Scheme and Syllabi of Examination

for

Pre-Ph. D. Course Work

in

Mathematics

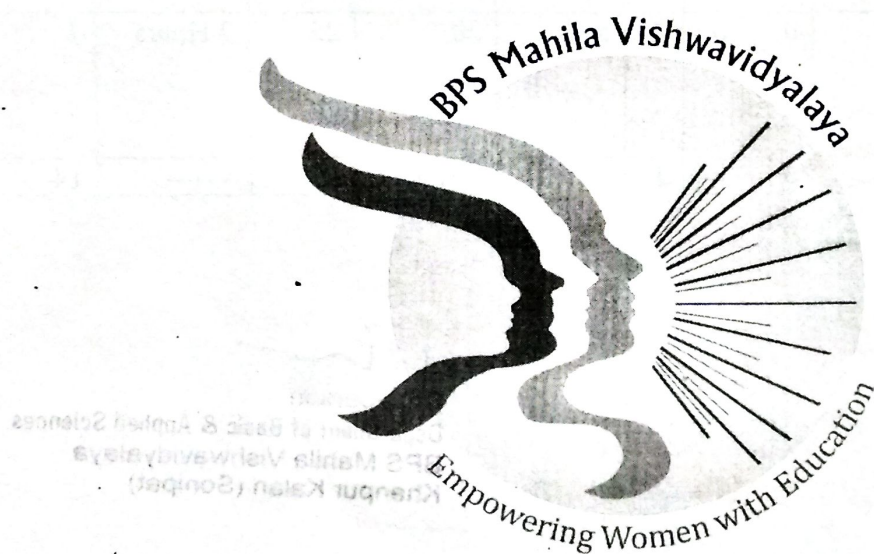**(w. e. f. academic session 2020-2021)**

Offered by

Department of Basic & Applied Sciences

Under

(Faculty of Science)

Programme Code - 7

Bhagat Phool Singh Mahila Vishwavidyalaya

Khanpur Kalan (Sonepat), Haryana-131305

www.bpswomenuniversity.ac.in

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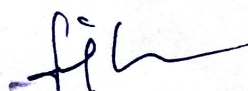BPS Mahila Vishwavidyalaya
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Scheme and Syllabi of Examination

For

Pre-Ph.D. Course Work in Mathematics

With Effect from Academic Session 2020-2021.

Paper No.	Paper title	Teaching Scheme			Examination Scheme			Duration of Exam	Credit
		L	T	P	Internal Marks	External Marks	Total		
PPDL- 701	Research Methodology	4	0	0	20	80	100	3 Hours	4
PPDP- 703	Review of Literature and Seminar	0	0	0	20	80	100		4
PPDL-705	Continuum Mechanics	4	0	0	20	80	100	3 Hours	4
PPDL-707	Research and Publication Ethics (Theory)	1	0	0	5	20	25	2 Hours	1
PPDP-709	Research and Publication Ethics (Practical)	0	0	2	5	20	25	2 Hours	1
	Total	9	----	2	70	280	350	-------	14

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Programme Outcomes

Students have/ capable of
- Undergone relevant (taught) courses required for undertaking specialized research.
- Identifying unsolved yet relevant problem in a specific field.
- Articulating ideas and strategies for addressing a research problem.
- Undertaken original research on a particular topic.
- Effectively research, through journal publications and conference presentations, to the mathematics community.
- Disseminating research to a broader audience.

Program Specific Outcomes

- Generate publications in reputed mathematical journals.
- Provide scope for interaction with international researchers and developing collaborations.
- **Demonstrate** the highest standard of ethics in research
- Provide opportunities to research students for communication (and discussion) of advanced mathematical topics to undergraduate and graduate students

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PPDL -701: Research Methodology

L   T   P
4   0   0 (4 Credits)

Marks for External Exam   : 80
Marks for Internal Exam   : 20
Total   : 100
Time   : 3 Hours

Course Outcome:

- At the end of course students will be able to understand research methodology and research problem
- Understand scientific communication and thesis writing
- Understand computer application in research
- Understand how to resarch research material on Web

Note: The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

UNIT-I

Introduction of Research Methodology: Meaning of research, objectives of research, types of research, significance of research, research and scientific method, research process.
Research Problem: Definition, necessity and techniques of defining research problem. Formulation of research problem. Objectives of research problem.

UNIT-II

Scientific Communications: Publishing Research Papers: Selection of a journal; writing of paper's abstract, formulation of problem, discussion and references, submission and handling of reviewer's comment.
Writing of thesis: Format of a thesis; Review of literature, formulation; Writing methods, results; preparation of Tables, figures; writing discussion; writing conclusion; writing summary and synopsis; Reference citing and listing/Bibliography. Avoiding Plagiarism.

UNIT-III

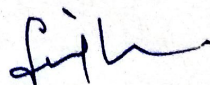**Computer Applications in Research**: Practical aspects of MATLAB, Introduction to LATEX.
MS Office 2007: Word Basics, Mail Merge, Macros, Math Type, Equation Editor
MS Excel 2007: Excel Basics, Data Sort, Functions.

UNIT-IV

Presentation: Poster and Oral. Presentation tools: Introduction to presentation tool, MS Power Point: features and functions, creating presentation, customizing presentation, showing presentation.
Web Search: Internet Basics, Internal Protocols, Pre-requisites, Search Engines, Searching Hints, Using advanced search techniques
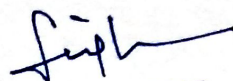
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Books Recommended:

1. Gurumani, N. (2010), Scientific Thesis Writing and Paper Presentation, MJP Publishers

2. Kothari, C.R. (2010), Research Methodology (Methods and Techniques), New Age International Publishers.

3. Gerald, C.F. and Wheatley, P.O. : Applied numerical analysis, 6th Ed. Addison Wesley (2002)

4. Smith G.D. : Numerical solution of partial differential equations, Oxford University Press (1982)

5. Schwartz H.R., Stiefel: E & Rustishausar : Numerical analysis of symmetric matrices, Prentice Hall (1976)

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PPDP -703: Review of Literature and Seminar

L T P   Marks for External Exam   : 80
0 0 0 (4 Credits)   Marks for Internal Exam   : 20
                         Total   : 100

Course Outcome:

- At the end of course students will be able to explain the latest research done in the prescribed field.

Note: The candidates are required to submit a copy of Review of Literature of 25 research papers on the relevant research topic. The performance will be evaluated on the basis of submitted literature and the presentation given by the candidates before the evaluation committee.

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PPDL- 705: Continuum Mechanics

L T P

4 0 0 (4 Credits)

Marks for External Exam : 80

Marks for Internal Exam : 20

Total : 100

Time : 3 Hours

Course Outcome:

- At the end of the course student will be able to explain general solution of the equilibrium equations
- Understand about Seismic Waves
- Understand about Viscoelasticity.
- Understand about Fluid Mechanics.

Note: The examiner is requested to set **nine** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt **five** questions selecting one from each unit and the compulsory question.

Unit –I

General solution of the equilibrium equations: Papkovitch-Neuber solution, Lame's strain potential, Galerkin Vector, Love's strain function, Applications to the solution of the Kelvin problem for an unbounded medium and the Boussinesq problem for a semi-infinite medium. Generalized Hooks's law including the effect of thermal expansion, Naviers' equation, thermal stresses in a long circular cylinder

Unit –II

Seismic Waves: Field equations of linear elastodynamics, Plane waves in unbounded media, P, SV and SH waves of seismology, wave propagation in two dimensions, Surface waves- Love & Rayleigh waves, Reflection of P, SV, SH waves at a free boundary, Reflection and transmission of SH-waves at a solid-solid interface.
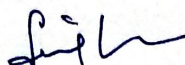
Unit –III

Viscoelasticity: Spring & Dashpot, Maxwell & Kelvin Models, Three parameter solid, Correspondence principle & its application to the Deformation of a viscoelastic Thick-walled tube in Plane strain.

Unit –IV

Fluid Dynamics: Vector & tensor analysis in fluid dynamics, The idea and viscous fluid, Newtonian, generalized Newtonian and non- Newtonian fluids, Rheology of fluid, Constitutive laws, Conservation laws, Navier-Stokes, Couette flow, flow over a Flat Plate, Wedge flows, Hangen-Poiseuille flow. Boundary layer flow, similarity solution. Flow through porous media: Darcy, Brinkman and Forchheimer models. Heat transfer: Free convection through Vertical plate, horizontal plate, cylinders.

Books suggested:
1. Bath, M. : Mathematical Aspects of Seismology, Elsevier
2. Bullen, K.E. and A. Bolt: An Introduction to the Theory of Seismology, Cambridge University Press
3. Fung, Y.C, : Foundations of Solid Mechanics, Prentice Hall
4. Peter M. Shearer: Introduction to Seismology, Cambridge University Press
5. W. Flugge, Viscoelasticity, Springer Verlag.
6. Kundu, P.K. and Cohen I.M., Fluid Mechanics, 3rd Ed., academic Press, (2004).
7. Nield, A.D. and Bejan, A., Convection in Porous Media, Springer, Berlin, 1999
8. Schlichting H., Boundary-layer theory, McGraw Hill International, (1979)

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9. Sherman F.S., Viscous Flow, McGraw Hill International, (1990)
10. White F.M., Viscous Fluid Flow, McGraw Hill International, (1991)

PPDL- 707: Research and Publication Ethics (Theory)

L T P
1 0 0 (1 Credit)

Marks for External Exam	: 20
Marks for Internal Exam	: 05
Total	: 25
Time	: 2 Hours

Course Outcome:

- At the end of the course, the student will have awareness about the publications ethics and publication misconducts.

Note: The examiner is requested to set **seven** questions in all taking two questions from each unit and one **compulsory** question. The compulsory question will consist of four parts of 02 marks each and will be distributed over the whole syllabus. The candidate is required to attempt **four** questions selecting one from each unit (and each question is of 4 marks) and the compulsory question (is of 8 marks).

UNIT-I

RPE 01: PHILOSOPHY AND ETHICS: Introduction to Philosophy: definition, nature and scope, concept, branches.
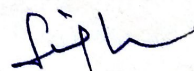**ETHICS:** definition, moral philosophy, nature of moral judgment and reactions.

UNIT-II

RPE 02: SCIENTIFIC CONDUCT: Ethics with respect to science and research, Intellectual honesty and research integrity, Scientific misconducts: Falsification, Fabrication and Plagiarism (FPP), Redundant publications: duplicate and over lapping publications, salami slicing, Selective reporting and misrepresentation of data.

UNIT-III

RPE 03: PUBLICATIUON ETHICS: Publication ethics: definition, introduction and importance, Best practices / standard setting initiatives and guidelines: COPE, WAME, etc., Conflicts of interest, Publication misconduct: Definition, concept, problems that lead to unethical behavior and vice versa, types, Violation and publication ethics, authorship and contributor ship, Identification of publication misconduct, complaints and appeals, Predatory publishers and journals.

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Suggested Reading

- Nicolas H. Steneck. Introduction to the Responsible Conduct of Research. Office of Research Integrity, 2007. Available at: http://ori.hhs.gov/sites/default/files/rcrintro.pdf
- The student's Guide to Research Ethics By Paul Oliver Open University Press, 2003.
- Responsible Conduct of Research By Adil E. Shamoo; David B. Resnik Oxford University Press, 2003.
- Ethics in Science Education, Research and Governance Edited by Kambadur Muralidhar, Amit Ghosh Ashok Kumar Singhvi. Indian National Science Academy, 2019. ISBN: 978-81-939482-1-7. http:www.insaindia.res.in/pdf/Ethics_Book.pdf
- Anderson B.H., Dursaton, and Poole M.: Thesis and assignment writing, Wiley Eastern 1997.
- Bijorn Gustavii: How to write and illustrate scientific papers? Cambridge University Press.
- Bordens K.S. and Abbott, B.b.: Research Design and Methods, Mc Graw Hill, 2008.
- Graziano, A., M., and Raulin, M.,L.: Research Methods – A process of Inquiry, Sixth Edition, Pearson, 2007.
- Bird, A. (2006). Philosophy of Science. Routledge.
- MacIntyre, Alasdair (1967) A Short History of Ethics. London.
- P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN: 978-9387480865.
- National Academy of Sciences, National Academy of Engineering and Institute of Medicine (2009). On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition. National Academies Press.
- Resnik, D.B. (2011). What is ethics in research & why is it important. National Institute of Environmental Health Sciences, 1-10. Retrieved from https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm
- Beall, J. (2012). Predatory publishers are corrupting open access. Nature, 489(7415), 179-179. https://doi.org/10.1038/489179a

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PPDP- 709: Research and Publication Ethics (Practical)

L   T   P

0   0   2 (1 Credit)

Marks for External Exam   : 20
Marks for Internal Exam   : 05
Total   : 25
Time   : 2 Hours

Course Outcome:

- At the end of the course, the student will have awareness about the publications ethics and publication misconducts.

Note: The practical part will be evaluated jointly by an internal and external examiner. The evaluation will be based on Viva-Voce/practical before the commencement of final examination every academic year.

UNIT-I

RPE 04: OPEN ACCESS PUBLISHING : Open access publications and initiatives, SHERPA/RoMEO online recourse to check publisher copyright & self archiving policies, Software tool of identify predatory publications developed by SPPU, Journals finder/journals suggestion tools viz. JANE, Elsevier Journals Finder, Springer Journals Suggester, etc.

UNIT-II

RPE 05: PUBLICATION MISCONDUCT:
A. **Group Discussions:** Subject specific ethical issues, FFP, authorship, Conflicts of interest Complaints and appeals: examples and fraud from India and abroad.
B. **Software tools:** Use of plagiarism software like Turnitin, Urkund and other open source software tools

UNIT-III

RPE 06: DATABASE AND RESEARCH METRICS:
A. **Database:** Indexing databases, Citation databases: Web of Sciences, Scopus, etc.

B. **Research Metrics:** Impact factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score, Metrics: h-index, g index, i 10 index, altmetrics.

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