

Bachelor of Honours
ACADEMIC CALENDAR
&
COURSE PLAN
2014-2015



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বিভাগের শিক্ষকমণ্ডলীর পরিচিতি

নাম	পদবী
মোঃ মোশাররফ হোসেন	অধ্যাপক
মোঃ শহিদুল আলম	সহযোগী অধ্যাপক
মোঃ কফিলার রহমান	সহযোগী অধ্যাপক
মোঃ নূরুল ইসলাম	সহযোগী অধ্যাপক
ড. আখতার বাবু	সহকারী অধ্যাপক
ড. মোঃ আব্দুল আজিজ	সহকারী অধ্যাপক
মোঃ আসাদুজ্জামান	সহকারী অধ্যাপক
মোঃ মিজানুর রহমান	সহকারী অধ্যাপক
মোঃ শারওয়ার জাহান	সহকারী অধ্যাপক
সাদিকা হরকিল	প্রভাষক
নাদীরা নাজনীন	প্রভাষক
মোছাঃ লাইলাতুল কাদরী	প্রভাষক
মোছাঃ মাহফুহা মুস্তারী	প্রভাষক

কর্মচারিবৃন্দের পরিচিতি

মোঃ রাকিবুল আজাদ	কম্পিউটার অপারেটর
এমী আক্তার	সেমিনার লাইব্রেরী সহকারী
মোঃ আলফাজ উদ্দিন	এমএলএসএস

বিভাগের শ্রেণিভিত্তিক সমন্বয়কারী শিক্ষকগণের নাম

ক্রমিক নম্বর	বর্ষ	নাম
১.	প্রথম বর্ষ অনার্স	১. মোঃ আব্দুল আজিজ, সহকারী অধ্যাপক
		২. মোঃ শারওয়ার জাহান, সহকারী অধ্যাপক
২.	দ্বিতীয় বর্ষ অনার্স	১. মোঃ নূরুল ইসলাম, সহযোগী অধ্যাপক
		২. সাদিকা হরকিল, প্রভাষক
৩.	তৃতীয় বর্ষ অনার্স	১. মোঃ শহিদুল আলম, সহযোগী অধ্যাপক
		২. নাদীরা নাজনীন, প্রভাষক
৪.	চতুর্থ বর্ষ অনার্স ও মাস্টার্স প্রথম পর্ব	১. মোঃ কফিলার রহমান, সহযোগী অধ্যাপক
		২. মোঃ আসাদুজ্জামান, সহকারী অধ্যাপক
৫.	মাস্টার্স শেষ পর্ব	১. ড. আখতার বাবু, সহকারী অধ্যাপক
		২. মোছাঃ লাইলাতুল কাদরী, প্রভাষক

বিভাগের জাতীয় বিশ্ববিদ্যালয় পরীক্ষার ফলাফল

গত ৫ বছরের অনার্স পর্যায়ে ফলাফল

বছর	১ম শ্রেণি	২য় শ্রেণি	৩য় শ্রেণি	পাস	ফেল	অন্যান্য	মোট
২০১২	৪৯	৬৮	১১	৫	৮	৪	১৩৩
২০১১	৩৮	৬২	১১	৯	১১	৫	১৩৬
২০১০	৩২	৭৮	০৪	০৪	১১	০৮	১৩৭
২০০৯	১২	১০১	২০	০৩	০৬	০৪	১৪৬
২০০৮	১৩	৯২	১৩	০৬	০২	০২	১২৮
২০০৭	০৮	৮০	১০	০২	০৫	১৫	১২০
২০০৬	০৩	৪৬	১৬	০৭	০৫	০৩	৮০

গত ৫ বছরের মাস্টার্স পর্যায়ে ফলাফল

বছর	১ম শ্রেণি	২য় শ্রেণি	৩য় শ্রেণি	পাস	ফেল	অন্যান্য	মোট
২০১১	১৭	৮১	৪	-	৪৭	২	১০২
২০১০	৪৬	৯২	১৩	-	১৮	০২	১৭১
২০০৯	৪০	৭১	০৮	-	২৪	০৩	১৪৬
২০০৮	৩৭	৭১	০৫	-	১১	০০	১২৪
২০০৭	২০	৩৬	০৭	-	১১	২	৭৬
২০০৬	-	৪৯	০২	-	২৪	০৫	৮০

সহশিক্ষা কার্যক্রম :

১. প্রতি শিক্ষাবর্ষের নবাগত শিক্ষার্থীদের 'রিসিপশন ও ওরিয়েন্টেশন' অনুষ্ঠানের মাধ্যমে বরণ।
২. বার্ষিক ক্রীড়া এবং সাহিত্য ও সাংস্কৃতিক প্রতিযোগিতায় শিক্ষার্থীদের অংশগ্রহণ।
৩. জাতীয় দিবসসমূহ উদযাপন ও বিভিন্ন প্রতিযোগিতায় শিক্ষার্থীদের অংশগ্রহণ।
৪. বিভাগের উদ্যোগে দেয়াল পত্রিকা ও স্মরণিকা প্রকাশ।
৫. বাংলা নববর্ষ, বসন্ত উৎসব, বর্ষাবরণ, সরস্বতী পূজা, রবীন্দ্র, নজরুল জয়ন্তী উদযাপনে শিক্ষার্থীদের অংশগ্রহণ।
৬. বনভোজন ও শিক্ষা সফরে শিক্ষার্থীদের অংশগ্রহণ।
৭. শিক্ষা বিষয়ক সেমিনারের আয়োজন।
৮. রোভার্স স্কাউটস ছাত্র-ছাত্রীদের আত্মনির্ভরশীল করে তোলার জন্য বিভিন্ন সামাজিক কার্যক্রমে অংশগ্রহণ।
৯. বিএনসিসি জাতীয় প্রতিরক্ষায় নিজেদের সম্পৃক্ত রাখার প্রত্যয়ে ছাত্র-ছাত্রীদের নিয়োজিত হওয়ার কার্যক্রম।
১০. বাঁধন স্বেচ্ছায় রক্তদান করে মানবতার সেবায় নিয়োজিত একটি সংগঠন।
১১. বরেন্দ্র থিয়েটার গ্রুপ থিয়েটার আন্দোলনভিত্তিক নাটক ও জীবনধর্মী চলচ্চিত্র বিষয়ক সংগঠন।
১২. অন্বেষণ জাতীয় পালাপার্বণে বিশুদ্ধ সাংস্কৃতিক চর্চার একটি সংগঠন।
১৩. আরসিডিসি (রাজশাহী কলেজ ডিবেটিং ক্লাব) ছাত্র-ছাত্রীদের মেধা বিকাশের জন্য বিতর্ক চর্চামূলক সংগঠন।
১৪. রাজশাহী কলেজ নাট্য সংসদ 'উদয়ের পথে আমরাও' এই ভাবনায় সৃষ্টিশীল ও ইতিবাচক নাট্য আন্দোলনে বিশ্বাসী এই সংগঠনটি আলো জ্বালানোর প্রত্যয় নিয়ে কাজ করছে।
১৫. রাজশাহী কলেজ সঙ্গীত চর্চা কেন্দ্রের উদ্যোগে শিক্ষার্থীদের সঙ্গীতসহ অন্যান্য বিষয় শেখানো হয়।
১৬. সরকারি প্রজ্ঞাপনের মাধ্যমে যে সব সহশিক্ষা কার্যক্রমের নির্দেশনা আসে তা আয়োজন করা।

একাডেমিক ক্যালেন্ডার

স্নাতক (অনার্স) পর্যায়

শিক্ষাবর্ষ : ২০১৪-২০১৫

(১০০ নম্বরের কোর্সের ৬০ ক্লাস ঘন্টা = ৪ ক্রেডিট,

৭৫ নম্বরের কোর্সের ৪৫ ক্লাস ঘন্টা = ৩ ক্রেডিট,

৫০ নম্বরের কোর্সের ৩০ ক্লাস ঘন্টা = ২ ক্রেডিট)

১ম বর্ষ অনার্স			
পর্ব	ক্লাস (১৯০ কার্যদিবস)	পরীক্ষা	ফলাফল প্রকাশ
১ম ইনকোর্স	২২/০২/২০১৫-২৬/০৫/২০১৫=৬০ কার্যদিবস	২৭/০৫/২০১৫ ১০/০৬/২০১৫	---
	১০০ নম্বরের কোর্স (২৫ ক্লাস ঘন্টা) ৭৫ নম্বরের কোর্স (২০ ক্লাস ঘন্টা) ৫০ নম্বরের কোর্স (১২ ক্লাস ঘন্টা)		
২য় ইনকোর্স	১১/০৬/২০১৫-০৪/১০/২০১৫=৫৮ কার্যদিবস	০৫/১০/২০১৫ ১৯/১০/২০১৫	---
	১০০ নম্বরের কোর্স (২৫ ক্লাস ঘন্টা) ৭৫ নম্বরের কোর্স (২০ ক্লাস ঘন্টা) ৫০ নম্বরের কোর্স (১২ ক্লাস ঘন্টা)		
নির্বাচনী	২৮/১০/২০১৫-৩০/১১/২০১৫=২৮ কার্যদিবস	০১/১২/২০১৫ ১৫/১২/২০১৫	পরীক্ষা সমাপ্তির ২ সপ্তাহের মধ্যে
	১০০ নম্বরের কোর্স (২৫ ক্লাস ঘন্টা) ৭৫ নম্বরের কোর্স (২০ ক্লাস ঘন্টা) ৫০ নম্বরের কোর্স (১২ ক্লাস ঘন্টা)		

২য় বর্ষ অনার্স			
পর্ব	ক্লাস	পরীক্ষা	ফলাফল প্রকাশ
১ম ইনকোর্স	ক্লাস শুরু তারিখ থেকে ১৫ সপ্তাহ	ক্লাস শুরুর ১৫ সপ্তাহের মধ্যে	---
	১০০ নম্বরের কোর্স (২৫ ক্লাস ঘন্টা) ৫০ নম্বরের কোর্স (১২ ক্লাস ঘন্টা)		
২য় ইনকোর্স	১ম ইনকোর্স পরীক্ষার পরবর্তী ১৫ সপ্তাহ	১ম ইনকোর্স পরীক্ষা থেকে পরবর্তী ১৫ সপ্তাহের মধ্যে	---
	১০০ নম্বরের কোর্স (২৫ ক্লাস ঘন্টা) ৫০ নম্বরের কোর্স (১২ ক্লাস ঘন্টা)		
নির্বাচনী	২য় ইনকোর্স পরবর্তী ১ মাস	২য় ইনকোর্স পরবর্তী ১ মাসের মধ্যে	পরীক্ষা সমাপ্তির ২ সপ্তাহের মধ্যে
	১০০ নম্বরের কোর্স (২৫ ক্লাস ঘন্টা) ৫০ নম্বরের কোর্স (১২ ক্লাস ঘন্টা)		

৩য় বর্ষ অনার্স			
পর্ব	ক্লাস	পরীক্ষা	ফলাফল প্রকাশ
১ম ইনকোর্স	ক্লাস শুরু তারিখ থেকে ১৫ সপ্তাহ	ক্লাস শুরুর ১৫ সপ্তাহের মধ্যে	---
	১০০ নম্বরের কোর্স (২৫ ক্লাস ঘন্টা)		
২য় ইনকোর্স	১ম ইনকোর্স পরীক্ষার পরবর্তী ১৫ সপ্তাহ	১ম ইনকোর্স পরীক্ষা থেকে পরবর্তী ১৫ সপ্তাহের মধ্যে	---
	১০০ নম্বরের কোর্স (২৫ ক্লাস ঘন্টা)		
নির্বাচনী	২য় ইনকোর্স পরবর্তী ১ মাস	২য় ইনকোর্স পরবর্তী ১ মাসের মধ্যে	পরীক্ষা সমাপ্তির ২ সপ্তাহের মধ্যে
	১০০ নম্বরের কোর্স (২৫ ক্লাস ঘন্টা)		

৪র্থ বর্ষ অনার্স			
পর্ব	ক্লাস	পরীক্ষা	ফলাফল প্রকাশ

১ম ইনকোর্স	ক্লাস শুরু তারিখ থেকে ১৫ সপ্তাহ	ক্লাস শুরুর ১৫ সপ্তাহের মধ্যে	---
	১০০ নম্বরের কোর্স (২৫ ক্লাস ঘন্টা)		
২য় ইনকোর্স	১ম ইনকোর্স পরীক্ষার পরবর্তী ১৫ সপ্তাহ	১ম ইনকোর্স পরীক্ষা থেকে পরবর্তী ১৫ সপ্তাহের মধ্যে	---
	১০০ নম্বরের কোর্স (২৫ ক্লাস ঘন্টা)		
নির্বাচনী	২য় ইনকোর্স পরবর্তী ১ মাস	২য় ইনকোর্স পরবর্তী ১ মাসের মধ্যে	পরীক্ষা সমাপ্তির ২ সপ্তাহের মধ্যে
	১০০ নম্বরের কোর্স (১০ ক্লাস ঘন্টা)		

** কলেজ কর্তৃপক্ষ প্রয়োজনে যে কোন কার্যক্রম বা সময়সূচি পরিবর্তন করতে পারে।

ছাত্র ও অভিভাবকদের জ্ঞাতব্য

- ১। ব্যাচেলর (অনার্স) পরীক্ষায় অংশগ্রহণের যোগ্যতা হিসাবে মোট লেকচার ক্লাস/ব্যবহারিক ক্লাসের ৭৫% উপস্থিতি থাকতে হবে। বিশেষ ক্ষেত্রে অধ্যক্ষ বিভাগীয় প্রধানের সুপারিশের ভিত্তিতে উপস্থিতি ৭৫%-এর কম এবং ৬০% বা তার বেশি থাকলে তা বিবেচনার জন্য সুপারিশ করতে পারবেন। ৭৫% এর কম উপস্থিতির জন্য পরীক্ষার্থীকে পরীক্ষার ফরম পূরণের সময় ৫০০ (পাঁচশত) টাকা নন-কলেজিয়েট ফি অবশ্যই জমা দিতে হবে।
- ২। পরীক্ষার জন্য প্রেরিত পরীক্ষার্থীর আবেদনপত্রে অধ্যক্ষ/বিভাগীয় প্রধান প্রত্যয়ন করবেন যে-
 - (i) পরীক্ষার্থীর আচরণ সন্তোষজনক;
 - (ii) লেকচার ক্লাসে, ব্যবহারিক ক্লাসে, ইন-কোর্সে ও মাঠ পর্যায়ে তার উপস্থিতি সন্তোষজনক;
 - (iii) পরীক্ষার্থী কলেজের সকল অভ্যন্তরীণ পরীক্ষায় উত্তীর্ণ হয়েছে এবং বিশ্ববিদ্যালয় কর্তৃক আরোপিত সকল শর্ত পূরণ করেছে।
- ৩। ক্লাস শিক্ষক নির্ধারিত কার্যক্রমে শিক্ষার্থীদের সক্রিয়ভাবে অংশগ্রহণ করতে হবে।
- ৪। জাতীয় বিশ্ববিদ্যালয়ের সিলেবাস ও কোর্সসমূহে কোন পরিবর্তন আসলে কলেজ কর্তৃপক্ষ তা বিবেচনায় আনবেন।
- ৫। ইনকোর্স পরীক্ষাসহ অন্যান্য পরীক্ষার নির্দিষ্ট তারিখে অংশগ্রহণে ব্যর্থ হলে পরিবর্তিত আর উক্ত পরীক্ষা দেয়ার সুযোগ থাকবে না।
- ৬। নির্বাচনী পরীক্ষার ফলাফল আনুষ্ঠানিকভাবে প্রকাশ এবং ভাল ফলাফল অর্জনকারী ও ক্লাসে সর্বাধিক উপস্থিত শিক্ষার্থীদের পুরস্কৃত করা হবে।
- ৭। ছাত্র-ছাত্রীদের প্রত্যেক পরীক্ষার পূর্বে বেতন অন্যান্য ফি হালনাগাদ পরিশোধ করে প্রবেশপত্র সংগ্রহ করতে হবে।
- ৮। কোন ছাত্র-ছাত্রীদের কলেজের শৃঙ্খলা পরিপন্থী কোন কাজ করলে কর্তৃপক্ষ বহিষ্কারসহ আইনানুগ যে কোন শাস্তিমূলক ব্যবস্থা নিতে পারবেন।
- ৯। এই প্রতিষ্ঠানের নিয়মশৃঙ্খলা বজায় রাখতে এবং সবচেয়ে ভাল ফলাফল করতে সকল ছাত্র-ছাত্রীর প্রচেষ্টা ও অভিভাবকবৃন্দের সহযোগিতা আমাদের কাম্য।
- ১০। ধর্মীয় অনুষ্ঠানাদি চান্দ্রমাসের ওপর নির্ভরশীল হওয়ায় উল্লিখিত ছুটির তারিখ পরিবর্তিত হতে পারে।
- ১১। প্রয়োজনে যে কোন কার্যক্রম কর্তৃপক্ষ পরিবর্তন করতে পারে।

Course Plan

Honours

1st Year

2nd Year

3rd Year

4th Year

Session : 2014-2015



Department of Mathematics

Rajshahi College, Rajshahi.

Department of Mathematics
Rajshahi College, Rajshahi

1st Year Honours (2014-15)

Courses and Marks Distribution
Year wise Papers and marks distribution

FIRST YEAR

Paper Code	Paper Title	Marks	Credits
213701	Fundamentals of Mathematics	75	3
213703	Calculus – I	75	3
213705	Linear Algebra	75	3
213707	Analytic and Vector Geometry	75	3
Any TWO of the following:			
212807	Chemistry-I	100	4
212808		Chemistry-I Practical	50
213607	Introduction to Statistics	100	4
213608		Statistics Practical-I	50
212707	Physics-I (Mechanics, Properties of Matter, Waves & Optics)	100	4
212709		Physics-II (Heat, Thermodynamics and Radiation)	50
211501	History of the Emergence of Independent Bangladesh	100	4
	Total =	700	28

Department of Mathematics
Rajshahi College, Rajshahi

Course Plan

1st Year Honours (2014-15)

Paper Code: 213701

Paper Title: **Fundamentals of Mathematics**

Marks-75, 3(credits), 45 Lectures

Teacher's Name: Md. Sarwar Jahan(SJ)

Examination	Course Content	Lectures
1st Incourse (20 Lectures)	Elements of logic: Mathematical statements, Logical connectives, Conditional and bi-conditional statements, Truth tables and tautologies, Quantifiers, Logical implication and equivalence, Deductive reasoning.	5
	Set Theory : Sets and subsets, Set operations, Cartesian product of two sets, Operations on family of sets, De Morgan's laws.	4
	Relations and functions: Relations. Order relation. Equivalence relations. Functions. Images and inverse images of sets. Injective, surjective, and bijective functions. Inverse functions.	4
	Real Number System: Field and order properties, Natural numbers, Integers and rational numbers, Absolute value and their properties,	3
	Basic inequalities. (Including inequalities of means, powers; inequalities of Cauchy, Chebyshev, Weierstrass).	4
2nd Incourse (20 Lectures)	Complex Number System: Field of Complex numbers, De Moivre's theorem and its applications.	5
	Theory of equations: Relations between roots and coefficients, Symmetric functions of roots, Sum of the powers of roots, Synthetic' division, Des Cartes rule of signs, Multiplicity of roots, Transformation of equations.	6
	Elementary number theory: Divisibility. Fundamental theorem of arithmetic. Congruences (basic properties only).	4
	Summation of series: Summation of algebraic and trigonometric series.	5
Test (5 Lectures)	Revision and Discussion	5

Books Recommended:

1. Schaums Outline Series- Theory and problems on set theory and related topics.
2. S. Bernard & J M Child- Higher algebra.
3. Md. Abdur Rahman - Basic Algebra.

1st Year Honours (2014-15)

Paper Code: 213703

Paper Title: **Calculus-I**

Marks-75, 3(credits), 45 Lectures

Teache's Name: Mst. Lailatul Kadri (LK)

Examination	Course Content	Lectures
1st Incourse (20 Lectures)	Functions & their graphs : Polynomial and rational functions, logarithmic and exponential functions, trigonometric functions & their inverses, hyperbolic functions & their inverses, combinations of such functions.	4
	Limit and continuity: Definitions and basic theorems on limit and continuity. Limit at infinity & infinite limits, Computation of limits.	4
	Differentiation: Tangent lines and rates of change. Definition of derivative. One-sided derivatives. Rules of differentiation (proofs and applications). Successive differentiation. Leibnitz's theorem (proof and application). Related rates. Linear approximations and differentials.	4
	Applications of Differentiation: Mean value theorem. Maximum and minimum values of functions. Concavity and points of inflection. Optimization problems.	4
	Approximation and Series: Taylor polynomials and series. Convergence of series. Taylor's series. Taylor's theorem and remainders. Differentiation and integration of series. Validity of Taylor expansions and computations with series.	4
2nd Incourse (20 Lectures)	Integration: Antiderivatives and indefinite integrals. Techniques of integration. Definite integration using antiderivatives. Fundamental theorems of calculus (proofs and applications). Basic properties of integration. Integration by reduction.	6
	Applications of Integration: Arc length. Plane areas. Surfaces of revolution. Volumes of solids of revolution. Volumes by cylindrical shells. Volumes by cross sections.	4
	Graphing in polar coordinates: Tangents to polar curves. Arc length in polar coordinates. Areas in polar coordinates.	6
	Improper integrals : Tests of convergence and their applications. Gamma and Beta functions. Indeterminate form of type 0/0. L'Hospital's rule. Other indeterminate forms.	4
Test (5 Lectures)	Revision and Discussion	5

Books Recommended:

- | | |
|--------------------------------|--|
| 1. Howard Anton | : Calculus (7 th and forward editions). |
| 2. E.W. Swokowski | : Calculus with Analytic Geometry. |
| 3. Md. A Matin & B Chakraborty | : Differential Calculus |
| 4. Md Abu Yousuf | : Differential and Integral Calculus |

1st Year Honours (2014-15)

Paper Code: 213705
 Paper Title: **Linear Algebra**
 Marks-75, 3(credits), 45 Lectures
 Teache's Name: Md. Asaduzzaman (AZ)

Examination	Course Content	Lectures
1st Incourse (20 Lectures)	Matrices: Notion of matrix. Types of matrices. Algebra of matrices, Some theorems. Determinants: Introduction, Determinant function. Properties of determinants. Minors, Cofactors, expansion and evaluation of determinants. Elementary row and column operations and row-reduced echelon matrices. Invertible matrices: Invertible matrices. Different types of matrices, Rank of matrices.	7
	Vectors in \mathbb{R}^n and \mathbb{C}^n: Vectors in \mathbb{R}^2 , Vectors in \mathbb{R}^3 , Vectors in \mathbb{R}^n , addition of two vectors in \mathbb{R}^2 and \mathbb{R}^n , zero vector, Dot or innerproduct in \mathbb{R}^3 & \mathbb{R}^n , parallel vectors, perpendicular vectors, Distance between two vectors, Norm or length in \mathbb{R}^3 & \mathbb{R}^n , vectors in \mathbb{C}^n , Dot product in \mathbb{C}^n , norm in \mathbb{C}^n , Cauchy-Schwarz inequality, Minkowski's inequality.	7
	A System of Linear Equations: A homogeneous and non-homogeneous system to linear equations, particular solution and general solution, zero or trivial solution, non trivial and trivial solution, consistent and consistent system of Linear equation, Echelon form, Gaussian elimination, Matrix form of system of linear equation, Matrix form of system of linear equation, Solved problem	6
2nd Incourse (20 Lectures)	Application of matrices and determinants for solving system of linear equations: Solution of system of linear equations by the matrix method, Cramer's rule, Applications of system of equations in real life problems.	4
	Vector Spaces: Binary operation, Group, Ring, Field, vector space, sub space, sum and direct sum, solved problem. Linear combination: Linear combination, dependence and independence, Linear dependence and independence of vector, Solved problem. Generators, Basis, Dimension: Generator, Basis and dimension of vectors, Basis and dimension of solution space, Row space and column space of a matrix, Basis and dimension of Row and column space of matrix, Solved problem.	8
	Linear Transformation: Linear transformation and linear operation, Image and Kernel of linear transformation. Rank and Nullity, singular and non singular linear transformation, Matrix and linear transformations. Relation between rank and nullity, composition function of linear transformation, Solved problem. Matrix representation of linear transformation: Matrix representation of linear transformation of a linear operator, Change of basis matrix, Transition matrix, Solved problem.	8
Test (5 Lectures)	Eigen values and Eigen vectors: Matrix polynomial, Eigen values and Eigen vectors of a linear operator, Eigen vector of a square matrix, Characteristic matrix, polynomial and equation, The minimum polynomial, similar matrix, Eigen space. Solved problem.	5
	Revision and Discussion	

Books Recommended:

1. Howard Anton & Chris Rorres – Elementary Linear Algebra with Application.
2. Seymour Lipschutz (Schaum's Outline Series)-Linear Algebra.
3. Md. Abdur Rahman- Linear Algebra.

1st Year Honours (2014-15)

Paper Code: 213707

Paper Title: **Analytic and vector Geometry**

Marks-75, 3(credits), 45 Lectures

Teacher's Name: Md. Mizanur Rahman (MR)

Examination	Course Content	Lectures
1st Incourse (20 Lectures)	Two-dimensional Geometry: Transformation of coordinates, Pair of straight lines (Homogeneous second degree equations, General second degree equations represent a pair of straight lines, Angle between pair of straight lines, Bisectors of angle between pair of straight lines),	12
	Two-dimensional Geometry: General equations of second degree (Reduction to standard forms, Identifications, Properties and Tracing of conics).	8
2nd Incourse (20 Lectures)	Three-dimensional Geometry: Three-dimensional coordinates, Distance, Direction cosines and direction ratios, Planes and straight lines, Spheres. Conicoids (basic properties).	12
	Vector Geometry: Vectors in plane and space, Algebra of vectors, Scalar and vector product, Vector equations of straight lines and planes. Triple scalar product. Applications of vectors to geometry (vector equations of straight lines and planes, areas and volumes).	8
Test (5 Lectures)	Revision and Discussion	5

Books Recommended:

1. H.H. Askwith : Analytic Geometry of Conic Section.
2. J. A. Hummel : Vector Geometry.
3. Khosh Mohammad : Analytic Geometry and Vector Analysis.
4. Rahman & Bhattacharjee : A text Book on Co-ordinate Geometry With Vector Analysis
5. Robert J.T. Bell : A treatise on Three Dimensional Geometry

1st Year Honours (2014-15)

Course Code: 211501

Course Name: **History of Emergence of Independent Bangladesh**

Marks-100, 4(credits), 60 Lectures

Course Code		Marks: 100	Credits: 4	Class Hours: 60
Course Title:	History of Emergence of Independent Bangladesh			

স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস

ভূমিকা: স্বাধীন বাংলাদেশের অভ্যুদয়ের ইতিহাস-পরিধি ও পরিচিতি

১। দেশ ও জনগোষ্ঠীর পরিচয়

- ক) ভূ প্রকৃতির বৈশিষ্ট্য ও প্রভাব
- খ) নৃতাত্ত্বিক গঠন
- গ) ভাষা
- ঘ) সংস্কৃতির সমন্বয়বাদিতা ও ধর্মীয় সহনশীলতা
- ঙ) অভিন্ন বাংলার পরিপ্রেক্ষিতে তৎকালীন পূর্ববঙ্গ ও বর্তমান বাংলাদেশের স্বকীয় সত্তা

২। অখন্ড স্বাধীন বাংলা রাষ্ট্র গঠনের প্রয়াস ও উপমহাদেশের বিভক্তি, ১৯৪৭

- ক) ঔপনিবেশিক শাসন আমলে সাম্প্রদায়িকতার উদ্ভব ও বিস্ফোর
- খ) লাহোর প্রস্তাব, ১৯৪০
- গ) অখন্ড স্বাধীন বাংলা রাষ্ট্র গঠনের উদ্যোগ, ১৯৪৭ ও পরিণতি
- ঘ) পাকিস্তান সৃষ্টি, ১৯৪৭

৩। পাকিস্তান: রাষ্ট্রীয় কাঠামো ও বৈষম্য

- ক) কেন্দ্রীয় ও প্রাদেশিক কাঠামো
- খ) সামরিক ও বেসামরিক আমলাতন্ত্রের প্রভাব
- গ) অর্থনৈতিক, সামাজিক ও সাংস্কৃতিক বৈষম্য

৪। ভাষা আন্দোলন ও বাঙালির আত্মপরিচয় প্রতিষ্ঠা

- ক) মুসলিম লীগের শাসন ও গণতান্ত্রিক রাজনীতির সংগ্রাম
- খ) আওয়ামী লীগের প্রতিষ্ঠা, ১৯৪৯
- গ) ভাষা আন্দোলন: পটভূমি ও ঘটনা প্রবাহ
- ঘ) হক-ভাসানী-সোহরাওয়ার্দীর যুক্তফ্রন্ট, ১৯৫৪ সালের নির্বাচন ও পরিণতি

৫। সামরিক শাসন: আইয়ুব খান ও ইয়াহিয়া খানের শাসনামল (১৯৫৮-৭১)

- ক) সামরিক শাসনের সংজ্ঞা ও বৈশিষ্ট্য
- খ) আইয়ুব খানের ক্ষমতা দখল ও শাসনের বৈশিষ্ট্য (রাজনৈতিক নিপীড়ন, মৌলিক গণতন্ত্র, ধর্মের রাজনৈতিক ব্যবহার)
- গ) আইয়ুব খানের পতন ও ইয়াহিয়া খানের শাসন, এক ইউনিট বিলুপ্তিকরণ, সার্বজনীন ভোটাধিকার, এলএফও (খবমধম ঋৎসবড়িৎশ ঔৎফবৎ)

৬। জাতীয়তাবাদের বিকাশ ও স্বাধিকার আন্দোলন

- ক) সাংস্কৃতিক আত্মসনের বিরুদ্ধে প্রতিরোধ ও বাঙালি সংস্কৃতির উজ্জীবন
- খ) শেখ মুজিবুর রহমানের ৬-দফা আন্দোলন
- গ) ৬-দফা আন্দোলনের প্রতিক্রিয়া, গুরুত্ব ও তাৎপর্য
- ঘ) আগরতলা মামলা, ১৯৬৮

- ৭। ১৯৬৯-এর গণঅভ্যুত্থান ও ১১-দফা আন্দোলন
ক) পটভূমি
খ) আন্দোলনের কর্মসূচী, গুরুত্ব ও পরিণতি
- ৮। ১৯৭০ এর নির্বাচন, অসহযোগ আন্দোলন ও বঙ্গবন্ধুর স্বাধীনতা ঘোষণা
ক) নির্বাচনের ফলাফল এবং তা মেনে নিতে কেন্দ্রের অস্বীকৃতি
খ) অসহযোগ আন্দোলন, বঙ্গবন্ধুর ৭ই মার্চের ভাষণ, অপারেশন সার্চলাইট
গ) বঙ্গবন্ধুর স্বাধীনতা ঘোষণা ও গ্রেফতার
- ৯। মুক্তিযুদ্ধ ১৯৭১
ক) গণহত্যা, নারী নির্যাতন, শরণার্থী
খ) বাংলাদেশ সরকার গঠন ও স্বাধীনতার ঘোষণাপত্র
গ) স্বতঃস্ফূর্ত প্রাথমিক প্রতিরোধ ও সংগঠিত প্রতিরোধ (মুক্তিফৌজ, মুক্তিবাহিনী, গেরিলা ও সম্মুখ যুদ্ধ)
ঘ) মুক্তিযুদ্ধে প্রচার মাধ্যম (স্বাধীন বাংলা বেতার কেন্দ্র, বিদেশী প্রচার মাধ্যম ও জনমত গঠন)
ঙ) ছাত্র, নারী ও সাধারণ মানুষের অবদান (গণযুদ্ধ)
চ) মুক্তিযুদ্ধে বৃহৎশক্তি সমূহের ভূমিকা
ছ) দখলদার বাহিনী, শালিডুকমিটি, আলবদর, আলশামস, রাজাকার বাহিনী, রাজনৈতিক দল ও দেশীয় অন্যান্য সহযোগীদের স্বাধীনতাবিরোধী কর্মকাণ্ড ও বুদ্ধিজীবী হত্যা
জ) পাকিস্তানে বন্দি অবস্থায় বঙ্গবন্ধুর বিচার ও বিশ্বপ্রতিক্রিয়া
ঝ) প্রবাসী বাঙালি ও বিশ্বের বিভিন্ন দেশের নাগরিক সমাজের ভূমিকা
ঞ) মুক্তিযুদ্ধে ভারতের অবদান
ট) যৌথ বাহিনী গঠন ও বিজয়
ঠ) স্বাধীনতা সংগ্রামে বঙ্গবন্ধুর নেতৃত্ব
- ১০। বঙ্গবন্ধু শেখ মুজিবুর রহমানের শাসনকাল, ১৯৭২-১৯৭৫
ক) স্বদেশ প্রত্যাবর্তন
খ) সংবিধান প্রণয়ন
গ) যুদ্ধ বিধ্বস্ত দেশ পুনর্গঠন
ঘ) সপরিবারে বঙ্গবন্ধু হত্যা ও আদর্শিক পটপরিবর্তন

History of the Emergence of Independent Bangladesh

Introduction: Scope and description of the emergence of Independent Bangladesh.
Writing on this topic.

1. Description of the country and its people.

- Geographical features and their influence.
- Ethnic composition.
- Language.
- Cultural syncretism and religious tolerance.
- Distinctive identity of Bangladesh in the context of undivided Bangladesh.

2. Proposal for undivided sovereign Bengal and the partition of the Sub Continent, 1947.

- a. Rise of communalism under the colonial rule, Lahore Resolution 1940.
- b. The proposal of Suhrawardi and Sarat Bose for undivided Bengal : consequences
- c. The creation of Pakistan 1947 .

3. Pakistan: Structure of the state and disparity.

- a. Central and provincial structure.
- b. Influence of Military and Civil bureaucracy.
- c. Economic , social and cultural disparity

4. Language Movement and quest for Bengali identity

- a. Misrule by Muslim League and Struggle for democratic politics .
- b. The Language Movement: context and phases .
- c. United front of Haque – Vasani – Suhrawardi: election of 1954, consequences.

5. Military rule: the regimes of Ayub Khan and Yahia Khan (1958-1971)

- a. Definition of military rules and its characteristics.
- b. Ayub Khan's rise to power and characteristics of his rule (Political repression, Basic democracy, Islamisation)
- c. Fall of Ayub Khan and Yahia Khan's rule (Abolition of one unit, universal suffrage, the Legal Framework Order)

6. Rise of nationalism and the Movement for self determination .

- a. Resistance against cultural aggression and resurgence of Bengali culture.
- b. Sheikh Mujibur Rahman and the six point movement
- c. Reactions : Importance and significance
- d. The Agortola Case 1968.

7. The mass- upsurge of 1969 and 11 point movement: background,programme and significance.

8. Election of 1970 and the Declaration of Independence by Bangobondhu

- a. Election result and centres refusal to comply

- b. The non co-operation movement, the 7th March , Address , Operation Searchlight
- c. Declaration of Independence by Bangabondhu and his arrest

9. The war of Liberation 1971

- a. Genocide, repression of women, refugees
- b. Formation of Bangladesh government and proclamation of Independence
- c. The spontaneous early resistance and subsequent organized resistance (Mukti Fouz, Mukti Bahini, guerillas and the frontal warfare)
- d. Publicity Campaign in the war of Liberation (Shadhin Bangla Betar Kendra, the Campaigns abroad and formation of public opinion)
- e. Contribution of students, women and the masses (Peoples war)
- f. The role of super powers and the Muslim states in the Liberation war.
- g. The Anti-liberation activities of the occupation army, the Peace Committee, Al-Badar, Al-Shams, Rajakars, pro Pakistan political parties and Pakistani Collaborators , killing of the intellectuals.
- h. Trial of Bangabondhu and reaction of the World Community.
- i. The contribution of India in the Liberation War
- j. Formation of joint command and the Victory
- k. The overall contribution of Bangabondhu in the Independence struggle.

10. The Bangabondhu Regime 1972-1975

- a. Homecoming
- b. Making of the constitution
- c. Reconstruction of the war ravaged country
- d. The murder of Bangabondhu and his family and the ideological turn-around.

সহায়ক গ্রন্থ

১. নীহার রঞ্জন রায়, *বাঙালীর ইতিহাস*, দে' জ পাবলিশিং, কলকাতা ১৪০২ সাল।
২. সালাহ উদ্দিন আহমেদ ও অন্যান্য (সম্পাদিত), *বাংলাদেশের মুক্তি সংগ্রামের ইতিহাস ১৯৪৭-১৯৭১*, আগামী প্রকাশনী, ঢাকা ২০০২।
৩. সিরাজুল ইসলাম (সম্পাদিত), *বাংলাদেশের ইতিহাস ১৭০৪-১৯৭১*, ৩ খন্ড, এশিয়াটিক সোসাইটি অব বাংলাদেশ, ঢাকা ১৯৯২।
৪. ড. হারুন-অর-রশিদ, *বাংলাদেশ: রাজনীতি, সরকার ও শাসনতান্ত্রিক উন্নয়ন ১৭৫৭-২০০০*, নিউ এজ পাবলিকেশন্স, ঢাকা ২০০১।

৫. ড. হারুন-অর-রশিদ, বাঙালির রাষ্ট্রচিন্তা ও স্বাধীন বাংলাদেশের অভ্যুদয়, আগামী প্রকাশনী, ঢাকা ২০০৩।
৬. ড. হারুন-অর-রশিদ, বঙ্গবন্ধুর অসমাপ্ত আত্মজীবনী পুনর্পাঠ, দি ইউনিভার্সিটি প্রেস লিমিটেড, ঢাকা ২০১৩।
৭. ড. আতফুল হাই শিবলী ও ড.মোঃ মাহবুবর রহমান, বাংলাদেশের সাংবিধানিক ইতিহাস ১৭৭৩-১৯৭২, সূবর্ণ প্রকাশন, ঢাকা ২০১৩।
৮. মুনতাসির মামুন ও জয়ন্ত কুমার রায়, বাংলাদেশের সিভিল সমাজ প্রতিষ্ঠার সংগ্রাম, অবসর, ঢাকা ২০০৬।
৯. আতিউর রহমান, অসহযোগ আন্দোলনের দিনগুলি: মুক্তিযুদ্ধের প্রস্তুতি পর্ব, সাহিত্য প্রকাশ, ঢাকা ১৯৯৮।
১০. ড. মোঃ মাহবুবর রহমান, বাংলাদেশের ইতিহাস, ১৯০৫-৪৭, তাম্রলিপি, ঢাকা ২০১১।
১১. ড. মোঃ মাহবুবর রহমান, বাংলাদেশের ইতিহাস, ১৯৪৭-১৯৭১, সময় প্রকাশন, ঢাকা ২০১২।

1st Year Honours (2014-15)

Course Code: 213607

Course Name: **Introduction of Statistics**

Marks-100, 4(credits), 60 Lectures

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	Statistics: Its nature and some important uses. Qualitative and quantitative data, classification, graphical representation of data.	6
	Measures of Location, Measures of dispersion, skewness and kurtosis	10
	Correlation coefficient, correlation analysis, The purpose and uses of regression analysis, Simple regression, method of least squares and estimation and parameters correlation ratio. Rank, Correlation, Partial and multiple correlations.	6
	Elements of time series analysis, Measurement of trend by moving average, By least square method. Trend, Curve, Determination of seasonal indices.	3
2nd Incourse (25 Lectures)	Meaning of probability, Definitions of probability, event, sample space and simple problem of probability. Additional rule, Conditional probability, Multiplication rule and Bayes theorem.	6
	The concept of random variable, Probability function and probability density function, joint probability function, Expected value and related theorem, Moment generating function, common probability distributions, Binomial, Poisson and normal.	13
	Concept of an index number and problems in the construction of index number, Type of index and their uses, test for index number.	3
	Differences of a polynomial, Finite difference operator, Difference table, Newton's formula and Stirling's central difference formula, Inverse interpolation, Numerical Integration.	3
Test (10 Lectures)	Revision	10

Books Recommended:

1. Yule and Kendall : Introduction to Theory of Statistics.
2. Islam, M. Nurul. : An Introduction to Statistics and Probability.
3. Jalil A. and Ferdous R. : Basic Statistics.
4. Mostafa M.G. : Methods of Statistics.
5. David E.N. : Probability Theory for Statistical Methods.
6. Weatherburn C.F. : A First Course in Mathematical statistics.
7. Mosteller, Roure and Thomas : Probability with Statistical Applications.
8. Ali A. : Theory of Statistics Vol. I
9. Mallick, S.A. : সাংখ্যিক গণিত
10. Freeman H. : Acturial, Mathematics Vols; I and II
11. Scarborough : Numerical Mathematics.
12. David F.N. : Probability theory for Statistical Methods.
13. Shil R.N. : Introduction to Theory of Statistics.
14. Feller, W : Introduction to Statistical Time Series (latest ed.).
15. Gupta and Kapoor : Applied Statistics.

1st Year Honours (2014-15)

Paper Code: 213608
 Paper Title: **Statistics Practical -I**
 Marks-50, 2(credits), 30 Lectures

Examination	Course Content	Lectures
1st Incourse (10 Lectures)	Condensation and tabulation of data. Graphical representation of data, Frequency table, Measures of Location. Dispersion, Moments, Skewness and Kurtosis.	5
	Measure of correlation coefficient, Rank , Correlation, Fitting of simple regression lines	3
	Finding trend values and seasonal variation from time series data by different methods	2
2nd Incourse (10 Lectures)	Fitting of Binomial, Normal and Poisson's distribution.	6
	Calculation of Index numbers and test of index number.	2
	Use of Newton's forward and backward formula, solution of numerical integration.	2
Test (10 Lectures)	Revision	10

Books Recommended:

1. Yule and Kendall : Introduction to Theory of Statistics.
2. Islam, M. Nurul. : An Introduction to Statistics and Probability.
3. Jalil A. and Ferdous R. : Basic Statistics.
4. Mostafa M.G. : Methods of Statistics.
5. David E.N. : Probability Theory for Statistical Methods.
6. Weatherburn C.F. : A First Course in Mathematical statistics.
7. Mosteller, Roure and Thomas : Probability with Statistical Applications.
8. Ali A. : Theory of Statistics Vol. I
9. Mallick, S.A. : সাংখ্যিক গনিত
10. Freeman H. : Acturial, Mathematics Vols; I and II
11. Scarborough : Numerical Mathematics.
12. David F.N. : Probability theory for Statistical Methods.
13. Shil R.N. : Introduction to Theory of Statistics.
14. Feller, W : Introduction to Statistical Time Series (latest ed.).
15. Gupta and Kapoor : Applied Statistics.

1st Year Honours (2014-15)

Course Code: 212707

Course Title: Physics-I (Mechanics, Properties of Matter, Waves & Optics)

Marks 100, 4 Credits, 60 Lectures

Teacher's Name: Md. Durul Huda (DH), Md. Mahfuj Hasan (MH)

Exam	Chapter	Content	Lectures
1 st In-course (25 Lectures)	1 st	1. Vector Analysis: Vectors and scalars, Addition and multiplication of vectors, Triple scalar & vector products, Derivatives of vectors, Gradient, divergence and curl-their physical significance, Theorems of Gauss, Green & Stoke's.	6
	2 nd	2. Work, Energy and Power: Work energy theorem, Conservation of energy and linear momentum, Conservative and non-conservative forces and systems, Conservation of energy and momentum, Centre of mass, Collision problems.	5
	3 rd	3. Rotational Motions: Rotational variables, Rotation with constant angular acceleration, Relation between linear and angular kinematics, Torque on a particle, Angular momentum of a particle, kinetic energy of rotation and moment of inertia. Combined translational and rotational motion of a rigid body, Conservation of angular momentum.	4
	4 th	4. Gravitation: Centre of gravity of extended bodies, Gravitational field and potential their calculations, Determination of gravitation constant and gravity, Compound and kater's pendulums, Motion of planets and satellites, Escape velocity.	4
	5 th	5. Elasticity: Moduli of elasticity, poisson's ratio, Relations between elastic constants and their determination, Cantilever.	3
	6 th	6. Surface Tension: Surface tension as a molecular phenomenon, Surface tension and surface energy, Capillary rise or fall of liquids, Pressure on a curved membrane due to surface tension, Determination of surface tension of water, mercury and soap solution, Effect of temperature.	3
2 nd In-course (25 Lectures)	7 th	7. Fluid Dynamics: Viscosity and coefficient of viscosity, Poiseulle's equation, Determination of the coefficient of viscosity of liquid by Stoke's method, Bernoulli's theorem and its applications, Toricelli's theorem, Venturimeter.	5
	8 th	8. Waves: Mechanical waves, types of waves, travelling waves. The superposition principle. Wave speed, Power and intensity in wave motion. Interference of waves, Standing Waves and resonance.	5
	9 th	9. Oscillatory Motions: Simple harmonic motion, Combination of harmonic motions, Damped harmonic motion, Forced oscillations and resonance.	5
	10 th	10. Geometrical Optics: Fermat's Principles, Theory of equivalent lenses, Defect of images, Optical instrument, Dispersion rainbow.	5
	11 th	11. Nature and Propagation of light: Properties of light, Wave theory and Huygene's Principle, Theories of light.	5
Test (10 Lectures)	12 th	12. Interference: Young's experiment: Bi-prism, Newton's ring.	2
	13 th	13. Diffraction: Fresnels and Fraunhofer types, Diffraction through single slit and double slit, diffraction grating, Dispersive and resolving powers of gratings.	3
	14 th	14. Polarization: Plane, Elliptical and circular Polarizations, Optical, Rotatory dispersion, Polarimeters.	2
	1 st -14 th	Revision	3

Books Recommended:

1. এস.এম. মোকহেদ আলী : Properties of Matter, Waves and Optics
2. Spiegel, M.R. : Vector Analysis
3. R.S. Halliday, R. Resnick, and J.Walker : Fundamentals of Physics
4. Halliday, D and Resnick, R. : Physics
5. Sears, F.W., Zimansky, M.W. and Young, H.D. : University Physics
6. Mathur, D.S. : Properties of Matter
7. Newman, F.W. and Serale, V.H.L : General Properties of Matter.
8. A text Book of Light : Choudhury, Saha & Pramanik
9. Fundamentals of Optics : F.A. Jenking & H.E. White
10. A Text Book of Light : K.G. Mazumder
11. Principles of Optics : B.K. Mathur

1st Year Honours (2014-15)

Course Code: 212709

Course Name: Physics-II (Heat, Thermodynamics and Radiation)

Examination duration: 2.5 hrs. Marks: 50 Credits: 2

Teacher's Name: Joy Kumar Das(JKD), Md. Rafikul Islam (RI)

Exam	Chapter	Content	Lectures
1 st In-course (12 Lectures)	1 st	1. Thermometry: Temperature, Concepts of thermal equilibrium, measurement of low and high temperature: Gas thermometers, Resistance thermometer, Thermocouple, Pyrometry, International temperature scale.	4
	2 nd	2. Calorimetry: Specific heats of solids, liquids and gases by method of mixture with radiation corrections: Newton's Law of cooling, Variations of specific heats, Atomic and molecular heats.	2
	3 rd	3. Transmission of Heat: Thermal conductivity, Determination of thermal conductivities of good and bad conductors.	3
	4 th	4. Thermodynamic Systems: Concept of internal energy: The first law of thermodynamics, Work and specific heats, Isothermal and adiabatic processes.	3
1 ²ⁿ In-course (12 Lectures)	5 th	5. The second law of thermodynamics: Reversible and irreversible processes: Carnot cycle, Efficiency of reversible engines, Absolute thermodynamic temperature scale, Change of phase: Clausius and Clapeyron equation, Porous plug experiment.	4
	6 th	6. Entropy: Entropy of an ideal gas, Temperature-entropy diagram, Increase of entropy.	4
	7 th	7. Thermodynamic Functions: The Maxwell's relations, Specific heat equations.	4
Test (06 Lectures)	8 th	8. Radiation: Concept of black body radiation, Kirchhoff's law, Stefan-Boltzmann law, Wien's displacement Law, Rayleigh-Jean's law, Planck's Radiation law, Pyrometers, Temperature of the sun.	3
	1 st to 8 th	Revision	3

Books Recommended:

1. এস.এম মো কহেদ আলী : তাপ ও তাপগতিবিদ্যা :
2. Halliday, D, Resnick, R. and Walker, J. : Fundamentals of Physics
3. Sears, F.W., Zemansky, M.W. and Young, H.D. : University Physics
4. Zemansky, M.W. : Heat and Thermodynamics
5. Sears, F.W. : An Introduction to Thermodynamics
6. Hossain, T. : Text Book of Heat
7. Saha, M.N. and Srivastava, B.N. : A Treatise on Heat.



Department of Mathematics
Rajshahi College, Rajshahi

2nd Year Honours (2014-2015)

Courses and Marks Distribution

Paper Code	Paper Title	Marks	Credits
223701	Calculus –II	100	4
223703	Ordinary Differential Equations	100	4
223705	Computer Programming (Fortran)	100	4
223706	Math Lab (Practical)	100	4
Any two of the following :			
222707	} Physics-III (Electricity and Modern Physics)	100	4
222708		50	2
222807	} General Chemistry-II	100	4
222809		50	2
223609	} Methods of Statistics	100	4
223610		50	2
	(Introduction to Statistics + Methods of Statistics)		
	Total =	700	28
221109	English (Compulsory)	100	Non-credit

Department of Mathematics
Rajshahi College, Rajshahi
Course Plan

2nd Year Honours (2014-2015)

Paper Code: 223701

Paper Title: **Calculus-II**

Marks-100, 4(credits), 60 Class

Teacher's Name: Mst. Lailatul Kadri (LK)

Examination	Course Content	Lectures
1st Incourse (25 Class)	Vector valued functions of a single variable: Limits, derivatives and integrals of vector valued functions. Tangent lines to graphs of vector-valued functions. Arc length from vector view point. Arc length parametrization.	5
	Curvature of space curves: Definition. Curvature from intrinsic equations, Cartesian equations and parametric equations. Radius of curvature. Centre of curvature.	7
	Multiple Integration: Double integrals and iterated integrals. Double integrals over nonrectangular regions. Double integrals in polar coordinates. Area by double integrals. Triple integrals and iterated integrals	9
	Topics in Vector Calculus: Scalar and vector fields, Gradient, divergence and curl and their properties	4
2nd Incourse (25 Class)	Functions of several variables: Graphs of functions of two variables. Limits and continuity. Partial derivatives. Differentiability, linearization and differentials. The Chain rule. Partial derivatives with constrained variables. Directional derivatives; gradient vectors and tangent planes, Extrema of functions of several variables, Lagrange multipliers. Taylor's formula.	13
	Multiple Integration: Volume as a triple integral. Triple integral in cylindrical and spherical coordinates. General multiple integrals. Change of variables in multiple integrals. Jacobians.	7
	Topics in Vector Calculus: Line integrals, Green's theorem. Surface integrals. Stokes' theorem, Divergence theorem.	5
Test (10 Class)	Revision and Discussion	10

Books Recommends

1. H. Anton et al, Calculus with Analytic Geometry.
2. E. Swokowski, Calculus with Analytic Geometry.
3. L. Bers & P. Karal, Calculus with Analytic Geometry.
4. S. Lang, Calculus of Several Variables.

2nd Year Honours (2014-2015)

Paper Code: 223703
 Paper Title: **Ordinary Differential Equations**
 Marks-100, 4(credits), 60 Class
 Teacher's Name: Shaika Horkil (SH)

Examination	Course Content	Lectures
1st Incourse (25 Class)	Ordinary differential equations and their solutions: Classification of differential equations. Solutions. Implicit solutions. Singular solutions. Initial value problems. Boundary value problems. Basic existence and uniqueness theorems (statement and illustration only). Direction fields. Phase line.	8
	Solution of first order Differential equations: Separable equations. Linear equations. Exact equations. Special integrating factors. Substitutions and transformations. Homogeneous equations. Bernoulli equation. Riccati equation. First order higher degree equation-solvable for x, y and p . Clairaut's equation.	10
	Modelling with first order differential equations: Construction of differential equations as mathematical models (exponential growth and decay, heating and cooling, mixture of solution. Series circuit, logistic growth, chemical reaction, falling bodies). Model solutions. and interpretation of results. Orthogonal trajectories.	7
2nd Incourse (25 Class)	Solution of higher order linear equations: Linear differential operators. Basic theory of linear differential equations. Solution space of homogeneous linear equations. Fundamental solutions of homogeneous solutions. Reduction of orders, Homogeneous linear equations with constant coefficients. Non-homogeneous equation. Method of undetermined coefficients. Variation of parameters. Euler-Cauchy differential equation.	15
	Series solutions of second order linear equations : Taylor series solutions. Frobenius series solutions. Series solutions of Legendre, Bessel, Laguerre and Hermite equations and their solutions.	10
Test (10 Class)	Revision and Discussion	10

Books Recommends

1. S.L. Ross- *Diferential Equations*.
2. Denis Gill-*Introduction to Diferential Equations*.
3. Frank Ayres, J R. *Theory and Problems of Difrential Equations*.
4. Martin Braun. *An introduction to Diferential Equations and their Applications*.

2nd Year Honours (2014-2015)

Paper Code: 223705
 Paper Title: **Computer Programming**

Marks-100, 4(credits), 60 Class
 Teacher's Name: Md. Asaduzzaman(AZ)

Examination	Course Content	Lectures
1st Incourse (25 Class)	Problem-solving techniques using computers: Flowcharts, Algorithms.	10
	Programming in Fortran: Syntax and semantics, data types and structures, input/output, loops, decision statements, Arrays, user-defined functions, subprograms and recursion.	15
2nd Incourse (25 Class)	Subprogram: function, subroutine, recursion.	10
	Computing using Fortran: Construction and implementation of FORTRAN programs for solving problems in mathematics and sciences.	15
Test (10 Class)	Revision and Discussion	10

Books Recommends

1. Gordon B Davis, Thomas R Hoffmann. Fortran 77: A structured, Disciplined Style.
2. Schaum's Outline Series- Programming with Fortran 77.
3. Ian D Chivers, Jane Sleightholme. Introduction to programming with FORTRAN.
4. Prof. Md. Elias Hossain: Computer Technique.

2nd Year Honours (2014-2015)

Course Code: 223706

Course Name: **Math Lab (Practical)**

Marks-100, 4(credits), 60 Lectures

Examination	Course Content	Lectures
	Running the package, Numerical computation, Algebraic computation, Mathematical functions, Derivatives and integrals, Limits and series, Lists and matrices.	30
	Graphics, Standard packages, solving problems in Algebra, Geometry, Calculus, Computing.	30

Books Recommended:

1. Schaum's Outline Series : *Mathematica*
2. Worlfarm's Research (Student edition) : *Mathematica*

2nd Year Honours (2014-2015)

Course Code: 222707

Course Name: **Physics-III (Electricity and Modern Physics)**

Marks-100, 4 credits, (60 Lectures)

Examination	Course Content	Lectures
1 st Incourse (25 Lectures)	1. Change and Matter: Concept of charge, Conservation of charge. Coulomb's law.	2
	2. The Electrostatic Field: The Electric field strength due to a point charge, a dipole, Group of charged and uniformly distributed charged bodies.	3
	3. The electrostatic potential: Potential due to a point charge, a dipole, a group of charged and a continuous distribution of charged bodies. Notion of gradient: Relation between potential and electric field strength. Electric potential energy. Van de Graff generator.	4
	4. Flux of electrostatic field: Gauss's law. Concept of solid angle. Flux due to a point charge, group of charge. Conservation of flux. Application of Gauss's law.	3
	5. Capacitor and Dielectrics: Capacitance, Parallel plate and cylindrical capacitor. Dielectrics and Gauss's law. Energy storage in an electric field.	4
	12. Electronics: Vacuum diodes and triodes, P-type, n-type semiconductors, p-n junctions, Transistors, Transistor biasing, Transistor amplifiers, Transmitters and Receivers.	4
	13. Special Theory of Relativity: Inertial frame, Galilean transformation, Michelson-Morley experiment, Postulates of special theory of relativity, Lorentz transformation equations space contraction, Time dilation, Relativity of mass, Mass and energy.	5
2 nd Incourse (25 Lectures)	6. Electric Current (D.C): Electromotive force, Current and current density. Resistance, Resistivity and conductivity, Ohm's law, Atomic view of resistivity, Energy transfer in an electric circuit, Kirchhoff's laws and their applications. Potentiometer. Meter bridge and Post office box.	3
	7. The Magnetic field: Magnetic Induction B. Motion of a charge field. Magnetic force on a current, Torque on a current loop, the Hall effect, Circulating charges. Dead beat and ballistic galvanometers, Thomson's experiment, Ampere's law, B near a long wire, Ampere's circuital law, B due to a solenoid, the Biot-Savart law and its applications.	4
	8. Electromagnetic induction: Faraday's law of induction, Lenz's law, Self and mutual inductance. Time-varying magnetic fields, Energy density in a magnetic field.	4
	9. Magnetic Properties of matter: Magnetic dipole, Gauss's Law for magnetism, Paramagnetism, Diamagnetism and ferromagnetism, Nuclear magnetism, Energy in a magnetic field, Hysteresis.	2
	10. Varying current: Growth and decay of currents in LR, CR and LCR circuits.	4
	11. Alternating Currents: AC generator, Concept of r.m.s and average values of current and voltage, Resistive circuit, CR, LR and LCR circuits in series and parallel, Resonance, Phase and Power transformer.	4
	16. The atomic nucleus: The nuclear constituents, The nuclear force, Nuclear radius, Stable nuclei, The binding energy of stable nuclei mass defect and Packing fraction.	2
Test (10 Lectures)	17. Radioactivity: Meaning of radioactivity, Unstable nuclei, Exponential decay law, Half life, Mean life and units of radioactivity, Basic ideas of nuclear reactor, Nuclear fission and Nuclear fusion.	2
	14. Light and Quantum Physics: Planck's radiation formula, Photoelectric effect, Einstein's Photon theory, The Compton effect, The hydrogen atom and The correspondence principle.	3
	15. Waves and particles: Matter waves, atomic structure and standing waves, Mechanics, Uncertainty principle.	2
	Revision	5

Books Recommended:

- Halliday, D, Resnick, R and Walker, J : Fundamentals of Physics
- Halliday, D and Resnick, R. : Physics
- Husain, A & Islam. S : Parmanabik Bijnan
- Emran, M, Ishaque, M & Islam, A.M.Z. : A Text Book of Magnetism, Electricity & Modern Physics.
- Besier, A. : Concepts of Modern Physics
- Semat, H. : Introduction to Atomic and Nuclear Physics.

2nd Year Honours (2014-2015)

Course Code: 222708

Course Name: **Physics-IV (Physics Practical)**

Marks-50, 2 credits, (Class Hour45)

Examination	Course Content	Lectures
1st Incourse (25 Class)	<p style="text-align: center;">Group – A</p> <ol style="list-style-type: none"> 1. Determination of 'g' by compound pendulum. 2. Determination of Young's and rigidity moduli by Searle's dynamic method. 3. Rigidity modulus by static method. 4. Surface tension of water by capillary tube method. 5. To determine the spring constant and effective mass of a given spiral spring and hence to calculate the rigidity modulus of the material of the spring. 6. To determine the Young's modulus by the flexure of a beam (bending method). 7. To determine the moment of inertia of a fly-wheel about its axis of rotation. 8. Determination of surface tension of mercury by Quincke's method. 9. To determine the specific heat of solid by method of mixture, with radiation correction. 10. To determine the specific heat of a liquid by the method of cooling. 11. To determine the thermal conductivity of a bad conductor by Lee's method. 12. To determine 'J' with radiation correction. 13. To verify the laws of transverse vibration of a stretched string with a sonometer (n-1, and n-T curves only) 14. To find the frequency of a tuning fork by Melde's experiment. 	25
2nd Incourse (15 Class)	<p style="text-align: center;">Group – B</p> <ol style="list-style-type: none"> 1. Comparison of e.m.f.s of two cells by potentiometer. 2. Determination of galvanometer resistance by half deflection method. 3. Determination of low resistance by fall of potential method. 4. Determination of figure of merit of a galvanometer. 5. To determine ECE of copper/silver. 6. Determination of the refractive index of a glass prism by a spectrometer. 7. Determination of Cauchy's constant and the resolving power of a prism using a spectrometer. 8. Determination of wavelength of light by Newton's rings. 9. Determination of wavelength of light using a bi-prism. 10. Specific rotation of plane of Polarization in sugar solution by polarimeter. 	15
Test (5 Class)	Revision	5

Books Recommended:

1. পদার্থবিজ্ঞান ব্যবহারিক- প্রফেসর মো: হাবিবুর রহমান,
2. Ahmed, G.U. and Uddin, M.S. : Practical Physics
3. Chawdhury, S.A. and Bashak, A.K. : ব্যবহারিক পদার্থবিদ্যা
4. Din, K. and Matin, M.A. : Advanced Practical Physics
5. Worsnop and Flint : Advanced Practical Physics

2nd Year Honours (2014-2015)

Course Code: 223609

Course Name: **Method of Statistics**

Marks-100, 4(credits), 60 Lectures

Examination	Course Content	Lectures
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1st Incourse (25 Lectures)	1. Sampling Distribution: Concept of sampling distribution of Statistics and its standard error, \bar{x} , t and F statistics and their distributions, properties and uses of these distributions. 2χ	06
	2. Design of Experiment: Principles of experimental design and analysis of variance, Meaning of experiments and randomization, Replication and local control, Basic designs: CRD, RBD and LSD, Analysis of these designs, Estimation of parameters, Missing plot estimation and analysis, Factorial experiment, $2^2, 2^3$. factorial experiments, Analysis and interpretation of these designs.	12
	3. Survey Methods: Concept of population, Sample, Sampling, Types of sampling, Principles of random sampling, Census and surveys, Advantages and limitations of sample survey over census, Sampling frame. Sampling and non-sampling errors, Detailed study of simple random sampling, Stratified random sampling, Systematic sampling and cluster sampling, Concept of quota sampling, Multistage sampling.	07
2nd Incourse (25 Lectures)	4. Test of Hypothesis: Concept of test of hypothesis, Logic behind tests of hypothesis, Neyman Pearson's approach of testing hypothesis, Preliminaries of tests: Hypothesis, Null and alternative hypotheses, Simple and composite hypotheses, Concept of test of significance, Procedures of testing a hypothesis, Test errors, Level of significance, One-tailed and two-tailed tests, P-value. Concept of test statistics: Normal, χ^2 , t and F statistics.	15
	5. Testing the significance of a single mean, Single variance, Single proportion, Difference of two means and two proportions, Ratio of two variances and their confidence intervals, Confidence intervals concerning simple correlation coefficient and regression coefficient for single and double sample, Paired t-test, Testing the homogeneity of several population means, Variance and proportions, Test of goodness of fit.	10
Test (10 Lectures)	Revision	10

Books Recommended:

1. David F.N. : Probability theory for statistical Methods
2. Levy H, and Roth L : Elements of Probability
3. Mostafa M.G. : Methods of Statistics
4. Islam M.N. : Introduction to Statistics and probability.
5. Kapoor; Saxena : Mathematical Statistics
6. Ali A. : Theory of statistics Vol. I
7. Mood, Graybill and Boes : Introduction to the Theory of Statistics 3rd Ed.
8. Hogg, R.V. and Craig, A.T. : An introduction to Mathematical Statistics.

9. Federer	:	Experimental Design; Theory and Applications.
10. Mallick S .A.	:	Parikkaneer Design.
11. Bhuiyan M.R.	:	Fundamentals of Experimental Design.
12. Anderson, R.L. and Bancroft. T.A.	:	Statistical Theory in Research
13. Mood and Graybill	:	Introduction to the Theory of Statistics
14. Weather Burn C.E.	:	A First Course in Mathematical Statistics
15. Cochran G.W.	:	Sampling Techniques

2nd Year Honours (2014-2015)

Course Code: 223610

Course Name: **Statistics Practical (Introduction of Statistics + Method of Statistics)**

Marks-50, 2(credits), 30 Lectures

Examination	Course Content	Lectures
1st Incourse (10 Lectures)	1. Introduction to Statistics: Condensation and tabulation of data, Graphical representation of data, Frequency table, Measures of location, Dispersion, Moments, Skewness and Kurtosis, Measures of correlation coefficient, Rank correlation, Fitting of simple regression lines, Fitting of Binomial, Normal and Poisson distributions, Finding trend values and seasonal variation from time series data by different methods, Calculation of index numbers and test of index number, Use of Newton's forward and backward formula, Solution of numerical integration.	10
2nd Incourse (10 Lectures)	2. Methods of Statistics: Analysis of basic designs, Missing plot estimation and analysis of these designs, Measures of relative efficiency, Analysis of factorial designs, Drawing of SRS, Estimation of mean and properties with standard error in SRS, Drawing of stratified random samples and estimation of mean and variance of population from samples of stratified random samples, Cluster samples, Systematic samples and determination of relative efficiency.	07
	3. Test of Hypothesis: Common tests of significance of Mean, Variance, Proportion, Correlation coefficient and Regression coefficient, Fitting of theoretical distributions and testing of goodness of fit, tests of large samples, Tests of homogeneity, Construction of confidence intervals.	03
Test (10 Lectures)	Revision	10

Books Recommended:

1. David F.N.	:	Probability theory for statistical Methods
2. Levy H, and Roth L	:	Elements of Probability
3. Mostafa M.G.	:	Methods of Statistics
4. Islam M.N.	:	Introduction to Statistics and probability.
5. Kapoor; Saxena	:	Mathematical Statistics
6. Ali A.	:	Theory of statistics Vol. I
7. Mood, Graybill and Boes :	:	Introduction to the Theory of Statistics 3 rd Ed.
8. Hogg,R.V.and Craig,A.T. :	:	An introduction to Mathematical Statistics.
9. Federer	:	Experimental Design; Theory and Applications.
10. Mallick S .A.	:	Parikkaneer Design.

11. Bhuiyan M.R. : Fundamentals of Experimental Design.
 12. Anderson, R.L. and Bancroft. T.A. : Statistical Theory in Research
 13. Mood and Graybill : Introduction to the Theory of Statistics
 14. Weather Burn C.E. : A First Course in Mathematical Statistics
 15. Cochran G.W. : Sampling Techniques

2nd Year Honours (2014-2015)

Compulsory English

Course Code: 221109

Total Marks: 100(Non Credit), 60 Lectures

Examination	Topic	Lectures
1 st in-course (25 Lectures)	Understanding different purposes and types of readings. Guessing word-meaning in context. Understanding long sentences. Recognizing main ideas and supporting ideas. Answering comprehension questions. Writing summaries.	05 Lectures
	Writing correct sentences, completing sentences and combining sentences.	02 Lectures
	Situational writing: Posters, notices, slogans, memos, advertisements etc.	04 Lectures
	Paragraph writing: Structure of paragraph, topic sentences, developing ideas, writing a conclusion, types of paragraphs (narrative, descriptive, expository, persuasive), techniques of paragraph development (listing, cause and effect, comparison and contrast).	02 Lectures
	Word order of sentence.	02 Lectures
	Framing questions.	02 Lectures
	Tenses, articles, subject-verb agreement, noun-pronoun agreement, verbs, phrasal verbs, conditionals, prepositions and prepositional phrases, infinitives, participles, gerunds, (knowledge of grammar will be tested through contextualized passages.)	08 Lectures
2 nd in-course (25 Lectures)	Newspaper writing: Reports, press release, dialogues etc.	04 Lectures
	Writing resume.	02 Lectures
Examination	Topic	Lectures
2 nd in-course (25 Lectures)	Writing letters: Formal and informal letters, letters to the editor, request letters, job applications, complaints letters etc.	05 Lectures
	Punctuation.	03 Lectures
	Developing vocabulary: Using the dictionary, suffixes, prefixes, synonyms, antonyms, changing word forms (from verb to noun etc.) and using them in sentences	06 Lectures
	Translation from Bangla to English	05 Lectures
Test (10 Lectures)	Essay: Generating ideas, outlining, writing a thesis sentence; writing the essay: writing introductions, developing ideas, writing conclusions; revising and editing.	05 Lectures
	Revision of 1 st and 2 nd in-course	05 Lectures



Department of Mathematics
Rajshahi College, Rajshahi

3rd Year Honours (2014-2015)
Courses and Marks Distribution

Paper Code	Paper Title	Marks	Credits
233701	Abstract Algebra	100	4
233703	Real Analysis	100	4
233705	Numerical Analysis	100	4
233707	Complex Analysis	100	4
233709	Differential Geometry	100	4
233711	Mechanics	100	4
233713	Linear Programming	100	4
233714	Math Lab (Practical)	100	4
	Total =	800	32

3rd Year Honours (2014-2015)

Course Code: 233701

Course Name: **Abstract Algebra**

Marks-100, 4(credits), 60 Lectures

Teacher's Name: Dr. Md. Abdul Aziz (AA)

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	Congruence: Relations, Binary Relation, Types of Relation, Equivalence relations and classes. Properties of equivalence, Congruence relation, Binary operations, Laws of Binary operations, Identity element and Inverse element with respect to binary operation. Solved examples.	5
	Groups: Group, Some special groups, order of an element of a group, some theorems on group, Alternative postulates for a group, Solved example Residue classes of set of Integrates: Introduction, Addition and multiplication modulo m , some theorems on modulo composition, Equivalence relation of modulo m , Residue classes, Solved examples	10
	Subgroup: Subgroup, Improper and proper subgroup, Fundamental theorem, Theorem on subgroup, Theorem on cyclic group. Cyclic group: Cyclic group, Theorem on Cyclic group Permutation: Permutation, Cyclic permutation, Even and odd permutation, some theorem, order of an element of a group. Coset of a group: Coest, Index, Theorem on coset, LaGrange's theorem.	10
2nd Incourse (25 Lectures)	Normal subgroup: Normal subgroup, proper and improper normal subgroup, some theorem on Normal subgroup, Quotient group, some theorems Quotient group.	7
	Homomorphism: Some definitions, Isomorphism, Some theorems, Fundamental of 1st theorem of homomorphism, 2nd Isomorphism theorem, 3rd Isomorphism theorem, Automorphism of a group.	7
	Rings: Conception of ring, ring, various types of ring, Integral domain, Ideal and factor rings, Rings homomorphism, order integral domains. Elementary properties of ring, subgroups. Ideal and quotient ring. Polynomial: Polynomial in one and several indeterminates over ring. Division algorithm, uniqueness of factorization in polynomial domain.	11
	Fields: Definition and simple properties, the characteristic, Subfields, Algebraic extensions, splitting fields, Finite field. Minimal polynomial.	6
Test (10 Lectures)	Revision and Discussion	4

Books Recommended:

- | | |
|--|--|
| 1. W. K. Nicholuson | : <i>Introduction to Abstract Algebra</i> |
| 2. Neal H. Mecoy | : <i>Introduction to Abstract Algebra.</i> |
| 3. Hiram. Paley and P. M. Weichsel | : <i>First Course in Abstract Algebra.</i> |
| 4. P. B. Bhattacharya. S. K. Jain, S. R. Nagpaul | : <i>Basic Abstract Algebra.</i> |

5. F. Chowdhury, M. R. Chowdhury
 6. Prof. Dr. Fazlur Rahman

: *A Textbook of Abstract Algebra.*
 : *Abstract Algebra.*

3rd Year Honours (2014-2015)

Course Code: 233703

Course Name: **Real Analysis**

Marks-100, 4(credits), 60 Lectures

Teacher's Name: Md. Musharraf Husain (MH)

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	Real numbers as complete ordered fields: Supremum and infimum principles. Dedekind theorem and its equivalence. Archimedean property. Denseness of rational and irrational numbers.	6
	Topology of real line : Neighborhoods. Open and closed sets. Limit points and Bolzano-Weierstrass theorem. Interior, boundary and closure. Compact sets. Heine-Borel theorem. Connected sets.	7
	Real sequences: Convergence. Theorems on limits. Subsequential limits. Limit superior & limit inferior, Monotone sequence. Cauchy sequence. Absolute convergence.	6
	Infinite series of real numbers: Convergent and divergent series. Test for convergence (comparison tests, root test, ratio test, integral test, Raabe's test, Gauss's test). Rearrangements.	6
2nd Incourse (25 Lectures)	Real continuous functions: Local properties. Global properties (global continuity theorem, Preservation of compactness, maximum and minimum value theorem, intermediate value theorem, preservation of connectedness, uniform continuity).	5
	Differentiability of real functions: Basic properties. Rolle's theorem. Mean value theorem. Taylor's Theorem.	3
	Integration of real functions: Riemann sum and Riemann integral. Conditions for integrability. Properties of integrals. Darboux theorem. Fundamental theorem of calculus. Mean value theorem for integrals. Leibnitz theorem on differentiation under integral sign. Riemann-Stieltjes integration.	6
	Sequences and Series of Real Numbers: Point-wise convergence and uniform convergence. Tests for uniform convergence. Cauchy criterion. Weierstrass M –test. Continuity, differentiability and integrability of limit functions of sequences and series of functions.	6
	Euclidean n-spaces: Norms in R^n . Distance in R^n . Convergence and completeness. Compactness. Continuous functions and their properties.	5
Test (10 Lectures)	Revision and Discussion	10

Books Recommended:

1. Kenneth A. Ross : *Elementary Analysis: The theory of Calculus.*
2. Robert G. Bartle, Donald R. Sherbert : *Introduction to Real Analysis.*
3. Walter Rudin: *Principles of Mathematical Analysis.*
4. *Real Analysis –By P. N. Chatterjee*

3 rd Year Honours (2014-2015)

Course Code: 233705

Course Name: Numerical Analysis

Marks-100, 4(credits), 60 Lectures

Teache's Name: Mst. Mafruha mustari (MM)

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	Solution of equation in one variable: Bisection algorithm. Method of false position. Fixed point iteration. Newton-Raphson method. Convergence analysis.	6
	Interpolation and polynomial approximation: Taylor polynomials. Interpolation and Lagrange polynomial. Iterated interpolation. Extrapolation.	9
	Differentiation and Integration: Numerical differentiation. Richardson's extrapolation. Elements of Numerical Integration. Adaptive quadrature method. Romberg's integration. Gaussian quadrature.	10
2nd Incourse (25 Lectures)	Solutions of linear systems: Gaussian elimination and backward substitution. Pivoting strategies. LU decomposition method.	4
	Iterative techniques in matrix algebra: Linear systems of equations. Error estimations and iterative refinement. Eigenvalues and eigenvectors. The power method. Householder's method. Q-R method.	6
	Initial value problems for ODE : Euler's and modified Euler's method. Higher order Taylor's method. Single-step method (Runge-Kutta, extrapolation), Multi-step method (Adams-Bashforth, Adams-Moulton, Predictor-Corrector).	8
	Boundary value problems for ODE: Shooting method for linear and nonlinear problems. Finite difference method for linear and nonlinear problems.	7
Test (10 Lectures)	Revision and Discussion	10

Books Recommended:

1. R. L. Burden & J. D. Faires, *Numerical Analysis*.
2. M. A. Celia & W. G. Gray, *Numerical Methods for Differential Equations*.
3. L. W. Johson & R. D. Riess, *Numerical Analysis*.

3 rd Year Honours (2014-2015)

Course Code: 233705

Course Name: Complex Analysis

Marks-100, 4(credits), 60 Lectures

Teacher's Name: Dr. Akhtara Banu (AB)

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	Metric Properties of complex plane. Functions of a complex variable. Differentiability of a complex function.	9
	Analytic functions and their properties. Harmonic functions.	8
	Complex integration: Line integration over rectifiable curves. Cauchy-Goursat theorem. Cauchy's integral formulae. Fundamental theorem of algebra. Liouville's theorem.	8
2nd Incourse (25 Lectures)	Morera's theorem. Different types of singularities. Residues. Taylor's and Laurent's expansion.	8
	Entire functions. Meromorphic function. Cauchy's residue theorem. Evaluation of integrals by contour integration. Branch points and cuts.	10
	Rouche's theorem. The maximum modulus principle. Conformal mapping. Bilinear transformations.	7
Test (10 Lectures)	Revision and Discussion	10

Books Recommended:

1. Ruel V. Churchill- *Complex Variables and Applications*.
2. Schaum's Outline Series- *Complex Variables*.
3. *Fazlur Rahman-Complex Analysis*
4. *Taggi- Complex Variables*.

3rd Year Honours (2014-2015)

Paper Code: 233709

Paper Title: Differential Geometry

Marks-100, 4(credits), 60 Lectures

Teacher's Name: Mst. Lailatul Kadri (LK)

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	Curves in space: Vector functions of one variable. Space curves. Unit tangent to a space curve. Equation of a tangent line to a curve. Osculating plane.	9
	Vector function of two variables. Tangent and normal plane for the surface $f(x,y,z)=0$. Principal normal. Binormal. Curvature and torsion. Serret- Frenet formulae. Theorems on curvature and torsion.	8
	Helices and their properties. Circular helix. Spherical indicatrix, Curvature and torsion for spherical indicatrices. Involute and Evolute of a given curve. Bertrand curves.	8
2nd Incourse (25 Lectures)	Surface: Curvilinear coordinates, parametric curves, Analytical representation, Monge's form of the surface, first fundamental form, relation between coefficients E, F, G ; properties of metric, angle between any two directions and parametric curves, condition of orthogonality of parametric curves, elements of area, unit surface normal, tangent plane, Weingarten equations (or derivatives of surface normal).	10
	Second fundamental form, Normal curvature. Meusnier's theorem. Curvature directions. Condition of orthogonality of curvature directions. Principal curvatures. Lines of curvature. First curvature mean curvature, Gaussian curvature, centre of curvature, Rodrigues' formula.	8
	Euler's Theorem. Elliptic, hyperbolic and parabolic points. Dupin Indicatrix. asymptotic lines. Third Fundamental form.	7
Test (10 Lectures)	Revision and Discussion	10

Books Recommended:

1. L. P. Eisenhart : *An Introduction to Differential Geometry.*
2. Schaum's Outline Series : *Differential Geometry.*
3. C. E. Weatherburn : *Differential Geometry of three dimensions.*
4. D. J. Struik: *Lectures on Classical Differential Geometry.*
5. T. T. Willmore : *An Introduction to Differential Geometry.*

3rd Year Honours (2014-2015)

Paper Code: 233711

Paper Title: Mechanics

Marks-100, 4(credits), 60 Lectures

Teacher's Name: Md.Nurul Islam (NI)

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	Motion of a particle in one dimension: Momentum and energy equations. One-dimensional motion under variable forces. Falling bodies. Simple harmonic oscillator. Damped harmonic oscillator. Forced harmonic oscillator.	13
	Motion of a particle in two or three dimensions: Kinetics in a plane. Kinematics in three dimensions. Momentum and energy theorems. Plane and vector angular momentum theorems. Projectiles. Harmonic oscillator in two and three dimensions. Motion under a central force. Elliptic orbits. Hyperbolic orbits.	12
2nd Incourse (25 Lectures)	Gravitation: Centers of gravity of solid bodies. Gravitational field and gravitational potential.	9
	Lagrange's equations: Generalized coordinates. Lagrange's equations. Systems subject to constraints.	7
	Motion of rigid bodies: Moment of inertia. D'Alembert's principle. Motion about fixed axes.	9
Test (10 Lectures)	Revision and Discussion	10

Books Recommended:

1. S. L. Loney- *An Elementary treatise on Statics.*
2. S. L. Loney- *An Elementary treatise on the Dynamic of a Particle & of Rigid Bodies.*
3. L. A. Pars : *Introduction to Dynamics.*
4. Hafiz And Rahman-Mechanics
5. Q. S. Sajedur Rahman - Mechanics

3 rd Year Honours (2014-2015)

Paper Code: 233713

Paper Title: Linear Programming

Marks-100, 4(credits), 60 Lectures

Teacher's Name: Md. Asaduzzaman(AZ)

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	Convex sets and related theorems.	7
	Introduction to linear programming. Feasibility and optimality.	6
	Formulation of linear programming problems.	6
	Graphical solutions.	6
2nd Incourse (25 Lectures)	Simplex method. Two phase and Big-M simplex methods.	7
	Duality of linear programming and related theorems. Dual simplex method.	6
	Sensitivity analysis in linear programming.	6
	Transportation and assignment problems.	6
Test (10 Lectures)	Revision and Discussion	10

Books Recommended:

1. F. S. Hiller and G. T. Lieberman : *Linear Programming*.
2. P. R. Thie : *Introduction to Linear Programming and Game theory*.
3. N. S. Kambu : *Mathematical Programming Techniques*.
4. Hamdy A. Taha : *Operations Research*.
5. Prof. Dr. Ganesh Chanra Ray: *Linear Programming*.

3rd Year Honours (2013-2014)

Course Code: 233714

Course Name: **Math Lab (Practical)**

Marks-100, 4(credits), **Lectures: 60**

Teacher's Name: Md.Shahidul Alam (SA)

Problem solving in concurrent Papers (e.g., Calculus, Complex Analysis, Numerical Analysis and Linear Programming) using FORTRAN.

Lab Assignments: There will be at least 20 lab assignments. Evaluation: Internal Assessment (Laboratory works): 30 marks. Final Exam (Lab : 3 hours) : 70 marks

Department of Mathematics
Rajshahi College, Rajshahi

4th Year Honours (2014-2015)
Courses and Marks Distribution

Paper Code	Paper Title	Marks	Credits
243701	Theory of Numbers	100	4
243703	Topology & Functional Analysis	100	4
243705	Methods of Applied Mathematics	100	4
243707	Tensor Analysis	100	4
243709	Partial Differential equations	100	4
243711	Hydrodynamics	100	4
Any Two of the following			
243713	Discrete Mathematics	100	4
243715	Astronomy	100	4
243717	Mathematical Modeling in Biology	100	4
243718	Math Lab (Practical)	100	4
243720	Viva-Voce (Comprehensive)	100	4
	Total =	1000	40

4th Year Honours (2014-2015)

Paper Code: 243701

Paper Title: Theory of Numbers

Marks-100, 4 credits, (60 Lectures)

Teacher's Name: Md. Sarwar Jahan (SJ)

Examination	Course Content	Lectures
1 st Incourse (25 Lectures)	Arithmetic in \mathbb{Z} .	5
	Euclidean algorithm.	4
	Continued fractions.	4
	The ring \mathbb{Z} , and its group of units.	4
	Chinese remainder theorem.	4
	Linear Diophantine equations.	4
2 nd Incourse (25 Lectures)	Arithmetical functions.	4
	Dirichlet convolution.	4
	Multiplicative function.	5
	Representation by sum of two and four squares.	4
	Arithmetic of quadratic fields.	4
	Euclidean quadratic fields.	4
TEST (10 Lectures)	Revision	10

Books Recommended :

1. Niven, H. S. Zuckerman : *An Introduction to the Theory of Numbers.*
2. G. H. Hardy & E. M. Wright, *An introduction to Theory of Numbers.*
3. I. S. Niven and H. S. Zuckermann, *An introduction to Theory of Numbers.*
4. W. J. LeVeque, *Fundamentals of Number Theory.*
5. Fazlur Rahman – *Theory of Numbers*

4th Year Honours (2014-2015)

Paper Code: 243703

Paper Title: Topology and Functional Analysis

Marks-100, 4 credits, (60 Lectures)

Teacher's Name: Md. Kafilar Rahman (KR)

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	Metric Spaces: Definition with examples. Open sets. Closed sets. Convergence. Completeness. Baire's theorem. Continuous mappings. Spaces of continuous functions. Euclidean and unitary spaces.	8
	Topological Spaces: Definition with examples. Elementary concepts. Open bases and open subbases. Weak topologies. Function algebras.	8
	Compactness: Compact spaces. Product spaces. Tychonoff's theorem. Locally compact spaces. Compactness for metric spaces.	3
	Separation: T_1 -spaces and Hausdorff spaces. Completely regular spaces and normal spaces.	3
	Connectedness: Connected spaces. Locally connected spaces. Pathwise connectedness.	3
2nd Incourse (25 Lectures)	Banach Spaces: Definition with examples. Continuous linear transformations. Hahn-Banach theorem. Natural embedding. Open mapping theorem. Conjugate of an operator.	10
	Hilbert Spaces: Definition and simple properties. Orthogonal complements. Orthogonal sets. Conjugate spaces. Adjoint and self-adjoint operators.	11
	Fixed point theory : Banach contraction principle (with proof). Schauder Principle. (without proof). Applications.	4
10 Lectures	Revision and Discussion	10

Books Recommended :

1. G. Simons – *Introduction to Topology and Modern Analysis*.
2. S. Willard- *General Topology*.
3. Fatema Chowdhury and Munibur Raman Chowdhury – *Essentials of Topology and Functional Analysis*
4. Fazlur Rahman – *Topology*
5. Fazlur Rahman - *Functional Analysis*

4th Year Honours (2014-2015)

Paper Code: 243705

Paper Title: Methods of Applied Mathematics

Marks-100, 4 credits, (60 Lectures)

Teacher's Name: Mafruha mustari (MM)

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	Fourier Series: Fourier series and its convergence. Fourier sine and cosine series. Properties of Fourier series. Operations on Fourier series. Complex form. Applications of Fourier series.	9
	Laplace transforms: Basic definitions and properties, Existence theorem. Transforms of derivatives. Relations involving integrals. Laplace transforms and application to initial value problems and ordinary differential equations. Transforms of periodic functions. Transforms of convolutions . Inverse transform. Calculation of inverse transforms. Applications.	8
	Fourier transforms: Fourier transforms. Inversion theorem. sine and cosine transforms. Transforms of derivatives. Transforms of rational functions. Convolution theorem. Parseval's theorem. Applications to boundary value problems and integral equation.	8
2nd Incourse (25 Lectures)	Special functions: Gamma and Beta functions. Error function. Legendre functions (Generating function, recurrence relations and other properties of Legendre polynomials, Legendre differential equation, Legendre function of the first kind, Legendre function of the second kind, associated Legendre functions). Bessel functions (Generating function, recurrence relations, Bessel differential equation, Integral representations, Orthogonality relations, Modified Bessel functions). Laguerre polynomials (Generating function, Rodrigue formula, Orthogonality relations, Recurrence relations). Hermite polynomials (Generating function, Rodrigue formula, orthogonal properties, Hermite differential equation, recurrence relations). Hypergeometric and confluent hypergeometric functions. Expansion theorem.	14
	Eigenvalue problems and Strum-Liouville boundary value problems: Regular Strum-Liouville boundary value problems. Nonhomogeneous boundary value problems. Solution by eigenfunction expansion. Green's functions. Singular Strum-Liouville boundary value problems.	11
10 Lectures	Revision	10

Book Recommended :

1. R. V. Churchill & J. W. Brown- *Fourier series & boundary value problems.*
2. M. R. S. Piekel- (i) *Fourier analysis with application to boundary value problems*
(ii) *Laplace Transforms.*
3. L. A. Pipes & L. R. Harvill- *Applied mathematics for engineering and physics.*
4. W. N. Lebedev & R.A. Silverman, *Special Functions and their Applications.*
5. M. R. Spiegel, Schaum's Outline Series: *Laplace Transforms.*

4th Year Honours (2014-2015)

Paper Code: 243707

Paper Title: Tensor Analysis

Marks-100, 4 credits, (60 Lectures)

Teacher's Name: Nadira Nazneen(NN)

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	Coordinates, vectors and tensors: Curvilinear coordinates. Kronecker delta. Summation convention. Space of n -dimensions. Euclidean and Riemannian spaces.	4
	Coordinates, vectors and tensors: Coordinate transformation. Contravariant and covariant vectors. The tensor concept. Symmetric and skew-symmetric tensors.	4
	Riemannian metric and metric tensors: Basis and reciprocal basis vectors. Euclidean metric in three dimensions, Reciprocal or conjugate tensors. Conjugate metric tensor.	8
	Riemannian metric and metric tensors: Associated vectors and tensor's length. Angle between two vector's. The Christoffel symbols.	9
2nd Incourse (25 Lectures)	Covariant Differentiation of Tensors : Covariant derivatives of tensors. Covariant curvature tensor. The Ricci identity. The Ricci tensor.	7
	Covariant Differentiation of Tensors : Scalar Curvature. Bianchi's identity.	6
	Application of Tensors: Applications of tensor analysis to elasticity theory and electromagnetic theory.	12
Test (10 Lectures)	Revision	10

Book Recommended :

1. Schaum's Outline Series : *Vector and Tensor Analysis*.
2. B. Spain : *Tensor Calculus*.
3. C. E. Weatherburn : *An Introduction to Riemannian Geometry and the Tensor Calculus*.
4. A.J. McConnell, *Applications of Tensor Analysis*.
5. Abu Yousuf- *Tensor Analysis*.

4th Year Honours (2014-2015)

Paper Code: 243709

Paper Title: Partial Differential Equations

Marks-100, 4 credits, (60 Lectures)

Teacher's Name: Md. Shahidul Alam (SA)

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	First order equations: Complete integral. General solution. Cauchy problems. Method of characteristics for linear and quasilinear equations. Charpit's method for finding complete integrals. Methods for finding general solutions.	15
	Second order equations: Classifications. Reduction to canonical forms. Characteristic curves.	10
2nd Incourse (25 Lectures)	Boundary value problems: Boundary value problems related to linear equations. Applications of Fourier methods (Coordinate systems and separability, Homogeneous equations, Nonhomogeneous boundary conditions, Inhomogeneous equations.)	10
	Problems involving symmetry: Problems involving cylindrical and spherical symmetry, Boundary value problems involving special functions.	10
	Transform methods for boundary value problems: (Applications of the Laplace transforms; applications of Fourier sine and cosine transforms). Inhomogeneous equations.	10
TEST (10 Lectures)	Revision	10

Books Recommended :

1. J. N. Sneddon- *Elements of Partial Differential Equations.*
2. J. M. Kar – *Partial Differential Equations.*
3. B. Epsteim - *Partial Differential Equations.*
4. Schaum's outline Series - B. Epsteim - *Partial Differential Equations.*

4th Year Honours (2014-2015)

Paper Code: 243711

Paper Title: Hydrodynamics

Marks-100, 4 credits, (60 Lectures)

Teacher's Name: Md.Nurul Islam (NI)

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	Velocity and acceleration of fluid particles. Relation between local and individual rates. Steady and unsteady flows. Uniform and nonuniform flows. Stream lines. Path lines. Bernoulli's equations and its application.	10
	Rotational and irrotational flows, velocity potential vorticity and, vortex lines. Equation of continuity in spherical and cylindrical polar coordinates. Boundary surfaces.	7
	Euler's equation of motion. Conservative field of force. Lamb's hydrodynamical equations of Motion. Motion under conservative body force. Vorticity equation(Helmholtz's vorticity equation)	8
2nd Incourse (25 Lectures)	Motion in two-dimensions. Stream function. Physical meaning of stream function. Velocity in polar-Coordinates. Relation between stream function and velocity potential.	4
	Circulation and vorticity. Relation between circulation and vorticity. Kelvin's circulation theorem, Kelvin's minimum energy theorem. Generalized Joukowski's transformation. Elliptic coordinates and its application.	4
	The circle theorem. Motion of a circular cylinder. Pressure at any point on a circular cylinder. Application of circle theorem. Blasius theorem.	5
	Sources, sinks and doublets. Complex potential and complex velocity. Stagnation points. Complex potential due to sources and doublets, Image in two and three dimensions. Stoke's stream function.	5
	Vortex motion. Complex potential due to vortex motion.	3
	Wave motion. Mathematical representation of wave. Surface wave, Canal wave, Long wave.	4
TEST (10 Lectures)	Revision	10

Books Recommended :

1. L. M. Milne, Thomson - *Theoretical Hydrodynamics*.
2. F. Chorlton - *A Text Book of Fluid dynamics*.
3. P. P. Gupta - *Hydrodynamics*.

4th Year Honours (2014-2015)

Paper Code: 243713

Paper Title: Discrete Mathematics

Marks-100, 4 credits, (60 Lectures)

Examination	Course Content	Lectures
1st Incourse (25 Lectures)	Mathematical reasoning: Inference and fallacies. Methods of proof. Recursive definitions. Program verification.	8
	Combinatorics: Counting- principles. Inclusion-exclusion principle. Pigeonhole principle. Generating functions. Recurrence relations. Applications to computer operations.	8
	Algorithms and their efficiency : Searching algorithms. Sorting algorithms. Bin packing algorithms. Algorithms on integer operations. Recursive algorithms.	9
2nd Incourse (25 Lectures)	Graphs: Structure and symmetry of graphs, adjacency matrix, Trees and connectivity. Eulerian and Hamiltonian graphs Diagraphs. Directed graphs. Planar graphs.	9
	Algorithms on graphs : Introduction to graphs, paths and trees. Shortest path problems (Dijkstra's algorithm, Floyd-Warshall algorithm and their comparisons). Spanning tree problems. (Kruskal's greedy algorithm, Prim's greedy algorithm and their comparisons).	8
	Network flows: Flows and cuts. Flow augmentation algorithms. Application of max-flow min-cut theorem.	8
TEST (10 Lectures)	Revision	10

Books Recommended :

1. Schaum's Outline Series – *Discrete Mathematics*.
2. Kenth H.Rosen – *Discrete Mathematics and it's Application*.
3. Fazlur Rahman - *Discrete Mathematics*.
4. C.I. Liu - *Discrete Mathmatics*.

4th Year Honours (2014-2015)

Paper Code: 243715

Paper Title: Astronomy

Marks-100, 4 credits, (60 Lectures)

Examination	Course Content	Lectures
1 st Incourse (25 Lectures)	Sphere and spherical triangles. (Celestial sphere) Astronomical Co-ordinate systems. Conversion of Coordinates system .	10
	planetary motion, Keplar's laws. Equation of time. Unit of time.	15
2 nd Incourse (25 Lectures)	Astronomical refraction, Aberation	8
	Parallax (Geocentric annual) Precession and nutation	8
	Eclipses. Solar System. Stellar astronomy.	9
TEST (10 Lectures)	Revision	10

Books Recommended :

1. S.K. Bhattacharjee, *A Text Book of Astronomy*
2. K.K. Dey –Astronomy
3. Tod Hunter – *Spherical Trigonometry*
4. J.M. Kar – *Astronomy*
5. A.F.M. Abdur Rahman – *A Text Book of Modern Astronomy..*
6. কালী পদ দাস –Astronomy
7. M. L Khanna – *Spheriacal Astronomy.*

8.

Paper Code	243717	Marks: 100	Credits: 4	Class Hours: 60
Paper Title:	Mathematical Modeling in Biology			

Continuous population models for single species: Continuous growth models. Malthusian model, Logistic model, Delay models. Periodic fluctuations. Harvesting models.

Discrete population models for single species: Simple models. Discrete logistic models. Discrete delay models. Fishery management models

Continuous models for interacting populations: Predator-prey models. Lotka-Volterra systems. Complexity and stability. Periodic behavior. Competition Models. Mutualism, war models.

Discrete growth models for interacting populations: Predator-prey models. Competition models.

Epidemic models and dynamics of infectious diseases: Simple epidemic models (SI model, SIS model, SIR model) and practical applications. (HIV/AIDS model), control of epidemic model.

Books Recommended :

1. J. C. Frauenthal : *Introduction to Population Modeling*.
2. 'D.N. Burghes and M.S. Bowie: *Modeling with Differential Equations*.
3. J.D. Murray : *Mathematical Biology*.
4. Fazlur Rahman – *Mathematical Modeling in Biology*.

4th Year Honours (2014-2015)

Paper Code: 243718

Paper Title: Math Lab (Practical)

Marks-100, 4 credits, (60 Lectures)

Course Content	Lectures
Using Mathematica: Geometry , Linear Algebra, Calculas, Vector calculas, Complex Analysis, Numerical Analysis, Ordinay differential Equation, Mehtods of Applied Mathematics.	30
Using Fortran: Numerical Analysis, Complex Analysis, Linear Programming.	30

Evaluation: Internal Assessment (Laboratory works): 30 marks

Final Exam (Lab 3 hours): 70 marks.

Paper Code	243720	Marks: 100	Credits: 4	Class Hours: 60
Paper Title:	Viva- Voce			