

Mathematics Syllabus

for

UG Admission Test 2011

Department of Economics

Presidency University, Kolkata

(Based on West Bengal Higher Secondary Council Examination Syllabus for Classes XI and XII)

Module	Topic
Module 1	Algebra
	Arithmetic progression and geometric progression, logarithms, theory of quadratic equations, permutation and combination, principles of mathematical induction, binomial theorem for positive integral index, infinite series, matrix and determinant
Module 2	Trigonometry
	Associated angles, trigonometric ratio of compound angles, multiplicative and sub-multiplicative angles, properties of triangles
Module 3	Coordinate Geometry
	Basic ideas, equation of straight line, equation of circle, sets, relations and mapping, conics-parabola, ellipse, hyperbola
Module 4	Differential Calculus
	Idea of number systems, functions, limit, continuity and differentiability, derivative of function – x^n (n rational), $\sin x$, $\cos x$, e^x , $\log x$ (from first principle), working rule of derivative of x^n (n real), rules of differentiation of product, sum and quotient of two functions (statements), differential coefficient of $\tan x$, $\cot x$, $\sec x$, $\operatorname{cosec} x$, $\sin^{-1} x$, $\cos^{-1} x$, $\tan^{-1} x$, $\operatorname{cosec}^{-1} x$, $\sec^{-1} x$, $\cot^{-1} x$, derivative of function, differentiation of function, implicit function (statement) and derivative, differentiation of function in parametric form, second order derivative of function
Module 5	Integral Calculus
	Indefinite integral, integration by parts, definite integral
Module 6	Differential Equation – First order, First degree
Module 7	Tangent and Normal
Module 8	Maxima and Minima
Module 9	Determination of Area
Module 10	Velocity and Acceleration – Simple Applications
Module 11	Probability
	Random experiment and outcome in simple space, events, equally likely outcomes, classical definition, additive and multiplicative rules

Candidates will have to answer twenty five multiple choice questions of two marks each and four short answer type questions of 5 marks each.

**Mathematics Model Questions
For**

**UG Admission Test 2011
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Section 1 : Multiple Choice Questions (2 marks each)

Mention the correct alternative in your answer script. There is no negative marking.

1. The number of distinct solutions (x, y) of the system of equations
 $x^2 = y^2$
 $(x - a)^2 + y^2 = 1$
where a is any real number, can only be
(a) 0, 1, 2, 3, 4 or 5
(b) 0, 1 or 3
(c) 0, 1, 2 or 4
(d) 0, 2, 3 or 4
2. The straight lines $x + 2y - 9 = 0$, $3x + 5y - 5 = 0$ and $ax + by - 1 = 0$ are concurrent if the straight line $35x - 22y + 1 = 0$ passes through the point
(a) (a, b) (b) $(a/2, b/2)$ (c) $(2a, 2b)$ (d) none of these
3. Let $\phi(x) = x^3 + 4x^2 + \lambda x + 1$ is a monotonically decreasing function of x in the largest possible interval $(-2, -\frac{2}{3})$, then
(a) $\lambda = 4$ (b) $\lambda = 2$ (c) $\lambda = -1$ (d) λ has no real value
4. Evaluate:
$$\lim_{n \rightarrow \infty} \left[\frac{n}{1+n^2} + \frac{n}{2^2+n^2} + \dots + \frac{1}{2n} \right]$$

a) 0 b) 1 c) $\frac{\pi}{2}$ d) $\frac{\pi}{4}$
5. If we twice flip a balanced coin, then the probability of getting at least one head is:
a) $1/2$ b) $1/3$ c) $3/4$ d) $1/4$

Section 2 : Short answer-type questions

1. How many ways can four distinct integers be chosen from $1, 2, \dots, n$ ($n \geq 7$) such that no two are consecutive?
2. If A and B are two points on the line $3x + 4y + 15 = 0$, such that $OA = OB = 9$ units where O is the origin, then find out the area of the triangle OAB.
3. Find out the area enclosed by the parabola $y^2 = ax$ and a circle $x^2 + y^2 = 2ax$
4. Find the global maximum and the global minimum for the function, $f(x) = (x + 2) + \frac{1}{(x - 2)}$. Is the maximum less than minimum? If so, identify the reason.
5. The digits 1, 2, 3,4,5,6, and 7 are written down in a random order to give a seven-digit number. What is the probability that the number is divisible by 4?

**ENGLISH SYLLABUS
for**

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One essay (20marks)
One comprehension (10marks)

**English Model Questions
For**

**UG Admission Test 2011
Department of Economics
Presidency University, Kolkata**

Write an essay in English on any one of the following:

1. Gender-bias in politics and society
2. Travel as a part of education.

(20 marks)

Comprehension Passage

We have to make judgment regarding risk. Figuring out the right thing to do is usually not that difficult. And yet, we often don't do what we know to be the right thing. The problem is that we must go against our intuition, expend money or time we'd rather use elsewhere, None of those choices is easy, since the costs in money and trouble are guaranteed while the benefits are not. That trade-off is in the very nature of uncertainty.

The principle of avoiding the bigger mistake underlies dealing sensibly with all types of risk. For everyday hazards, little more than disciplined common sense is demanded: taking out prudent amounts of insurance; going to the doctor quickly when we have symptoms we can't account for; holding the banister when using the stairs; ensuring that medicines, small objects, and household poisons are out of the reach of children; observing sensible safety precautions when using power saws and other dangerous tools; and having someone hold the ladder when we're pruning the hedge.

The same principle also encourages taking precautions for less common occurrences, such as floods, hurricanes, tornadoes epidemics and terrorist attacks. It may not seem that advice about a home mishap can be linked to one's preparations for a terrorist attack. But preparing for either event involves thinking about prevention, developing tactics for rapid response, and managing the aftermath if the worst happens. Furthermore both sets of events have probabilities that one must understand.

Qs. What should be the basic guiding rule in handling all types of risk? Why do people often disregard this? (10 marks)