

द्वितीय पत्र :- गणित सम्बन्धी विषय

Section A- 30 Marks

- 1. Introduction to Mathematics Education** **10%**
- 1.1 Development of mathematics
 - 1.2 Goals, nature and structure of mathematics
 - 1.3 Place of mathematics in school and utilitarian value of mathematics
 - 1.4 Growth of mathematics in ancient civilization (Babylonean, Egyptian, Greek, Chinese and Hindu)
 - 1.5 Practical mathematics and integrated approach
- 2. Theories of learning and their implication in learning and teaching of mathematics** **10%**
- 2.1. Piaget's theory of intellectual development
 - 2.2. Bruner's theory of instruction
 - 2.3. Robert Gagne's theory
 - 2.4. Van Hiele's Model of learning
 - 2.5. Ausbell's theory
- 3. Study of secondary school mathematics curricula and Textbooks** **10%**
- 3.1. Curriculum structure
 - 3.2. Overview of primary/ lower secondary/ secondary school mathematics curriculum and textbooks of Nepal
 - 3.3. The need for change in curriculum
 - 3.4. The nature of change in curriculum
 - 3.5. The in-depth grade-wise study of secondary school textbooks
 - 3.5.1 Textbooks of compulsory mathematics
 - 3.5.2 Textbooks of optional mathematics
 - 3.5.3 Consistency of textbooks with reference to the curriculum
 - 3.5.4 Report on the analysis of textbooks
 - 3.6. Study of Secondary school mathematics curriculum of SAARC countries

Section B- 20 Marks

- 4. Instructional strategies** **10%**
- 4.1. Problems of instruction in mathematics
 - 4.1.1 Teaching for understanding
 - 4.1.2 Teaching for assimilation
 - 4.1.3 Teaching for transfer
 - 4.1.4 Teaching for permanence
 - 4.2. Methods of teaching mathematics
 - 4.2.1 Expository method
 - 4.2.2 Inductive and deductive methods
 - 4.2.3 Analytic and synthetic methods
 - 4.2.4 Discovery and guided discovery methods
 - 4.2.5 Problem solving method

- 5. Development of Instructional Materials in improving mathematics 10%**
- 5.1. Types of teaching materials: - literature, audio-visual aids models, manipulative materials
 - 5.2. Collection and construction of teaching materials
 - 5.2.1 Collection of different journals, cassettes/ pamphlets/ articles/ related to secondary school math's teaching
 - 5.2.1 Construction of different materials such as charts, graphs, paper folding, models, geoboard, circle board, etc
 - 5.3. Use/application of teaching materials
 - 5.3.1 Local resources and environment in mathematics teaching
 - 5.3.2 Black board Use of prepared and collected different materials
 - 5.4. Evaluation of manipulative materials in secondary school math's classroom

Section C- 30 Marks

- 6. Planning classroom Instruction 10%**
- 6.1. Needs of planning in instruction
 - 6.2. Yearly, unit and daily lesson plans
 - 6.3. Classroom management in math's teaching and principles of motivation
 - 6.4. Strategies in planning for improving mathematics instruction
- 7. Evaluation in mathematics Education 10%**
- 7.1 Assessment techniques
 - 7.2 Planning of a test
 - 7.3 Construction of test items (specification chart, marking scheme etc)
 - 7.4 Construction of different test items
 - 7.5 Analysis and reporting the test
- 10. Supervision and Training 10%**
- 10.1 Supervision of mathematics instruction
 - 10.1.1 Needs of supervision
 - 10.1.2 Techniques of supervision in mathematics teaching
 - 10.1.3 Evaluation of teaching
 - 10.2 Mathematics teachers training program in Nepal

Section D- 20 Marks

- 8. Teaching selected topic 10%**
- 8.1 **Teaching Arithmetic** (sets, ratio and proportion and percentage, unitary method, profit and loss, simple and compound interest, commission and discount, home arithmetic, measurement)
 - 8.2 **Teaching Algebra** (algebraic expressions, equation and inequalities, linear equations and simple inequalities, quadratic equations and simple inequalities in two variables, relations and function, matrices, vectors)
 - 8.3 **Teaching Geometry** (classification of polygons, similarity and congruency of two triangles and their applications, Parallelogram, area of triangles and quadric laterals, bearing and scale drawing, surface and volume of solids, coordinate, geometry, transformation geometry, reflection, rotation, translation, enlargement)

लोक सेवा आयोग
नेपाल शिक्षा सेवा, शिक्षा प्रशासन समूह, गणित उपसमूहको राजपत्राङ्कित तृतीय श्रेणी पदको खुला र आन्तरिक
प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

- 8.4 **Teaching Trigonometry** (trigonometric functions, values of trigonometric ratios, sine, cosine and tangent graphs, area of triangles using trigonometric ratios)
- 8.5 **Teaching Statistics** (graphical presentation of data, central tendencies, probability)
- 8.6 Linear Programming
- 9. Diagnostic and remedial Teaching** **10%**
- 9.1 Problems faced by students in learning mathematics
- 9.2 Remedial instruction
- 9.3 Counseling with parents/ guardians
- 9.4 Application and Understanding of basic mathematics in everyday life

द्वितीय पत्रको एकाईहरूको प्रश्नसंख्या निम्नानुसार हुनेछ

द्वितीय पत्रका खण्ड	A			B		C			D	
द्वितीय पत्रका एकाई	1	2	3	4	5	6	7	10	8	9
प्रश्न संख्या	1	1	1	1	1	1	1	1	1	1

विषयगत नमूना प्रश्नहरू (Sample questions)

Attempt all question.

- 1) Discuss the needs of teaching mathematics in secondary level. What kind of utilitarian value students get from teaching of mathematics? Describe. 5+5
- 2) Explain the implications of Piaget's Theory of cognitive development stages in the pedagogy of mathematics education. Also write any three implications of Bruner's theory in learning and teaching of mathematics. 7+3
- 3) Write the steps required in constructing a curriculum. Discuss briefly the essential qualities of a good textbook hence examine in terms of essential qualities in part of the Arithmetic current textbook of grade x. 4+3+3
- 4) Write a factorization model $x^2 + 5x + 6$ and explain why your model is desirable to teach the given factorization problem. And also draw geometric illustration for the following identity: 2+2+3+3
 - (a) $(p+q)^3 = p^3 + 3p^2q + 3pq^2 + q^3$
 - (b) $x^2 - y^2 = (x+y)(x-y)$
- 5) Describe what types of planning you have to do as a mathematics teacher and list the main purpose of each type. 4+6
- 6) What do you mean by specification chart? Explain what measure do you take to increase objectivity of subjective type question in mathematics give your opinion. 10
- 7) (a) Describe how you would process to have your student discover the Pythagorean Theorem. 6
 - (b) Explain shortly the essential difference between providing trigonometric identity and solving a trigonometric equation. Illustrate by example. 4
- 8) Discuss about remedial teaching with examples. Explain how diagnostic teaching helps the teaching students in the learning of mathematics. 10
- 9) (a) Describe any five reasons why supervision of mathematics instruction is necessary in our schools. 5
 - (b) Evaluate mathematics teacher training program of our country 5

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प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

नेपाल आर्थिक योजना तथा तथ्याङ्क, इन्जिनियरिङ्ग, कृषि, वन, विविध र शिक्षा सेवाका सबै समूह/उपसमूह,
राजपत्राङ्कित तृतीय श्रेणी र एवं स्वास्थ्य सेवाको सातौं र आठौं तहका पदहरूमा
प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र
लिइने **सामूहिक परीक्षण (Group Test)** को लागि

सामूहिक छलफल (Group Discussion)

यस प्रयोजनको लागि गरिने परीक्षण १० पूर्णाङ्क र ३० मिनेट अवधिको हुनेछ जुन नेताविहिन सामूहिक छलफल (Leaderless Group Discussion) को रूपमा अवलम्बन गरिने छ। दिइएको प्रश्न वा Topic का विषयमा पालैपालोसँग निर्दिष्ट समयभित्र समूहबीच छलफल गर्दै प्रत्येक उम्मेदवारले व्यक्तिगत प्रस्तुति (Individual Presentation) गर्नु पर्नेछ। यस परीक्षणमा मूल्याङ्कनको लागि देहाय अनुसारको ३ जना भन्दा बढीको समिति रहनेछ।

आयोगका सदस्य	-	अध्यक्ष
आयोगका सदस्य	-	सदस्य
मनोविज्ञ	-	सदस्य
दक्ष/विज्ञ (१ जना)	-	सदस्य

सामूहिक छलफलमा दिइने नमूना प्रश्न वा Topic

उदाहरणको लागि - उर्जा संकट, गरीबी निवारण, स्वास्थ्य बीमा, खाद्य सुरक्षा, प्रतिभा पलायन जस्ता Topics मध्ये कुनै एक Topic मात्र दिइनेछ।