UNIVERSITY OF
RAJSHAHI

FACULTY OF ENGINEERING

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

Syllabus for
B.Sc. in Electrical & Electronic Engineering
Session 2013-2014

March 2014

University of Rajshahi
Faculty of Engineering
Department of Electrical & Electronic Engineering
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The courses designed for B.Sc. in Electrical & Electronic Engineering consist of 4000 marks of 160 credits (40 units×4 credits, each unit carries 100 marks and 4 credits) distributed over eight semesters in four academic years. Each academic year is divided into two semesters (odd & even) each of duration not less than 11 weeks (66 working days). There shall be final examinations at the end of each semester. The medium of answer in all examinations will be either Bangla or English, but not the mixer of both. The theoretical examination of courses less than or equal to 2 credits shall be of 2 hours duration and courses greater than 2 credits shall be of 3 hours duration. An academic schedule for an academic year shall be announced for general notification before the start of the academic year, on the prior approval of the academic committee.

1. Attendance (Ref. The Rajshahi University Academic Ordinance (RUAO), 2013 for B. Sc in Engineering Curriculum in Colleges/Institutes Affiliated with RU, article no: 13): In order to be eligible to appear, as a regular candidate, at the semester final examinations, a student shall be required to have attended at least 70% of the total number of periods of lectures/tutorials/laboratory classes offered during the semester in every course. A student whose attendance falls short of 70% but not below 60% in any course may be allowed to appear at the final Examinations as **non-collegiate** student and **he/she shall not be eligible for the award of any scholarship or stipend** for the following academic year/semester. A student, appearing the examination under the benefit of this provision shall have to pay in addition to the fees, the requisite fee prescribed by the syndicate for the purpose. Students having less than 60% attendance in lectures/tutorials/laboratory classes of any courses will not be allowed to appear in the final examinations of the semester. The basis of awarding marks for class participation and attendance is shown in Table-1.

Table-1: Distribution of Marks in Attendance

Attendance	Marks%	Remarks
90% and above	100	Regular
85% to less than 90%	90	
80% to less than 85%	80	
75% to less than 80%	70	
70% to less than 75%	60	
65% to less than 70%	50	Non-collegiate
60% to less than 65%	40	
less than 60%	00	

(Ref. The Rajshahi University Academic Ordinance (RUAO), 2013 for B. Sc in Engineering Curriculum in Colleges/Institutes Affiliated with RU, Article no.13), unit=100 marks

2. The Grading System

The letter grade system shall be used to assess the performance of the students as shown in Table-2 (Ref. The Rajshahi University Academic Ordinance (RUAO), 2013 for B. Sc in Engineering Curriculum in Colleges/Institutes Affiliated with RU, Article no. 14.1):

Table-2: Letter Grade System

Numerical grade	Letter Grade (LG)	Grade point (GP) (G_i)	Credit (C_i)
80% or above	A+	4.00	4.00
75% to less than 80%	A	3.75	4.00
70% to less than 75%	A-	3.50	4.00
65% to less than 70%	B+	3.25	4.00
60% to less than 65%	B	3.00	4.00
55% to less than 60%	B-	2.75	4.00
50% to less than 55%	C+	2.50	4.00
45% to less than 50%	C	2.25	4.00
40% to less than 45%	D	2.00	4.00
less than 40%	F	0.00	4.00
Incomplete	I	0.00	4.00

A letter grade 'I' ((incomplete) shall be awarded for courses in the odd semester which continue through to the even semester.

A **Grade Point Average (GPA)** shall be calculated for each semester as follows:

$$GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} Ci} \qquad \text{(i)}$$

Where, n is the number of courses offered during the semester, Ci is the number of credits allotted to the i-th course and Gi is the grade point earned for that course.

Illustration: Suppose a student obtained following grade in Part-1 odd semester:

Code No	Subject	Credit	Letter Grade	GP
PHY 1111	Physics-1	4	C	2.25
CHEM 1113	Chemistry-1	4	A+	4.0
MATH1115	Mathematics-1	4	B-	2.75
TE 1111	Introduction to Textile Engineering	6	B+	3.25
CE 1112	Engineering Drawing	2	A+	4.0

$$\text{Therefore, GPA in the Part-1 odd semester} = \frac{4(2.25)+4(4)+4(2.75)+6(3.25)+2(4)}{4+4+4+6+2} = 2.40$$

And let's assume that his/her GPA in Part-1 even semester is 3.13

$$\text{Therefore, YGPA of Part-1 Examination} = \frac{20(2.40)+20(3.13)}{20+20} = 2.77$$

The **Cumulative Grade Point Average (CGPA)** gives the cumulative performance of students from the first year upto the end of the fourth year to which it refers, and will be calculated as follows:

$$GPA = \frac{\sum_{k=1}^{m} C_k G_k}{\sum_{k=1}^{m} Ck} \qquad \text{(ii)}$$

where, m is the total number of years being considered, C_k is the total number of credits registered during the k-th year and G_k is the YGPA earned in that particular year.
Similarly assume that, the YGPA of the student for the other 3 Parts are as follows:

Year	Credit	YGPA
Part-II	40	3.47
Part-III	40	2.96
Part-IV	40	3.33

Then his/her CGPA of four academic years is

$$\text{Therefore, CGPA} = \frac{20(2.77)+40(3.47)+40(2.96)+40(3.33)}{40+40+40+40} = 3.13$$

(Both YGPA & CGPA will be rounded upto the second place of decimal for reporting. For instance, YGPA= 2.212 shall be rounded up as YGPA=2.22)

3. Earned Credit

The courses in which a student has obtained minimum 'D' in 'Theoretical courses' and 'C' in 'Laboratory courses & Board Viva-Voice' or higher grade will be counted as credits earned by the student. Any course in which a student has obtained 'F' grade will not be counted towards his/her earned credit. 'F' grade will not be counted for GPA calculation but will stay permanently on the Grade sheet and Transcripts.

4. Marks and Credits distribution for B.Sc. in Electrical & Electronic Engineering

The distribution of marks and credits in various Definitions of Disciplines in the ordinance for B. Sc. Engineering Degree in the Department of Electrical & Electronic Engineering are given in Table-3 [Ref. The Rajshahi University Academic Ordinance (RUAO), 2013 for B.Sc. in Engineering Curriculum in Colleges/Institutes Affiliated with RU, Article no 6.1]

Table-3: Marks and Credits distribution in discipline for B.Sc. in Electrical & Electronic Engineering

Course Type	Marks	Marks (%)	Credits
[a]Humanities	250	6.25%	10
[b]Mathematics & Basic Sciences	1150	28.75%	46
Allied and Major Engineering	2600	65%	104
Distribution	Basic and Major Engineering:		
	Theoretical	2800	70%	112
	Laboratory	1125	28.125%	45
	Board Viva-Voice	75	1.825%	3
Total	**4000**	**100**	**160**

[a]Each department must include course on English and

[b]Each department must include courses on Physics, Chemistry and Mathematics. 1 unit course carries 4 credits (100 marks), 0.75 unit course carries 3 credits (75 marks) and half unit course carries 2 credits (50 marks). For other fractions of credit, proportionality shall be applied.

5. Courses offered to the undergraduate students of Electrical & Electronic Engineering Department for B.Sc. Engineering degree (Session 2013-2014)

Part-1 Odd Semester

Code No.	Name of Subject	Theory		Sessional		Total	
		Credit Hours	Contact Hours	Credit Hours	Contact Hours	Credit Hours	Contact Hours
PHY 1141	Physics	3	3	0	0	3	3
PHY 1142	Physics Sessional	0	0	1	2	1	2
MATH 1143	Differential and Integral Calculus, Differential Equation	4	4	0	0	4	4
HUM 1147	English	2	2	0	0	2	2
EEE 1141	Electrical Circuit-I	4	4	0	0	4	4
EEE 1142	Electrical Circuit-I Sessional	0	0	2	4	2	4
EEE 1144	Engineering Graphics	0	0	2	4	2	4
Total		13	13	5	10	18	23

No. of Theory Courses: 4 Total contact Hrs/week: 23
No. of Sessional Courses: 3 Total Credit Hours: 18.00

Part-1 Even Semester

Code No.	Name of Subject	Theory		Sessional		Total	
		Credit Hours	Contact Hours	Credit Hours	Contact Hours	Credit Hours	Contact Hours
CHEM 1241	General Chemistry	3	3	0	0	3	3
CHEM 1242	General Chemistry Sessional	0	0	1	2	1	2
MATH 1243	Matrix, Victor Analysis and Co-ordinate Geometry	4	4	0	0	4	4
HUM 1245	Financial Account and Economics Analysis	4	4	0	0	4	4
EEE 1241	Electrical Circuit-II	3	3	0	0	3	3
EEE 1242	Electrical Circuit-II Sessional	0	0	1	2	1	2
CSE 1241	Fundamentals of Computing	3	3	0	0	3	3
CSE 1242	Fundamentals of Computing Sessional	0	0	2	4	2	4
Total		17	17	4	8	21	25

No. of Theory Courses: 5 Total contact Hrs/week: 25
No. of Sessional Courses: 3 Total Credit Hours: 21.00

Part-2 Odd Semester

Code No.	Name of Subject	Theory		Sessional		Total	
		Credit Hours	Contact Hours	Credit Hours	Contact Hours	Credit Hours	Contact Hours
EEE 2141	Electronic Circuit-I	3	3	0	0	3	3
EEE 2142	Electronic Circuit-I Sessional	0	0	1	2	1	2
EEE 2143	Electrical Machine-I	3	3	0	0	3	3
EEE 2144	Electrical Machine-I Sessional	0	0	1	2	1	2
EEE 2146	Electrical Shop Practice	0	0	1	2	1	2
EEE 2147	Linear Circuit System	3	3	0	0	3	3
MATH 2143	Fourier Analysis, Laplace Transform and Partial Differential Equation	4	4	0	0	4	4
ME 2141	Basic Mechanical Engineering	3	3	0	0	3	3
ME 2142	Basic Mechanical Engineering Sessional	0	0	1	2	1	2
Total		16	16	4	8	20	24

No. of Theory Courses: 5 Total contact Hrs/week: 24
No. of Sessional Courses: 4 Total Credits: 20.00

Part-2 Even Semester

Code No.	Name of Subject	Theory		Sessional		Total	
		Credit Hours	Contact Hours	Credit Hours	Contact Hours	Credit Hours	Contact Hours
EEE 2241	Electronic Circuit-II	3	3	0	0	3	3
EEE 2242	Electronic Circuit-II Sessional	0	0	1	2	1	2
EEE 2243	Electrical Machine-II	3	3	0	0	3	3
EEE 2244	Electrical Machine-II Sessional	0	0	1	2	1	2
EEE 2245	Computational Methods in Electrical Engineering	3	3	0	0	3	3
EEE 2246	Computational Methods in Electrical Engineering Sessional	0	0	2	4	2	4
EEE 2247	Introduction to digital System and Design	3	3	0	0	3	3
EEE 2248	Introduction to digital System and Design Sessional	0	0	1	2	1	2
MATH 2243	Complex Variable and Statistical Analysis	3	3	0	0	3	3
Total		15	15	5	10	20	25

No. of Theory Courses: 5 Total contact Hrs/week: 25
No. of Sessional Courses: 4 Total Credit Hours: 20.00

Part-3 Odd Semester

Code No.	Name of Subject	Theory		Sessional		Total	
		Credit Hours	Contact Hours	Credit Hours	Contact Hours	Credit Hours	Contact Hours
EEE 3141	Electronic Circuit-III	3	3	0	0	3	3
EEE 3142	Electronic Circuit-III Sessional	0	0	1	2	1	2
EEE 3143	Electrical Machine-III	3	3	0	0	3	3
EEE 3144	Electrical Machine-III Sessional	0	0	1	2	1	2
EEE 3145	Microprocessor and Micro Computer System	3	3	0	0	3	3
EEE 3146	Microprocessor and Micro Computer System Sessional	0	0	2	4	2	4
EEE 3148	Electrical Shop Practice	0	0	1	2	1	2
EEE 3149	Electromagnetic Fields and Waves	3	3	0	0	3	3
HUM 3141	Legal Issues for Engineering and Introduction to Management	3	3	0	0	3	3
Total		15	15	5	10	20	25

No. of Theory Courses: 5 Total contact Hrs/week: 25
No. of Sessional Courses: 4 Total Credit Hours: 20.00

Part-3 Even Semester

Code No.	Name of Subject	Theory		Sessional		Total	
		Credit Hours	Contact Hours	Credit Hours	Contact Hours	Credit Hours	Contact Hours
EEE 3241	Control System	3	3	0	0	3	3
EEE 3242	Control System Sessional	0	0	1	2	1	2
EEE 3243	Industrial Electronics	3	3	0	0	3	3
EEE 3244	Industrial Electronics Sessional	0	0	1	2	1	2
EEE 3245	Measurement and Instrumentation	3	3	0	0	3	3
EEE 3246	Measurement and Instrumentation Sessional	0	0	2	4	2	4
EEE 3247	Electronic Circuit for Communication System	3	3	0	0	3	3
EEE 3248	Electronic Circuit for Communication System Sessional	0	0	1	2	1	2
EEE 3249	Power Transmission and Distribution	3	3	0	0	3	3
Total		15	15	5	10	20	25

No. of Theory Courses: 5 Total contact Hrs/week: 25
No. of Sessional Courses: 4 Total Credit Hours: 20.00

Part-4 Odd Semester

Code No.	Name of Subject	Theory		Sessional		Total	
		Credit Hours	Contact Hours	Credit Hours	Contact Hours	Credit Hours	Contact Hours
EEE 4140	Project and Thesis	0	0	2	4	2	4
EEE 4141	Power System	3	3	0	0	3	3
EEE 4142	Power System Sessional	0	0	2	4	2	4
EEE 4143	Communication Engineering	3	3	0	0	3	3
EEE 4144	Communication Engineering Sessional	0	0	2	4	2	4
EEE 4145	Project Planning, Management and Engineering	3	3	0	0	3	3
EEE 4148	Advance Computer Programming	0	0	2	4	2	4
EEE 4149	Optional-I	3	3	0	0	3	3
Total		12	12	8	16	20	28

No. of Theory Courses: 4 Total contact Hrs/week: 28
No. of Sessional Courses: 4 Total Credit Hours: 20.00

Part-4 Even Semester

Code No.	Name of Subject	Theory		Sessional		Total	
		Credit Hours	Contact Hours	Credit Hours	Contact Hours	Credit Hours	Contact Hours
EEE 4240	Project and Thesis	0	0	2	4	2	4
EEE 4241	Power Station	3	3	0	0	3	3
EEE 4243	Power System Protection & Switchgear	3	3	0	0	3	3
EEE 4244	Power System Protection and Switchgear Sessional	0	0	1	2	1	2
EEE 4245	Digital Signal Processing	3	3	0	0	3	3
EEE 4246	Seminar	0	0	2	4	2	4
EEE 4247	Microwave Devices	3	3	0	0	3	3
EEE 4248	Microwave Devices Sessional	0	0	2	4	2	4
EEE 4249	Optinal-II	3	3	0	0	3	3
Total		15	15	7	14	22	29

No. of Theory Courses: 5 Total contact Hrs/week: 29
No. of Sessional Courses: 4 Total Credit Hours: 22.00

6. **Rules for Promotion** (Ref: The Rajshahi University Academic Ordinance (RUAO), 2013 for B.Sc. in Engineering Curriculum in Colleges/Institutes Affiliated with RU, Article no. 15):
There shall be final examinations conducted by the Examinations Conducting Committee of the college/institute at the end of each semester. The results shall be finalized at the end of the even semester of the academic year. A student entering in an odd semester shall automatically move on to the next semester, unless she/he was debarred from appearing at the final examinations at the end of the semester. Individual course grades and GPA shall be announced within a date ordinarily not later than three weeks after the end of the semester final examinations.

6.1 **Minimum passing grade:** The minimum passing grade in a theoretical course will be D and the minimum passing grade in a laboratory/project/field work/in-plant training/ workshop/ similar Courses (henceforth referred to as laboratory course) and Viva-voce will be C.

6.2 **Promotion to higher class:** A student who has a grade point average of 2.25 or higher and no F grade in the theoretical courses and not less than C grade in the laboratory courses and viva-voce of the two semesters shall be promoted to the next higher class.

6.3 There shall be no refereed in laboratory courses and viva-voce. A student failing to secure a minimum C grade in any of the laboratory courses and Viva-voce in any semester will not pass in that year.

6.4 **Course Improvement:**

6.4.1 **Referred (with 'F'):** A student who has a grade point average of 1.7 or higher, with 'F' grade in the theoretical courses, not more than 10 credit points in an academic year shall be awarded Referred up to 10 credits in the courses where less than B grade (including F grade) were obtained and he/she may appear at a supplementary examination in those courses only. In such case the student has to give his/her choice of course/courses for supplementary examination in writing.

6.4.2 **Referred (with no 'F'):** A student having grade point average of less than 2.2 and no 'F' grade in theoretical courses may appear at a supplementary examination in not more than 10 credit points in an academic year, only for courses in which less than B grade was obtained. In such case the student has to give his/her choice of course/courses for supplementary examination in writing.

6.4.3 **Promotion of Referred student to higher Class:** In order to be promoted to the next higher class, a student must obtain a grade point average of 2.2 with no less than D grade in any of the courses in which he/she appeared in supplementary examination.

6.4.4 Grades obtained by a student in the courses in which s/he appeared at the supplementary examination will be recorded for assessment and the grade obtained by him/her in those courses at the regular final examination shall automatically be treated cancelled.

6.4.5 Clause 6.4.4 is not valid for a candidate, who cannot improve his/her course grade at the supplementary examination, in that case the previous grade shall remain valid.

6.4.6 **Improvement of YGPA**: A candidate obtaining an YGPA of less than 2.75 at the end of the academic year shall be allowed to sit for supplementary examination up to a maximum of 8 credit points of (courses in where less than 'B' grade was obtained) theoretical courses in the academic year. No improvement shall be allowed for laboratory examination and Board Viva-voce. If a candidate fails to improve YGPA with the block of new GP in total, the previous YGPA shall remain valid.

6.4.7 All **Referred examinations** shall ordinarily be held during the inter-session break. This break may also be utilized for industrial attachment training or survey Sessional, etc.

6.5 **Course Exemption:** students who fail to be promoted to the next higher class shall be exempted from taking the theoretical and laboratory courses where they obtained grades equal to or better than B. These grades would be counted in calculating GPA in the next year's examination results.

6.6 **Merit Position:** The YGPA obtained by a student in the semester final examinations will be considered for determining the merit position for the award of scholarships, stipends etc.

7. **Publication of Results:**

7.1 A student must successfully complete the courses of all the semesters within a maximum of seven academic years as outlined by the Committee of Courses with all its pre-requisites in order to be eligible for the award of B.Sc. Engineering degree. The student must earn 160 credits (no 'F' grade) and CGPA 2.25 or higher.

7.2 **Merit position:** Merit position of a student for each academic year of each degree) awarding department shall be determined on the basis of his/her YGPA of that particular year. Merit position for the award of the degree of B.Sc. Engineering will be based on CGPA of all the academic years.

7.3 **Honours:** Candidates for Bachelor's degree in engineering will be awarded the degree with Honours if their CGPA is 3.75 or higher.

7.4 **Result Improvement:** A candidate obtaining a CGPA of less than 2.75 at the end of Part-IV even semester examinations, within 4 or 5 academic years shall be allowed to improve his/her result, of upto a maximum 4 units (courses less than B grade) of the Part-IV, maximum 2 units from any one semester of the year, theoretical courses in the immediate next regular examination after publication of his/her result. No improvement shall be allowed for laboratory examinations and Board Viva-voce. If a candidate fails to improve CGPA with the block of new GP in total, the previous result shall remain valid.

7.5 **Dean's List:** As a recognition of excellent performance, the names of students obtaining a cumulative GPA of 3.75 or above in two regular semesters in each academic year may be published in the Dean's List in the faculty. Students who have received an 'F' grade in any course during any of the two regular semesters will not be considered for Dean's List in that year.

7.6 **Industrial and Professional Training Requirements:** Depending on each department's own requirements, a student may have to complete a prescribed number of days of industrial/professional training in addition to minimum credits and other requirements, to the satisfaction of the concerned department.

7.7 **Recording of Results:** The overall results of a successful student covering all semesters' examinations of four years shall be declared on the basis of CGPA with the corresponding Letter Grade (LG). The transcripts in English will show the course designation, course title, credit, grade and grade point of individual courses. YGPA of each year, CGPA and corresponding LG for the overall result.

8. Eligibility for Examination:

8.1 A candidate may not be admitted to any semester final examinations unless he/she has

8.1.1 Submitted to the registrar/ Vice-Chancellor an application in the prescribed form for appearing at the examination.

8.1.2 Paid the prescribed examination fees, and all outstanding college/institute dues.

8.1.3 Fulfilled the conditions for attendance in class and

8.1.4 Been barred by any disciplinary rule.

8.2 On special circumstances the Vice- Chancellor may permit a student to appear at the examination.

8.3 A student whose attendance falls short of 70% but not below 60% in any course as mentioned above may be allowed to appear at the final examinations as a non-collegiate student

Details of course outline of each subject for Bachelor of Science in Electrical Engineering

Part-1 Odd Semester

PHY 1141 Physics

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Atomic structure. Thompsons, Rutherford and Boor's atomic model. Atomic arrangement in solids. Different types of bonds in solids-metallic, Vander Walls and ionic bond.

Electronic structure of materials: Free electron the theory, Metallic conduction. Energy bands, Brillion zones, Temperature dependence of metallic conductivity. Semiconductors: Band theory intrinsic and extrinsic semiconductors, Fe-me levels, mobility and electrical conductivity, carrier diffusion and life time. (Magnetic materials: Properties Dia,-Para – and Ferro-magnetism. Hysteresis loop, B-H curve, Energy losses in magnetic materials and their measurements. Soft and hard magnetic materials ferities)

Thermal electricity: Thermocouple, seeback effect, Peltier and Thompson effect, Thermo-emf.

Photoelectricity: Laws of photoemission and Einstein's equation photoelectric cell and its use.

Sound : Simple harmonic motion, Principle of superposition. Bratsk, Dispersion, Phase and group velocities, Doppler's effect, Free and forced vibrations.

Physical Optics: Theories of light: Huygens's principal and construction. Interference of light: Young's double slit experiment, Fresnel bi-prism, Newton's rings, interferometers. Diffraction of light: Fresnel and Fraunhoffer diffraction by single and double slit diffraction gratings. Polarization, production and analysis of polarized light, optical activity, optics of crystals.

PHY 1142 Physics Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Laboratory experiments based on the theory of courses **PHY 1141.**

MATH 1143 Differential and Integral Calculus, Differential Equation

Theory: Credit Hours- 4 **Contact Hours/week 4 + 0**

Differential Calculus : Differentiation and its geometrical interpretation .Successive differentiation of various type of function. Rolle's theorem, Mean valu theorem. Divergency and Convergency of series. Functions of several independent variables, Partial Differentiation, Euler's theorem, Jacobian. Series expansion of functions with one or more variables by Taylor's theorem, Maclaurin's series. Tangent, normal and curvature. Determinations and application of maximum values of functions and points of inflection.

Integral Calculus : Definition and properties of integration. Integration by the method of substitution. Integration by parts, standard integrals, integration by the method of successive reduction. Definite integrals, its properties and use in summing series. Wally's formulae. Improper integrals, Beta and Gamma function. Area under a plan curve and area of the rigion enclosed by curves in Cartesian and polar co-crdinates. Introduction to Trapezoidal and Simpson's rules. Length of curves in Cartesian and polar co-crdinates, parametric and pedal equations. Intrinsic equation. Valumes of solids or revolution. Volumes of hollow solids of revolution by shell method. Area of surface of revolution.

Differential Equation : Degree and order of ordinary differential equations. Solution of first order differential equations by various methods. Solutions of liner equations of second and higher order with constant coefficients. Solution of homogeneous liner equations. Solution of higher order differential equations in absence of dependent/independent variables. Series solutions of differential equation, the Frobenius method Ross.

HUM 1147 English

Theory: Credit Hours- 2 **Contact Hours/week 2+ 0**

English phonetics: the places and manners of articulation of the English sounds. Vocabulary. English grammar Construction of sentences, some grammatical problems. Comprehension. Composition on current affairs. Amplification, precis writing, Phrases and idioms. Commercial correspondence and tenders. Technical report writing, Lessons in spoken English, Drafting notes. - Short stories written by some well- known classic writers.

EEE 1141 Electrical Circuit-I

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Introduction of electrical power sources, ideal and Sessional sources, and linear circuit elements. DC analysis of series, parallel and series-parallel circuits: Kirchhoff's Voltage and current laws. voltage, current, power and energy. Sinusoidal wave: Average and effective values, form factor, peak factor, phase relation and phasors. Steady state AC analysis of series, parallel and series-parallel circuit: phase relation between voltage and current, concept of impedance, power, power factor, phasor diagram. Network theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, substitution theorem and reciprocity theorem. Frequency response of ac circuits, resonance phenomena.
Magnetic circuit and concepts: flux, fields, permeability reluctance, analysis of series, parallel and series-parallel magnetic circuit.

EEE 1142 Electrical Circuit- I Sessional

Sessional: Credit Hours- 2 **Contact Hours/week 0 +4**
Sessional based on the theory of course **EEE 1141.**

EEE 1144 Engineering Graphics

Sessional: Credit Hours- 2 **Contact Hours/week 0 +4**

Introduction, Orthographic, projections, pictorial views, Drawing standards and practices. Interpenetrating of surfaces, Development of surfaces. Machine drawings. Technical sketching. Introduction to computer-aided-drawing.

B.Sc. in Electrical & Electronic Engineering
Part-1 Even Semester

CHEM 1241 General Chemistry

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Different types of chemical bonds and their properties. Modern concepts of acids and bases. Problems involving acid base titration. Properties and uses of noble gases. Electrochemistry, Mechanism of electrolytic conduction, Transport number, Kohl-Rausch's law. Ionization of water and concept of p^H. Different types of cells, Cell emf. Single electrode potentials, their determination and application. Secondary cells or Accumulators, lead accumulator and alkaline accumulator. Different types of solutions. Factors influencing the solubility of a substance, solution of gas in liquids. Colligative properties of dilute solution. Lechatelier's theorem and some of its important industrial applications. Thermochemistry, chemical kinetics.

CHEM 1242 General Chemistry Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Laboratory experiments based on theory of course **CHEM 1241.**

MATH 1243 Matrix, Victor Analysis and Co-ordinate Geometry

Theory: Credit Hours- 4 **Contact Hours/week 4 + 0**

Matrix : Definition, equality, addition, subtraction, multiplication. transposition inversion, rank. Vector space and liner transformation. Eigen values and eigen vectors. Application of eigen values to systems of differential equations.

Victor Analysis: Addition and subtraction of victors, scalar and vector product of two victors, Differentiation and integration of victors, line surface and volume integrals. Gradient of a scalar function, divergence and curl of a victor function. Physical significance of gradient, divergence and curl. Conservative systems. Gauss's divergence theorem, Stole's theorem and Green's theorem, and their applications in engineering problems.

Co-ordinate Geometry : Co-ordinate Geometry of two dimension-Change of axis, Transformation of co-ordinate, simplification of equations of curves. Co-ordinate Geometry of three dimension System of co-ordinates, distance between two points, section formula, projection, direction cosines, equations of planes and lines.

HUM 1245 Financial Account and Economics Analysis

Theory: Credit Hours- 4 **Contact Hours/week 4 + 0**

Accountancy : Basic accounting principles, Transaction, Journal, Ledger and accounts. Cash book, Bank Reconciliation statement. Preparation of Financial Statement. Cost Accounts and its objects. Cost classification. Elements of costs, preparation of cost sheet. Overhead allocation. Use of Relevant costs in Decision-Making, Standard costing. Material cost variance. Break even analysis.

Economics: Nature of the economics theory-applicability of economic theories to the problem of developing countries. Some basic concepts supply, demand and their elasticity. The relationship among average, margin and total and their derivation. Equilibrium- stable, straight and dynamic equilibrium. Consumer's equilibrium-indifference curve, Producer's equilibrium- isoquant. Production-factors of production, production possibility curve equilibrium of farm. Fixed cost and variable cost, the short run and the long run. The cost curves and supply curves, law of returns and external economics and diseconomies. Economics of development and planning basic concept –saving , investment, GNP, NNP, per-capita income, growth rate, policy instruments of development, Fiscal policy, monetary policy and trade policy, their relative applicability in Bangladesh, some planning tools-capital output ratio, input analysis, planning in Bangladesh-five year plans of Bangladesh, development problems related to agriculture, industry and population of Bangladesh.

EEE 1241 Electrical Circuit- II

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Polyphase system, balanced and unbalanced three phase circuit analysis. Two-point analysis. Coupled circuit. Introduction to fil; r.

EEE 1242 Electrical Circuit-II Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Sessional based on the theory of course **EEE 1241**

CSE 1241 Fundamentals of Computing

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Introduction to Computer Fundamentals: Types and generation of computers, basic organization and fundamental units. Different types of computer language. compiler, Interpreter, Assembler. Operating Systems and application software.

Hardware : Input, output and memory devices, keyboard, mouse, OMR, OCR, CD-ROM, Printers, CRT, microfilm, floppy disk, hard disk, magnetic tape etc.

Programming Concepts: Algorithms and flow chart construction. Writing debugging and running programs using C. Variables, expression, type, operators, decisions, loops, functions, arrays, pointer and its applications, Input/output file.

CSE 1242 Fundamentals of Computing Sessional

Sessional: Credit Hours- 2 **Contact Hours/week 0 +4**

Sessional based on the theory of course **CSE 1241**

B.Sc. in Electrical & Electronic Engineering
Part-2 Odd Semester

EEE 2141 Electronic Circuit-I

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Signals, their origin and processing in electronic system. Development of electronic processing device; Vacuum tubes and semiconductor devices; P-N junction semiconductor diodes; Application of diode as rectifier, Zener diode and its application.

BJT, FET, MOSFET : Characteristics, Biasing techniques, Stabilization factors, Compensation. Equivalent circuits, single stage amplifiers at midland frequencies. Power amplifiers. Heat sink.

EEE 2142 Electronic Circuit-I Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Sessional based on the theory of course **EEE 2141**

EEE 2143 Electrical Machine-I

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

DC generator: Principal of electromagnetic induction. Construction of generator armature winding. Theory and analysis of armature reaction, eddy current and commutation over air gap, flux distribution. Type of generator. Voltage build-up process. Performance characteristics, loss and efficiency. Starting of motor and speed control scheme. Operation of motor fed form diode and thyrister rectifier and chopper. Electrical breaking, regenerative and degenerative. Application and testing of motor. Single phase transformers. Parallel Operation of DC Generator.

EEE 2144 Electrical Machine-I Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Sessional based on the theory of course **EEE 2143**

EEE 2146 Electrical Shop Practice

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Electrician's tools, splices, soldering, code practice. Electrical and Electronic symbols, Safety rules, electricity rules, and electricity codes. Electrical wiring system design drawing and estimation for residential and commercial house wiring and Industrial installation wiring. Use of meggers, Insulation test, Grounding earth resistance measurement using earth resistance tester. Battery charging.

EEE 2147 Linear Circuit System

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Response to non-sinusoidal voltage. L-system. Transform methods. Purpose and nature of transform, Fourier and Laplace transforms. Impulse function. Convolution integral and their application to network and system analysis. Filter equations, modern filters, Z-Transform.

MATH 2143 Fourier Analysis, Laplace Transform and Partial Differential Equation

Theory: Credit Hours- 4 **Contact Hours/week 4 + 0**

Fourier Analysis : Fourier Series, Fourier Coefficients, even and odd functions. Properties of fourier series Convergence of fourier Series, extension of internal of Fourier series, Fourier integral, Sine and Cosine integrals and laplace integral.

Laplace Transform: Properties of Laplace transform, its basic theorem, application of Laplace transform for solution of ordinary differential equation. Error function and error complement. Gamma function. Simple partial differential equation with intial and boundary conditions of being not more than secong degrees and not more than three independent variables. Laplace, poission and diffusion equations. Application of Laplace transform to partial differential equation.

Partial Differential Equation : Derivation of equations, One dimensional wave equation, two dimensional wave equation, steady state heat flow equation, solution of partial differential equation by separation of variables, D' Alembert solution.

Harmonics: Solutions of Laplace equation, Rectangular, Cylindrical and Spherical harmonics.

ME 2141 Basic Mechanical Engineering

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Study of fuels. Steam generation units with accessories and mountings. Study of steam generation and steam turbines. Introduction to internal combustion engines and their cycles. Study of SI and CI engines and gas turbines with their accessories.

Refrigeration and air conditioning with their application. Refrigeration equipment: compressors, condensers and evaporators.

Type of fluid machinery, Study of impulse and reaction turbine. Pelton wheel and Kalpan turbine. Study of centrifugal and axial flow machines. Pumps, fans, blowers and compressors. Study of reciprocation pumps.

ME 2142 Basic Mechanical Engineering Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Sessional based on the theory of course **ME 2141**

B.Sc. in Electrical & Electronic Engineering
Part-2 Even Semester

EEE 2241 Electronic Circuit-II

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

BJT, FET, MOSFET multistage amplifier circuit. Frequency response of single stage and multistage amplifiers. Introduction to CMOS and its applications.

Introduction to operational amplifiers: Basic linear and non linear applications. Frequency response, bandwidth and other Sessional limitation of op-amps, compensation techniques. Feedback concept, Improvement of amplifier characteristics by negative feedback. Classification, analysis of feedback amplifier . Sinusoidal oscillators: Concept and its classification. Active filters. Negative impedance converters.

EEE 2242 Electronic Circuit-II Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Sessional based on the theory of course **EEE 2241.**

EEE 2243 Electrical Machine-II

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Three phase transformer connection, three phase to six phase transformation. Auto-transformer, Instrument transformers. Parallel operation of transformers.

Polyphase induction motor: Construction and operating principal. Electrical equivalent circuit, Power and torque in induction motor, Torque- Speed characteristics, speed regulation, losses and efficiency, Circle diagram, speed control. Starting of motor, method of breaking, plugging. Induction generator. Starting and speed control, Single phase induction motor.

EEE 2244 Electrical Machine-II Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Sessional based on the theory of course **EEE 2243.**

EEE 2245 Computational Methods in Electrical Engineering

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Computer algorithm Mathematical modeling of physical systems. Iterative Techniques, Solution of simultaneous equations, interpolation, Curve fitting, Mathematical Modeling. Solution of Differential Equations. Application of the above techniques in Electrical & Electronic Engineering through computer program.

EEE 2246 Computational Methods in Electrical Engineering Sessional

Sessional: Credit Hours- 2 **Contact Hours/week 0 +4**

Sessional based on the theory of course **EEE 2245**

EEE 2247 Introduction to Digital System and Design

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Number system. Conversion and arithmetic of number systems. Numeric and Alphanumeric codes. Boolean algebra. Different Sessional methods of simplifying Boolean function. Introduction to logic gates. Analysis, synthesis, design and use of Sessional combinational circuits. Encoder, decoder, multiplexer, demultiplexer, adder, subtractor, comparator, PLA etc. Introduction to flip-flops. Analysis and synthesis of sequential circuits. Design and use of registers, counters, buses etc. Design of data handling and arithmetic circuits. Semiconductor memories, RAM, ROM, PROM, EPROM etc.

EEE 2248 Introduction to Digital System and Design Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Sessional based on the theory of course **EEE 2247**

MATH 2243 Complex Variable and Statistical Analysis

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Complex Variable: Function of a complex variable. Caushy's integral theorem. Integral, derivative. Tailor's series, Laurent's series. Singular point and residue. Geometrical representation and conformal mapping. Application of conformal mappings in electrostatics, electromagnetic fields. Flow equation, Blessius flow. Harmonic Analysis.

Statistical Analysis: Frequency and relative frequency. Probability, sample space, probability of finite space. Random variable. Measure of central tendency. Mean, Media, Mode, Quartile deviation, Mean absolute Deviation. Measure of dispersion; Variance, Co-variance; Standard deviation. Probability density function. Continuous and discrete distribution. Ensemble and exsemble average of stochastic process. Equivalent distribution. Correlation and regression analysis. Normal probability distribution. Probability equation and its derivatives. Normal curve and its properties. Probability integral and its evaluation by ascending and descending power series. Different discrete distribution; control limit. Laplace-demovire theorem. Law of large number, poisson's law. Theory of errors and Gaussian law of errors; Arithmetic mean, weighted mean. Most probable value, measures of precision. Mean square error, probable error and average error. Rejection of observation, confidence limit.

B.Sc. in Electrical & Electronic Engineering
Part-3 Odd Semester

EEE 3141 Electronic Circuit-III

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Wave shaping: Linear and non-linear wave shaping, Clipping and Clamping circuits, Non linear function circuits. Negative resistance switching circuits. Timing circuits; Bi-stable, mono stable and Astable maltivibrators, Sweep and staircase generator, IC 555 and its application. Application of op-amp in timing circuits, Comparators, Schimtt's Trigger. Pulse generator, VCO, PLL, Blocking oscillators.

EEE 3142 Electronic Circuit-III Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Sessional based on the theory of course **EEE 3141**

EEE 3143 Electrical Mechine-III

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Principle of Electromagnetic energy conversion system.

Synchronous generator: Alternator construction. Armature winding, air gap flux and voltage compensation. Determination of machine parameters. Vector diagram and alternator regulation by different methods. Parallel operation, synchronization. Transient condition of alternator, transient and sub-transient reactances, Blondel's two reaction analysis. Power balance, loss and efficiency.

Synchronous motor: Characteristics operation and vector diagram. Effect of excitation on power factor and motor performance. Application and testing of synchronous motor. Synchronous capacitor and power factor improvements.

Special Machine: Welding machine, Brushless machines, universal motor, stepper motor, reluctance motor, repulsion motor, servomotor, Hysteresis motor, permanent magnet motor and electrostatic motor.

EEE 3144 Electrical Mechine-III Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Sessional based on the theory of course **EEE 3143**

EEE 3145 Microprocessor and Micro Computer System

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Microcomputer Architecture: Basic microcomputer blocks, Microcomputer bus structure.

Microprocessor Architecture: Generalized microprocessor architecture. Basic concepts of 8085. Details study of 8-bitlntel 8086 microprocessor architecture and pin diagram. Familiarization with Z80, MC 68000, 80286 and Pentium Series.

Microcomputer Programming: Introduction to machine and assemble language programming. Detail study of 8086 instruction sets with assembly language programming examples.

Memory subsystem : Memory Module design Intel 8086 family memory IC's and interfacing them with microprocessor. Familiarization with different memory technology.

I/0 Subsystem : Introduction to parallel and serial I/O. Detail study of Intel 8086 family chips and interfacing them with microprocessor. Comparison of the architecture based on hardware features such as addressing modes interrupt structures, instruction execution, multiprogramming abilities and memory management.

Microprocessor interfacing : Introduction to some available microprocessor peripheral ICs and their application; Timing diagram, Interrupts. I/O System, DMA- based data transfer, Memory interfacing, A/D and D/A converter interfacing: Introduction to microcomputers.

EEE 3146 Microprocessor and Micro Computer System Sessional

Sessional: Credit Hours- 2 **Contact Hours/week 0 +4**

Sessional based on the theory of course **EEE 3145**

EEE 3148 Electrical Shop Practice

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Introduction to formal procedures of preventive maintenance. Circuit tracing, trouble shooting fault repairing, soldering and de-soldering of electronic circuits. Design of PCB layout, etching.

Radio receivers: Principles of operations, circuit tracing, fault finding by signal injection alignment. TV camera, B/W TV, color TV, CD player and VCD player.

EEE 3149 Electromagnetic Fields and Waves

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Electrostatics and Magnetostatics using vector methods. Fields in dielectrics and conductors. Boundary conditions of Electric and Magnetic fields. Time Varying Fields; Maxwell's equation and pointing vector. Uniform plane wave; Transmission and reflection. Skin effect and Surface resistance. Wave guides. Introduction to radiator antenna.

HUM 3141 Legal Issues for Engineering and Introduction to Management

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Business and Industrial Law: Law of contract, elements of a valid contract, Consideration. Parties competent to contact. Sale of goods and hire purchase. Negotiable instrument.

Industrial law in Bangladesh. Factories act. Industrial relation ordinance. Workmen's compensation.

Industrial Management: Administration management and organization. Authority and responsibility. Scientific management. Organization structures. Organization chart. Span of control.

Personal Management: Selection and Recruitment of employees. Training and its type. Promotion. Wage system and incentive. Job evaluation and merit rating Plan layout, layout of physical facilities. Transportation and storage. Material handling and maintenance policy. Production control in intermittent and continuous manufacturing industry, functions of production control.

Promotion, motivation, job redesign leadership organizational change and conflict. Purchase procedures: Inventory control. Need of control and methods of control. Factors Affection inventory build-up. Economic lot size and reorder point.

Marketing Management: Concepts, strategy, sales promotion, patent laws, patent laws Management of innovation and changes.

B.Sc. in Electrical & Electronic Engineering
Part-3 Even Semester

EEE 3241 Control System

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Introductory Concepts: Open loop versus closed loop feedback system. Input output relationship.

Transfer function. DC machine dynamics, performance criteria, sensitivity and accuracy. Analysis of control systems time and frequency domain error constants.

Stability of control system: Routh-Harwith criterion, bode plot. Nyquist method. Root locus techniques. Frequency response analysis. Nicholes chart, compensation. Introduction to non-liner control system. State variable characterization of system, transition matrix, canonical forms. Controllability and observability.

EEE 3242 Control System Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Sessional based on the theory of course **EEE 3141**

EEE 3243 Industrial Electronics

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Introduction to power switching devices and their terminal characteristics. Snubber circuits. Single and three phase line frequency diode rectifiers and line frequency phase controlled rectifiers. Thyristor circuit and its control with commutation techniques. Cycloconverters, dc-dc switch mode converters, UPS, DC choppers: classification. Step up, step down choppers. Single phase PWM inverters. Introduction to three phase inverters. Voltage controlled inverters. Advanced modulation techniques. Introduction to induction, dielectric and microwave heating.

EEE 3244 Industrial Electronics Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**

Sessional based on the theory of course **EEE 3143**

EEE 3245 Measurement and Instrumentation

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Introduction: Methods of measurement, Statistical method applied to field of measurement and error analysis and calibration.

Resistance, inductance and capacitance measurement: Different Methods of measuring high, medium and low resistances. Methods of measuring self and mutual inductance and capacitance measurement. A.C and D.C bridge methods, Measurement of insulation and earth resistances Localization of cable fault.

Magnetic measurement: Ballistic galvanometer, Tangent galvanometer, D-Arsonval galvanometer, Flux meter, Flux and Flux density measurement Determination of iron losses and their separation.

Measuring instruments: Classification of measuring instruments. Ammeter, Voltmeter, wattmeter. A VO meter, Energy meter, Ampere-hour meter and maximum demand meter for measuring AC and DC quantities. Speed, frequency and phase difference measurement. Illumination measurement.

Electronics measuring instruments: Digital instruments, VTVM Q-meter and CRO.

Instrumentation: Extension of instrument range. Use of C.T and P.T and calculation of their burden, Instrumentation of substation.

Measurement of non-electrical quantities: Transducer. Measurement of temperature, pressure, displacement, velocity acceleration. Strain gauge and their applications.

EEE 3246 Measurement and Instrumentation Sessional

Sessional: Credit Hours- 2 **Contact Hours/week 0 +4**

Sessional based on the theory of course **EEE 3145**

EEE 3247 Electronic Circuit for Communication System

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Introduction to modulation and demodulation : AM, DSB, SSB, VSB, FM & PM

Radio communication: Receiver types, TRF and super heterodyne receivers, AM and FM Receiver.

Television : Introduction, principle of operation, transmitter and receiver and their circuits. Receiving and transmitting antenna. Camera tube, Picture tube, Electron beam scanning, T-lines,

balum, duplexer, Vestigial side-band filters and their circuits. Introduction to color TV, VCR, CCTV, CATV, MATV, TV Booster.
Rader : Introduction, radar-equation, pulse and MTI Radar, CW and FM Radar. Delay lines and cancellers, range getting.

EEE 3248 Electronic Circuit for Communication System Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**
Sessional based on the theory of course **EEE 3147**

EEE 3249 Power Transmission and Distribution

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**
Inductance and Capacitance of Transmission lines: Calculation of inductance and capacitance of Transmission lines of different geometrical configurations.
Representation of transmission lines: short, Medium and long length approximations, voltage and current relations on transmission line. Generalized circuit constants.
Voltage control in transmission system: Tap changing transformers and voltage regulators; booster transformers; induction regulator.
Power factor control: Static condenser, Synchronous condenser, Ferranti effect.
Power distribution: D.C & A. C distribution calculation for different network configuration.
Insulators of overhead transmission lines: Types of insulators and their coordination. Electric stress calculations and string efficiency. Insulator testing.
Mechanical characteristics of transmission lines : Sag calculations and stress analysis.
Insulated cable: Insulating materials, Electric stress grading of single phase and three phase cable. Dielectric losses and heating. Modern development, testing of insulated cables. Corona power loss. Kelvin's law. Economic conductor section, limitation and selection of ideal voltage.

B.Sc. in Electrical & Electronic Engineering
Part-4 Odd Semester

EEE 4140 Project and Thesis

Sessional: Credit Hours- 2 **Contact Hours/week 0 +4**

EEE 4141 Power System

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**
Representation of power system , single line diagrams, imortance and reatance diagrams, per unit system of calculations. Reactance of synchornous generaotrs and its equivalent circuits. Symmetrical fault calculations Limitation of short circuit current using reactors.
Symmetrical components; positive, Negative, and Zero sequence network of genetators, transformers and lines Unsymmetrical fault calculation.
Power and reactive power flow calculations of simple system. Lead flow studies large system. Control of voltage, power and reactive power.
Power system stability: Dynamic equation of rotating machines. Swing equation and solution of sowing equation. Steady state and stability limit of a two machine problem, equal area criterion. Methods of improving stability.

EEE 4142 Power System Sessional

Sessional: Credit Hours- 2 **Contact Hours/week 0 +4**

Sessional based on the theory course **EEE 4141**

EEE 4143 Communication Engineering

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Analysis of power and energy signal using Fourier methods cross Correlation and auto correlation functions. Spectral density. Signal transmission through liner systems. Basics of probability and random variables. Source and characteristics of thermal and shot noise, noise temperature, noise figure, noise equivalent bandwidth.

Analog pulse modulation: Generation, Spectra and Detection of PAM, PWM and PPM Quantization of analogue signal; Quantization noise, PCM, log PCM, DM, ADM, and ADPCM. Information theory , introduction to Telephony and Satellite communication.

EEE 4144 Communication Engineering Sessional

Sessional: Credit Hours- 2 **Contact Hours/week 0 +4**

Sessional based on the theory course **EEE 4143**

EEE 4145 Project Planning, Management and Engineering

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Definitions of project and project management in the Engineering point of view.

Project Initiation, Project selection, Project manager, Project organization and Project planning. Project feasibility study.

Project Implementation: Project management, Budgeting and cost estimation, Project control and Human aspects of project management. Network techniques of project management; PERT, CPM, and Gantt Charts.

EEE 4148 Advance Computer Programming

Sessional: Credit Hours- 2 **Contact Hours/week 0 +4**

Solution of various Electrical and Electronics Engineering problems using dedicated software.

EEE 4149 Optinal-I

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

EEE 4149(a) High Voltage Engineering

Ionization and decay process: Townsend's first and second ionization coefficient Electric breakdown in gases. Townsend's criterion for spark breakdown. Sparking potential. Penning effect. Corona discharges, power loss calculation. Breakdown of solid and liquid dielectrics.

Generation of high voltage: Alternating voltage, transformer cascade. Series resonant circuit for high voltage ac testing. Test of dc and ac cable.

Transient Voltage: Impulse wave shape. Impulse voltage generator and its mathematical analysis. Design consideration of impulse generators. Triggering of impulse generators.

DC voltage doublers and cascade circuits. Electrostatic generator, voltage stabilization. Measurement of high voltage. Electrostatic voltmeter, sphere gap. Potential driver. High voltage testing of power system equipment. Oil testing. Design consideration of transmission line based on direct stroke. High voltage transient in transmission line. High voltage lighting arrester. Insulation co-ordination.

EEE 4149(b) Digital Communication

Concept of information. Digital binary Modulation schemes: ASK, FSK, PSK, DPSK, QPSK, MSK and spectral properties. Coherent and non-cohdrent detection, correlation and matched filter receivers, phase locked loop (PLL) system.
Continuous and discrete signal and systems. Sampling Random process, density spectrum, Representation of digitally modulated signal and spectral analysis.

B.Sc. in Electrical & Electronic Engineering
Part-4 Even Semester

EEE 4240 Project and Thesis

Sessional: Credit Hours- 2 **Contact Hours/week 0 +4**

EEE 4241 Power Station

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Introduction to thermal, hydro, nuclear and magneto-hydrodynamic power stations. Nuclear reactor, reactor construction and control. Power reactors. Central station reactors. Nuclear hazards. Variable load problems, plotting and analysis of load curves, chronological load curves and load duration curve. Energy load curve and its use. Load factor, capacity factor, demand factor, utilization factor, diversity factor etc. and there impact over the cost analysis of power generation and utilization.Load forecasting, selections of units and plant location.
Load shearing: Base load and peak load plants. Use of chronological load curves to distribute load among units.
Power plant Economics: Economic operation of power plants. Input output curve, heat rate curve, incremental rate curve. Use of incremental rate curve for optimum load scheduling. Transmission line loss, determination of loss co-efficient. Economic conductor selection, Kelvin's law. Graphical method for location of distribution systems. Tariff and tariff design. Bus system. Importance of power control. Current limiting reactors. Different types of bus system layout. Forces on bus section in case of short circuit.

EEE 4243 Power System Protection and Switchgear

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

Philosophy of switchgear and protection. Circuit breakers, principle of arc extinction in DC and AC circuit breakers. Recovery voltage, rate of rise of recovery voltage and other transient phenomena. Switching surges. Disconnection of unloaded transformer and transmission line. Speed of circuit breaker. Construction, operation. rating and testing of bulk oil and minimum oil breaker, SF6 circuit breaker, ABCD and ACB. Selection of circuit breaker. Travelling wave in transmission line. Surge absorber, lightning arrester, horn gap, its rating and testing.
Protective relaying: Relay voltage rating, high, medium and low. Basic protective zone. Relaying Scheme.

Electromechanical Relays: Principal general equation. over current, balanced current, overvoltage, distance, directional, positive sequence, negative sequence and differential relays and their applications.
Static relays: Introduction to solid state device in the construction of static relays. Different type of static relays. Generator protection. Transformer protection, Bucholz's relay. Protection of bus bar, transmission line, feeder etc. Relay testing.

EEE 4244 Power System Protection and Switchgear Sessional

Sessional: Credit Hours- 1 **Contact Hours/week 0 +2**
Sessional based on the theory of course **EEE 4243**

EEE 4245 Digital Signal Processing

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**
Reviw of discrete time signals and system. Sampling of CT signals:
Aliasing pre-filtering, Decimation and interolution, A/D, D/A, conversion, quantiztion noise. Filter design techniques. DFT Computation. Fourier analysis of signals using DFT. Finite register length effect. DSP hardware. Applications.

EEE 4247 Microwave Devices

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**
Microwave Electronics: Transit time effect velocity modulation. Microwave amplifier and oscillator, Klystron (Multicavity and reflex), Magnetron, TWT. Semiconductor microwave devices.
Microwave Antenna: Horn antenna, Rhombic and slot antenna; parabolic antenna. Antenna arrays and their feeding techniques.

EEE 4248 Microwave Devices Sessional

Sessional: Credit Hours- 2 **Contact Hours/week 0 +4**
Sessional based on the theory of course **EEE 4247**

EEE 4246 Seminar

Sessional: Credit Hours- 2 **Contact Hours/week 0 +4**

EEE 4249 Optional-II

Theory: Credit Hours- 3 **Contact Hours/week 3 + 0**

EEE 4249(a) Computer Methods in Power System Analysis

General review of network theory, matrix analysis and computer modeling. Incidence matrices, privimitve networks and formation of importance and admittance network matrices. Algorithms for formation of network matrices. Three phase networks: Sysetrical components and sequence impedance balanced and unbalanced faults, fault importance and admittance matrices. Short circuit studies using Zbus and Zloop, open circuit fault studies. Load flow studies flow equations, Gauss-seidal, Newton-Raphson, Decoupled methods of load flow analysis. Three phase load flow.

EEE 4249(b) Digital Circuit Design

The course will present advance techniques of digital circuit design. It will concentrate on the design of sequential circuits, micro programming viewed as a sequential circuit and fault tolerant design. Basic review of Combinational circuit design using k-map, multiplexers and EPROMs. Introduction to sequential circuits; fundamental mode circuits. Concept of state, construction of state diagrams. Event driven Circuits using RS latch, multiplexers and EPROMs Clock driven circuits using JK flip-flops, counters and EPROMs. Microprogramming and use of AMD 2909 microsequencer and sequential circuits. Reliable design ihory and techniques. Some examples like Data Acquinition system, microprocessor peripheral interface, digital printer interface and DMA controller will be taken up.

EEE 4249(c) Optical Fiber Communication

Fiber optic transmitter and receiver designs. Link analyses. Line Coding. Coherent optical communication systems. Multiplexing schemes. Local area networks, FDDI, SONET and SDH. Fiber optic sensors and signal processing. Optical Amplifiers. Photonic Switching. Solutions in' optical fibers.