorem, Simple transportation and assignment problems, Convex functions and their basic properties, Lagrange theorem, KKT optimality conditions, quadratic programming, Characteristics of Inventory system, Simple economic lot size inventory models with and without shortages, Economic production quantity model, Reorder level, Simple single period stochastic inventory model, Definition of Queues and their characteristics, Queueing models with Markovian input and Markovian service, M/M/1 & M/M/C queueing models, Definitions of reliability and availability, Reliability of multi components systems, Failure time distributions- exponential and weibull.

Mathematics Linear independence and dependence of vectors, Matrices, Rank of a matrix, Linear homogenous and non-homogenous equations, Characteristic roots and vectors, Limit and continuity, Differentiability of functions, Successive differentiation, Partial differentiation, Integration and properties of definite integrals, Linear differential equations of first and second order, First order higher degree equations, Linear homogenous equations with constant coefficients, Neighbourhoods, Open and closed sets, Limit points, Continuous functions, Sequences and their properties, Rolle's theorem, Mean value theorem, Taylor's theorem, Taylor's series, Maxima and minima, Indeterminate forms.

Statistics Measures of central tendency and dispersion, Skewness and kurtosis, Probability, Conditional probability, Theorem of total probabilities, Bayes theorem, Random variables, Probability mass and density functions, Mathematical expectation and its properties, Moment generating functions, Binomial, Poisson, Geometric, Exponential and Normal distributions and their properties, Method of least squares, Correlation and regression.

Important dates:

Last date of submission of application: 30th November, 2015

Written Test: 10th December, 2015

Announcement of list of short-listed candidates: To be notified later

Date of Interview: To be notified later

Final list of the selected candidates will be displayed on university website and departmental notice board.

Note: Department reserves the right not to fill up the vacant seats of Ph.D. course in case of non-availability of suitable candidates.

**The Head
Department of Operational Research**