

EDU 09.10 PEDAGOGIC PRACTICES IN MATHEMATICS

Contact Hours: 100 (Instruction) Maximum Marks: 100 (External: 80, Internal: 20)

	Unit	Content		Reference
1	Skills of Teaching Mathematics	<p>1.1 Major skills in teaching mathematics- Definition, components and importance</p> <p>1.2 Micro teaching- Steps, Phases, Cycle, Advantages</p> <p>1.3 Planning micro teaching on various skills of teaching Mathematics</p>	<p>1. Meaning of a skill- Teaching skills- definition- major skills- the core skills- components of each skill- importance of each.</p> <p>2. Micro teaching- Meaning- assumptions- Steps(9 steps)- phases (3) (Singh & Sarma-4-14). Micro teaching cycle- explanation- Advantages of microteaching- difference with macro teaching.</p> <p>Micro teaching lesson plan for each skill. A suggested pattern- preliminary details- skill- Components- three columns 1. Teacher activities, 2. Student responses/ activities, 3. Component of the skill. Observation-check list and rating scale.</p>	<p>Books on Micro teaching like Paintal, 1. Micro teaching: A hand book for teachers, Oxford University Press , New Delhi 2. Singh& Sarma. Micro teaching –Theory and Practice,National Psychological corporation, Agra</p>
2	Pedagogic Analysis	<p>1.Pedagogic analysis- Meaning- importance- steps.</p> <p>2.Pedagogic analysis of various topics in mathematics at various level of Schooling– Arithmetic, Algebra, Trigonometry, Statistics and Probability, etc. listing objectives, pre requisites, resources, strategies for teaching, evaluation strategies etc.</p>	<p>Pedagogic analysis-Meaning- importance- steps; content analysis, determining objectives, identifying pre requisites, preparing diagnostic test to test pre requisites, listing the inputs/teaching aids, learning experiences/ processing the inputs, formative evaluation to be done, home assignments and summative evaluation. Familiarisation of term, fact, concept, principle, formula etc. Pedagogic analysis of the various types of content at secondary and higher secondary levels(whichever is applicable). Aspects of Pedagogical treatment : Identification of concepts and subconcepts, Expected specific</p>	<p>http://bedpedagogy.blogspot.in/2012/08/pedagogical-analysis-format.html https://www.boundless.com/education/textbooks/boundless-education-textbook/curriculum-and-instructional-design-3/instructional-design-14/what-is-pedagogy-48-12978/ http://study.com/academy/lesson/pedagogical-content-knowledge-definition-lesson-quiz.html</p>

			learning outcomes, Methods/ approaches of teaching-learning, Teaching learning materials to be used, Expected teacher and student activities Assessment strategies	
3	Planning Instruction	<p>1 Concept of objective based instruction- interdependence of objectives, learning experience and evaluation.</p> <p>2 .Stages of planning instruction- year plan, unit plan, lesson plan- importance and steps</p> <p>3. Planning of lessons in constructivist format and behaviourist format</p>	<p>Objective based instruction- meaning, importance, inter relationship between objectives, learning experience and evaluation. The diagram of the interrelationship and examples.</p> <p>Stages of planning- importance of planning- stages – steps of each and importance.</p> <p>Lesson plan- Herbartian steps and the steps in constructivist approach (Introduction, exploration , reflection and consolidation)</p> <p>Lesson planning-both approaches with focus on the way of planning and the steps.</p>	Chambers,P.(2008). Teaching mathematics- developing as a reflective secondary teacher. NewDelhi, Sage.
4	Models of Teaching	<p>1. Models of teaching- meaning, definitions, characteristics</p> <p>2. Families of models of teaching</p> <p>3. Concept attainment model, Inquiry training model, Inductive thinking model theoretical orientation, criteria for selecting a model for Mathematics teaching and lesson planning</p>	<p>Models of teaching- Definitions by Joyce, Joyce and weil, and others- general idea of model of teaching- characteristics- elements of a model- families and the criteria of classification- some eg: from each family.</p> <p>Information processing family- three models- theoretical orientation of each- elements of each – special application of each- eg: of topics for selection of each model.</p> <p>Lesson planning</p>	Joyce, B. &Weil,M. (1986).Models of teaching Singh L. C(!995) Multiple models of teaching for educators.

5	Resources in Mathematics Education	<p>1 Text books, hand books, work books, reference books, periodicals, journals, resourceCD, e-materials, supplementary readers- Need and importance of each.</p> <p>5.2 Audio- visual aids, Improvised aids-Meaning and importance.</p> <p>5.3 Technology integration strategies for Mathematics education – web based lessons- web Quest, cyber guides, multimedia presentation, tele-computing projects etc.</p> <p>5.4 Familiarising program for teaching mathematics in Edubuntu (Practical oriented)</p>	<p>Text book- qualities-need- importance Hand book/ teacher’s guide-need & importance. Work book- format of a work book- need and importance (specifically for Mathematics)- reference books, periodicals & journals- eg:- Reference book for Identities : The SAGE Handbook of Identities.</p> <p>e -materials-eg:- e-books, e-journals blogs, online encyclopedia etc. supplementary readers—eg:- (like Kanakkarivu or any other)- importance of such resources for a teacher- for simplifying the content, to cater individual needs, to motivate, to keep professional development.</p> <p>Improvised aid- meaning-relevance-teaching- learning aids to be environment friendly- less expensive-high level of utility.</p> <p>Introduction to Web based lessons</p> <p>Web quests- Meaning, components of webquests-Introduction, Task, Process, Resources, Evaluation. Introduction to cyber guide.</p> <p>Familiarising different modes of multimedia presentation like power point presentation, videos , animated videos & Graphics etc.</p> <p>Introduction to educational Telecomputing Projects</p> <p>Edubuntu- various programmes for teaching Mathematics- hands-on experience on Geogebra.</p>	<p>Any book on Methodology of teaching mathematics Available Mathematics books in the library and internet resources for locating eggs.</p> <p>IT text book of std 8</p> <p>http://www2.gsu.edu/~mstjrh/webbasedtemplate.html ,</p> <p>http://www.edutopia.org/blog/teaching-with-web-based-resources-edwige-simon</p> <p>www.wbquest.org</p> <p>www.questgarden.com</p> <p>Dodge,B.(1995). Some thoughts about webquests.</p> <p>http://webquest.sdsu.edu/aboutwebquests.html</p> <p>eric.ed.gov/?id=EJ499811.</p> <p>http://lrs.ed.uiuc.edu/mining/April95-TCT.html</p> <p>Edubuntu O.S by IT@School, Kerala</p>
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	<p>Assessment for Mathematics Learning</p>	<p>5. 5 Mathematics lab- importance, organisation and equipment 5.6 Mathematics library- role, organisation and effective functioning</p> <p>1 Continuous and Comprehensive Evaluation in mathematics learning. 2 Formal and informal tools/techniques for evaluating mathematics learning <i>Formal:</i> achievement test, diagnostic test, observation, rating scale, checklist <i>Informal assessment strategies:</i> application cards, exit cards, graphic organisers, guided reciprocal peer questioning etc. 6.3 Construction of achievement and diagnostic tests- steps- types of questions (construction, merits & demerits of each)- interpretation of test results, diagnosis and remedial measures</p>	<p>Mathematics lab- equipments- organization-importance</p> <p>Maths library- importance- organization- effective use of maths library- teacher's role</p> <p>CCE-concept- Need in Mathematics learning- tools of evaluation- description of each-informal strategies Construction of achvt. Test and diagnostic test- differences between the two- interpretation of results</p>	<p>Ram Bhai N. Patel, Educational Evaluation, Himalaya Publishing house, Delhi . Ebel&Frisbie. (1991). Essentials of Educational Measurements. New York. Mc.Graw Hill</p> <p>Moersch, C. Informal Assessment Strategies: A-Z for the Math. http://loticonnection.cachefly.net/iste_2010/Informal_Assessment_Strategies.pdf</p>
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EDU 10.10 PROFESSIONALIZING MATHEMATICS EDUCATION
Contact Hours: 50 (Instruction) MaximumMarks: 50 (External: 40, Internal: 10)

	Unit	Content		Reference
1	Mathematics for All	<p>1 Identifying learners strength and weaknesses; causes for poor performance in mathematics, Activities enriching mathematics learning</p> <p>1.2 Mathematics phobia among learners- Causes and Remedies</p> <p>1.3 Role of recreational activities in mathematics learning (mathematical games, riddles, quiz, puzzles, Sudoku etc.)</p> <p>1.4 Cooperative learning ensuring equal partnerships of learners with special needs.</p> <p>1.5 Mathematics club-Activities, importance and organisation</p> <p>1.6 Mathematics fairs</p>	<p>1. Different techniques and tools for identifying learner development- observation, verbal quizzes, projects & tests(achievement & Diagonostic). Causes of poor performance.</p> <p>2.Maths phobia- meaning of the word phobia- causes – factors related to the subject, teacher, student and environment. Remedies- concretizing the content at basic levels, encouraging students to attain MLL, make them able to think mathematically at the level appropriate to their development stage etc, - teacher qualities- healthy relationship between parents and teacher, understanding the responsibility of school and family in learner development.</p> <p>Recreational activities- meaning- types – role – egs.</p> <p>Co- operative learning- meaning- characteristics- principles- application in Mathematics class room</p> <p>Mathematics club- organization- activities- importance.</p>	<p>Teacher text of 8th/ 9th/ 10th std mathematics</p> <p>http://www2.hull.ac.uk/lli/pdf/MathsPhobia.pdf</p>
2	Exceptional Children in Mathematics	<p>2.1 Concept of Multiple Intelligences</p> <p>2.2 Exceptional children in mathematics- Mathematically gifted, slow learners, under achiever-their characteristics; special programmes for each</p> <p>2.3 Learning disability in mathematics (dyscalculia)- characteristics and remedial</p>	<p>Multiple intelligence by Gardner- types of intelligences.</p> <p>Exceptional children- meaning- gifted- slow learners- under achiever- Characteristics of each- special programmes for each.</p> <p>Leaning disability- : definition- (public law- Federal Govt. Of USA,) –</p> <p>Dyscalculia- meaning- Characteristics- :poor scholastic performance, arithmetical disability, difficulty in</p>	<p>Books on educational psychology</p> <p>Dynamics of Teaching Secondary School Mathematics, Cooney, Davis & Henderson</p> <p>https://www.understood.org/en/learning-attention-issues/child-learning-disabilities/dyscalculia/understanding-dyscalculia</p>

		<p>measures</p> <p>2.4 Mathematical creativity- characteristics, Role of teacher</p> <p>2.5 Governmental and non-governmental initiatives in improving mathematics learning; Fields medal, Mathematics Olympiad, NUMATS, NTSE, MTSE etc.</p>	<p>retrieving mathematical facts, anxiety, depression etc. Causes: brain dysfunction, damage, heredity, etc.</p> <p>Mathematical Creativity- meaning- components of creativity- Fluency, flexibility , originality and elaboration-meaning of each</p> <p>Role of Govt. organizations and NGO's- various programmes and competitions for students –Procedure of each- Fields Medal – familiarization of the reward.</p>	<p>Learning Disabilities in India Willing the mind to learn. Edited by Prathibha Karanth & Joe Rozario. 2003 (Page Nos. 31,51-61)</p> <p>Mathematical creativity: some definitions and characteristics Mehdi Nadjafikhaha, Narges Yaftianb1 *, Shahrnaz Bakhshalizadeh. <i>Procedia - Social and Behavioral Sciences</i> 31 (2012) 285 – 291</p> <p>https://www.imo-official.org www.scert.kerala.gov.in/index.php?option=com_content&view=article&id=110%3Anumats www.mathunion.org/general/prizes/fields/details www.ncert.nic.in/programmes/talent_exam/index_talent.html http://iisma.com/mtse.html</p>
3	ICT in Improving Teaching Performance	<p>3.1 E-content development- concepts, formats, steps for preparation, module preparation for e-content</p> <p>3.2 Using internet for accessing information, Websites for authoritative information like ERIC, INFLIBNET etc.</p> <p>3.3 Technology for teaching individual, small group and large group (Programmed and computerized instruction, personalized instruction, educational television, closed circuit</p>	<p>Globalization of Education e- learning, meaning & features of e-learning, Synchronous and asynchronous mode, e-content , features, forms & types, steps</p> <p>Educational Research and Information Information and Library Network</p> <p>Programmed Instruction using computers, PSI, ETV-Victers, CCTV, Video Tape, Radio Tape, Radio Lessons</p>	<p>www.cec.nic.in</p> <p>Reading Materials and CD Resources- Capacity building Programme on Multimedia and E-content development- Consortium for Educational Communication</p> <p>eric.ed.gov www.inflibnet.ac.in</p> <p>Educational Technology- K.L Kumar Essentials of Educational Technology, SK. Mangal</p>

		television, Video-Tape Interaction, Radio/Tape lessons etc.)		
4	Professionalizing Mathematics Teacher	<p>4.1 Teaching as a profession, professional ethics in teaching, Traits of professionalism-</p> <p>4.2 Qualities of a Mathematics teacher- General qualities, specific qualities, Personal qualities. Competencies listed by NCTE.</p> <p>4.2 Soft Skills for teachers</p> <p>4.3 Professional growth of Mathematics teacher. – Teaching, Research and Extension.</p> <p>4.4 Role of SCERT and NCERT in the professional growth of a teacher.</p> <p>4.5 Professional organizations of teachers.</p> <p>4.6 Research journals in mathematics and mathematics Education.</p> <p>4.7 Internet resources and websites for professional growth of a mathematics teacher</p>	<p>Meaning of Profession, Teaching as a Profession, Characteristics and ethics.</p> <p>Soft skill: soft skill- hard skill- difference- personal and interpersonal skills.</p> <p>Programmes and functions of NCERT & SCERT like Inservice and pre service training programmes, workshops, seminars, journals and other publications</p> <p>AMTI - The Association of Mathematics Teachers of India All India School Mathematics Teachers Association</p> <p>Journals like Junior Mathematician, Mathematics Teacher</p> <p>Blogs, wikis, e-books, e-journals, Discussion forums, video conferencing etc</p>	<p>http://www.ncte-india.org/ Innovations and researches in Education, 1(1), 2011, 89-95</p> <p>www.amtionline.com www.aismta.com</p> <p>Refer websites</p>