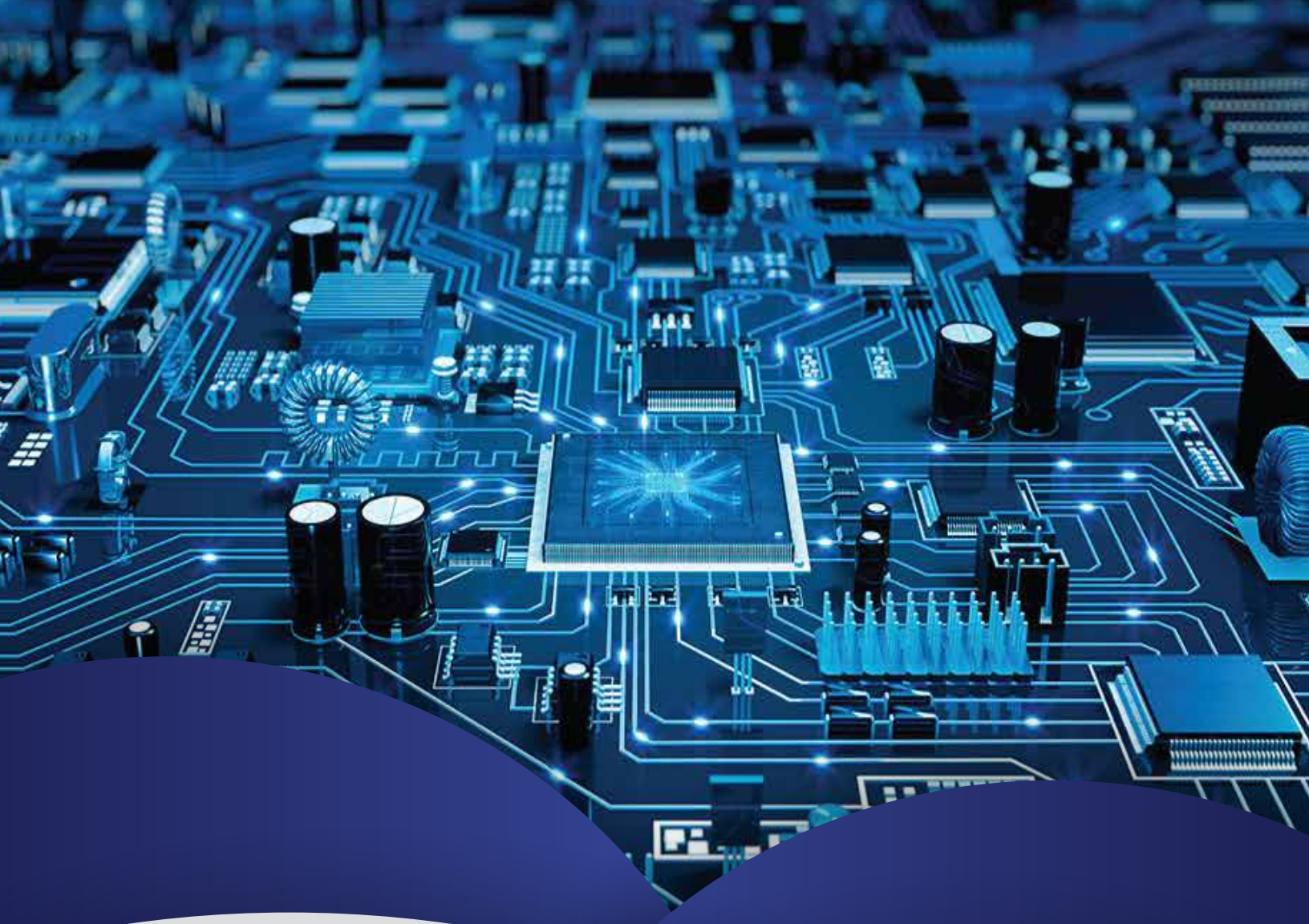
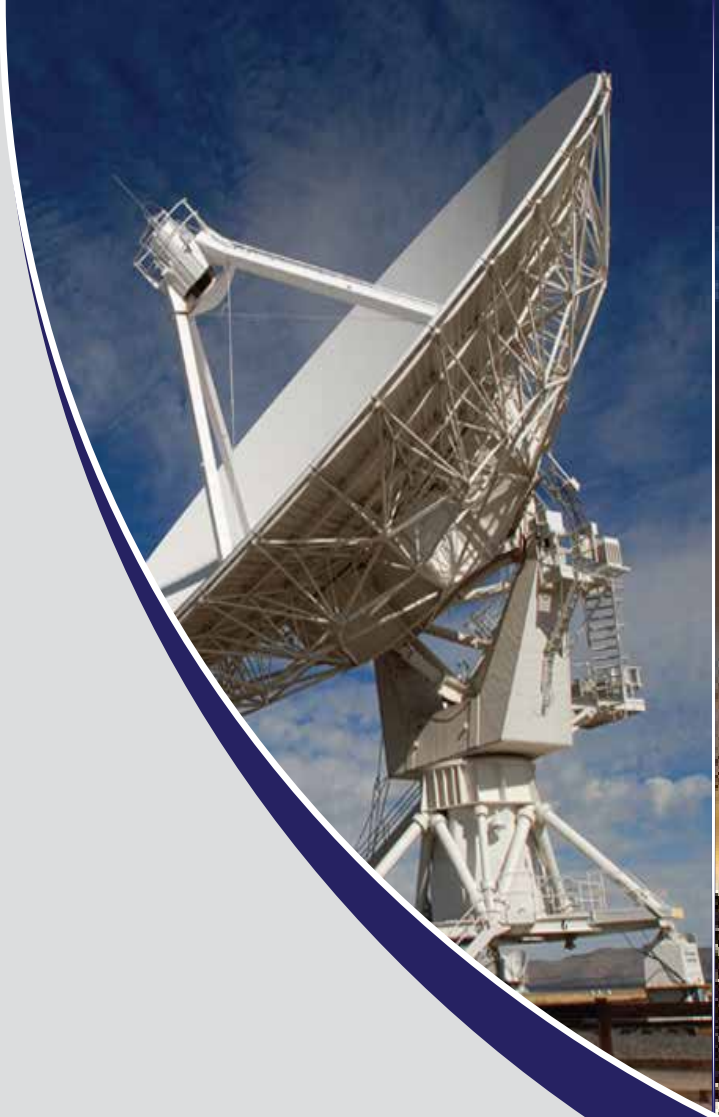
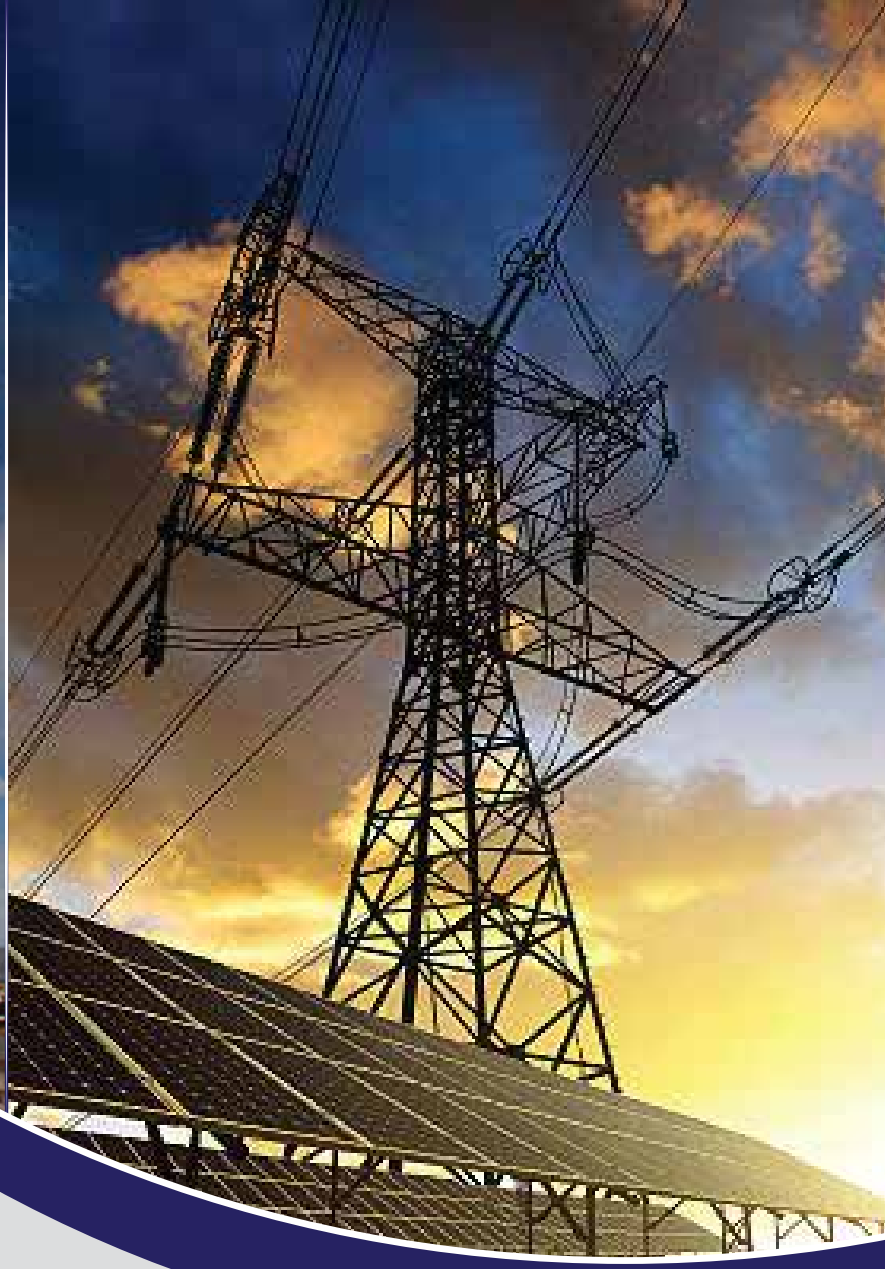


MANARAT INTERNATIONAL UNIVERSITY

DEPARTMENT OF EEE

E-PROSPECTUS





Prospect of Electrical & Electronic Engineering

CAREER OPPORTUNITIES

As EEE is a vast and ever-expanding domain that interpolates a wide range of disciplines, numerous career options are available upon graduation.

CONSISTENT PROGRESS

Being an expanding dynamic field, the domain of EEE will undergo further expansion in the future and will maintain its stature as a promising career field.

SCOPE FOR INNOVATIONS

Immense opportunities for the graduates to exercise their academic acumen and experiment with their ideas to make significant innovations and improvisations.

GLOBAL DEMAND

Since the discipline is based on core concepts of maths, physics, and electricity, EEE graduates have ample scopes to seek better career opportunities across the globe.

HIGHEST PAYING JOBS

EEE engineers are one of the highest paid job holders across the globe. According to the U.S Bureau of Labour Statistics, the median annual wage for electrical engineers was $98,530 in May 2019!

DIVERSE WORKING FIELDS

Graduates in EEE can work as Broadcast Engineer, Control and Instrumentation Engineer, Project engineer, Quality manager, Sales Executive, Management Consultant, Field Engineer, Systems Developer and so on in both government and private organizations and industries.

MESSAGE OF THE DEAN

Welcome to the School of Engineering, Science & Technology of Manarat International University. This school consists of three departments namely Pharmacy Department, Computer Science Engineering (CSE) Department and Electrical & Electronic Engineering (EEE) Department. As Dean, I have the privilege of leading such a vibrant school, a platform where the students can grow themselves as professional members of this present modern science and technology era.

Electrical and Electronic Engineering deals with the understanding, design, development and management of systems and devices which depends on electricity and light. Application of these two things has shaped the infrastructure of this modern civilization. With a view to making leaders and workers in this discipline, MIU launched EEE Department in 2013 (former ECE Department). Being a mother engineering discipline, it has widened the scopes for engineering graduates to work not only in the telecommunication and IT sectors but also to the automation and power industries.

The Department of EEE of MIU delivers engineering education through prescribed curriculum, approved by the University Grants Commission (UGC) and accredited by national professional bodies. A diverse faculty consisting of graduates from top home and abroad engineering institutions are appointed here to teach and maximize the students' learning opportunities. Apart from technical courses, the basic science and general education courses are taught here to ensure that the students can have a complete education system which will help them to build their future with excellence upholding the moral values.

Once again, I would like to welcome and thank all of you who have visited and shown your keen interest to the Electrical and Electronic Engineering department of Manarat International University.

PROF. DR. MD NAZRUL ISLAM
Dean,
School of Engineering, Science & Technology,
Manarat International University

MESSAGE FROM HEAD

On behalf of our faculty, staff and administration, it is my privilege to welcome all of you to the Department of Electrical and Electronic Engineering (EEE) at Manarat International University (MIU). We take pride in our faculty, a team of highly capable and dedicated professionals, most of whom have academic excellence, industrial exposures and degrees from leading universities of Bangladesh and overseas. We provide ample opportunities to our faculty and students, through in -house training, workshops and training outside the university campus for further growth and development in their areas of expertise.

Our teachers and students are actively involved in research and have publications in national, international journals and conferences. We always try to incorporate stronger ethical values in our academics and inspire students to face upcoming unknown new challenges in the area of Electrical and Electronics Engineering. The department believes in and adopted outcome-based education system. The department also encourages various extra and co-curricular activities and organizes study tours, industrial visits, seminars, workshops on a regular basis.

Your existence will be imperative to our future success. I welcome you all to the EEE department.

K.M.AKTHERUZZAMAN
Assistant Professor & Head
Department of EEE
Manarat International University

EEE Department **at a glance**

- A well revised curriculum for 21st century
- Undergraduate program in both regular and evening section
- Support from distinguished faculty members
- Both online and offline classroom with full digital support
- Enriched and prosperous laboratory facilities
- Scope of quality research work
- Participation in national & international events
- Industrial tours in each year
- Numerous extra-curricular activities through EEE club
- Clean and green campus
- Free transport facilities
- Hostel for female students
- Champion in different sports tournaments
- Affordable tuition fees & scholarships
- Excursions

As a student of MIU EEE, I am overwhelmed with the standard quality of education MIU is maintaining. EEE Department has much more enriched faculties and modern facilities that guide a student in their future goal. Thanks, MIU and EEE faculty members as they are helping us to be a good human being. My second home indeed!

ABDULLAH IBN AZIZ SHAKIB
12th Batch, EEE

The academic atmosphere and the facilities provided by the EEE Department are excellent. The well-structured course curriculum and the other facilities are admirable. I especially like the industrial tours and outdoor activities. I recommend visiting this Department to everyone who wants to build their career as an electrical engineer in the beautiful green campus of MIU in Ashulia.

AFRINA AKTER MIM
14th Batch, EEE

THE **FACULTY MEMBERS**

Supporting and dedicated faculty members are always with you...

MD. KORBAN ALI

Ph.D., RU, Bangladesh
M.Phil., Egypt
M.Sc. & B.Sc. (Statistics), RU, Bangladesh

Professor Dr. Md. Korban Ali joined as the Head of the Department of Business Administration of Manarat International University in 2010. He worked as the Vice Chancellor of Bangladesh Islami University, Treasurer & Dean of science faculty of MIU, Professor & founder Chairman of the Department of Population Science & Human Resource Development, Rajshahi University, Professor & Chairman of Department of Statistics, Rajshahi University, Bangladesh. He has more than 35 papers published in National and International Journals. His research areas are Econometrics, Economic & Business Statistics, Social Statistics and Population studies. In the EEE Department of MIU, he is teaching Statistics courses.

DR. M. UMAR ALI

Ph.D., Nagpur University, India
M.Sc. (Chemistry), RU, Bangladesh

Professor Dr. M. Umar Ali has a distinguished academic career spanning over 48 years. He had been a professor in the Department of Chemistry of University of Rajshahi since 1992. He also worked as the Vice-Chancellor of Manarat International University. He has more than 50 research publications in National and International Journals and conferences. His research interest involves mechanistic and synthetic organic chemistry, Development of methodology for the synthesis of organic compounds including natural products of biochemical / medicinal importance, Physico – organic chemistry. In the EEE Department of MIU, he is teaching Chemistry courses.

K. M. AKTHERUZZAMAN

M.Sc. (EEE), The University of Greenwich, UK
B.Sc. (EEE), AUST, Bangladesh

K. M. Aktheruzzaman, has been assistant professor in the Department of EEE, MIU since 2007 and now working as the Head of the Department of EEE, MIU. Before joining MIU, he worked as the faculty coordinator in the Department of EEE of International University of Business Agriculture and Technology (IUBAT). He also worked as an assistant design engineer in Power IC Bangladesh (2007), an electrical engineer in Horizon Trade Ltd. (2004-05) and techno-mechanical engineer in Delphi Automobile Systems, UK (2003). He obtained his bachelor degree in Electrical & Electronic Engineering from Ahsanullah University of Science & Technology (AUST) in 2001. Then, he completed his M.Sc. degree in EEE from the University of Greenwich, UK in 2003. His master's thesis was on solar power based water pumping systems. He has several publications in international conferences and journals. His research interest involves cyber security, Internet of things, Robotics, Solar power systems.

SAYEED ISLAM

M.Sc. (ETE), NSU, Bangladesh
B.Sc. (ETE), NSU, Bangladesh

Sayeed Islam has been Assistant Professor in the Department of EEE, MIU since 2015, after joining in July, 2012 as lecturer. He is also acting as the coordinator of EEE (Evening) program, MIU sports club moderator and assistant proctor of the MIU permanent campus. He obtained his bachelor degree in Electronics & Telecommunication Engineering from North South University (NSU) in 2010 where he secured third (3rd) position. He completed his master degree (2nd position) from the same department in 2018. His master's thesis was on the automated way of Vehicle Theft Detection in Parking facilities by CCTV Video Stream. He has several IEEE conference publications in the communication engineering field. His research interest involves OFDM technology, image processing and hybrid neural networks.

MD. BILLAL HOSSAIN (On study leave)

M.Sc. (ECE), The University of Akron, U.S.A.
B.Sc. (ECE), KUET, Bangladesh

Md. Billal Hossain joined the Department of EEE, MIU in 2013 as a lecturer. He has been working as the coordinator of EEE regular program. He obtained his bachelor degree in Electronics & Communication Engineering (ECE) from Khulna University of Engineering & Technology (KUET). He has just completed his M.Sc. in Electrical & Computer Engineering (ECE) from The University of Akron in USA. He has more than 10 publications in IEEE conferences and international journals. His research interest involves Artificial Intelligence, Machine Learning Algorithm Enhancement, Natural Language Processing, Deep Learning.

TANVIR AHMED

M.Sc. (Energy Systems), Skoltech, Russia
B.Sc. (EEE), IUT, Bangladesh

Tanvir Ahmed has been Assistant Professor in the Department of EEE, MIU since 2020, after joining in July, 2015 as lecturer. He obtained his bachelor degree in Electrical & Electronic Engineering from Islamic University of Technology (IUT). He completed his master degree in Energy Systems with a full-funded scholarship from Skolkovo Institute of Science and Technology, Moscow, Russia in 2019. His master's thesis was on modelling of hybrid energy storage systems for electric vehicle applications. His research interests are in energy storage, systems and renewable energy fields.

RAFIQUL ISLAM

M.Sc. (Mathematics), JU, Bangladesh
B.Sc. (Applied Mathematics), RU, Bangladesh

Rafiqul Islam has been Assistant Professor in the Department of EEE, MIU since 2020, after joining in July, 2016 as a lecturer. He obtained his bachelor degree in Applied Mathematics in 2011 from University of Rajshahi where he secured first (1st) position and also awarded A. F Mujubur Rahman Gold Medal. He completed M.Sc. in Mathematics securing first (1st) position from University of Jahangirnagar in 2016. His master's thesis was on the study of heat and mass transform of Nanofluid. His research interest is on mathematics application in fluid-solid interaction problems. He has few publications in conferences and journals on FeCo Alloy.

MIR MD. AMINUZZAMAN

M.Sc.(con't),(EECE), MIST, Bangladesh
B.Sc. (EECE), MIST, Bangladesh

Mir Md. Aminuzzaman joined the Department of EEE of MIU as lecturer in 2017. Before that, he worked as a lecturer in the Department of Electronics & Communication Engineering of Ahsanullah Institute of Information and Communication Technology (AIICT), Dhaka. Now, he is working as the coordinator of the EEE regular program. He obtained his bachelor degree in Electrical, Electronics & Communication Engineering from Military Institute of Science & Technology (MIST). Now, he is pursuing an M.Sc. degree in the same Department of MIST. His research interests include satellite navigation, Nanotechnology.

KHANDKER SHAFAET-UZ-ZAMAN

M.Sc. (E.T.E), North South University
B.Sc. (E.C.E), East West University

Khandker Shafaet-Uz-Zaman is working as a part-time lecturer in the EEE Department of MIU. He has completed M.Sc. in Electronics & Telecommunication Engineering from North South University and B.Sc. in Electronics & Communication Engineering from East West University. He has professional certification on CCNA and CCNAS.

MD. NURUL ISLAM (SHUVO)

M.Sc. (C.S.E.), Jahangirnagar University
B.Sc. (E.T.E), East West University

Md. Nurul Islam is working as a part-time lecturer in the EEE Department of MIU. He works as a server administrator at Amber IT Ltd. He works there as a team leader of the system administration team. He has rich working experience in server administration and also good at computer networking.

MOHAMMAD ZAKIR HOSSAIN

Mohammad Zakir Hossain is currently working as Research Associate & Lab Manager at AGenCy Lab, IUB. He works in the domain of Computer Vision and Natural Language Processing. At there, he has worked on automatic pill recognition using intrinsic geometric properties of pills from pill images. His research interest lies in Linear Algebra, Digital Signal Processing, IoT and various branches of Artificial Intelligence. He is also doing his Masters (EEE) at North South University (NSU) and completed his Bachelor's in Electrical and Electronic Engineering from, International Islamic University Chittagong (IIUC).

ASSOCIATES OF **EEE**

MD. MUSTAFIJUR RAHMAN
Senior Lab Officer

MOHAMMAD JAFAR IQBAL
Administrative Officer

MD. MOHAN HAIDAR
Lab Assistant

ABDULLAH
Office Assistant

GAZI M HAMIM HUSAIN

Gazi obtained his bachelor degree from ECE Department (presently EEE Department) in 2012. Then, he started his career as CAD Drafter in New York. In 2015, he joined York Restoration Corporation, Maspath, New York and now, working there as Assistant Project Manager. He also obtained his M.Sc. degree in Construction Management from Stevens Institute of Technology, USA in 2017.

SOMORITA IBRAHIM

Somorita graduated from ECE Department (presently EEE Department) in 2011. She started her career as Assistant Engineer in Cosmopolitan Communications Ltd (Sister concern of Summit Group). Then, she worked as an Executive Engineer in Citycell. She obtained her M.Sc. degree in Electronics & Telecommunication from University of Technology Malaysia (UTM) in 2016. Now, she is working as a Security Operation Assistant, in the Department of Safety & Security in the United Nations.

AMIR ABDULLAH MD FARUK

Amir graduated from ECE Department (presently EEE Department) in 2013. He started his career as a software engineer in Iqrasys Solutions Limited in Dhaka in 2015. Then, he moved to Azolution Software and Engineers Limited. Later, he joined INSO Projects GmbH as software developer. Now, he is pursuing M.Sc. in Information Engineering at Rhine-Waal University of Applied Science, Germany.

SHAMIMA AFRIN

Shamima completed her bachelor degree in Electronics and Communication Engineering from the EEE department of MIU in 2016. Then, she completed her M.Sc. in Information Security & Digital Forensic in 2018 from University of East London, UK. Now, she is pursuing a PhD in cyber security at the same university.

MD. ASRAFUL MAOLA

Asraful graduated from ECE Department (presently EEE Department) in 2011. After completing his M.Sc. in Computer Science from Jahangirnagar University, he started his career as Assistant Network Engineer in Dhakacom Ltd. He also worked as an Assistant Manager, IT Infrastructure in Progress Apparels (Bangladesh) Ltd. Now, he is working as an Assistant Manager in Network & Infrastructure Division in Daraz Bangladesh.

ANISUR RAHMAN

Anisur completed his bachelor degree in Electrical and Electronic Engineering in 2017 from MIU. After Completing his graduation, he got a job as DT Engineer in Yinda Technology Myanmar (YMM) & Yinda Technology Bangladesh (YBD). Now, he is working as Senior Marketing Officer in ACI Motors Ltd.

IN CAMPUS **CLASSROOM**

The classrooms of the EEE Department are equipped with the modern classroom facilities and technologies. Each classroom is facilitated with whiteboard, multimedia projector and air conditioning system so that the teachers can deliver their lectures efficiently using graphical illustrations, writing on the boards and the students can maximize their learning opportunities in a calm and comfortable atmosphere.

PROSPEROUS
LABORATORY FACILITIES

The EEE Department has multiple laboratory facilities for conducting different experiments related to theory courses. Department has laboratories for Physics, Circuit & Electronics, Communication Engineering, Electrical Machines and Computer related simulations and experiments. Moreover, to meet the demand of lab facilities for increasing numbers of students, EEE Department purchases new equipment and enriches the lab facility each year.

PROJECTS

The First **Quadcopter** in MIU



On 30 January, 2018, under the supervision of Prof. Dr. Md. Yeakub Hussain, the third-year students of the Department of EEE made the first quadcopter in the MIU premises. The students flew the drone successfully around the MIU Permanent Campus. Such unmanned aerial vehicle or drone can be used in different applications like aerial photography, product delivery, agriculture, surveillance, infrastructure inspections and so on.

Automatic Breeding Machine **Egg Incubator**



In order to meet the high demand for poultry meat, hatcheries need to maximize chick production, and this entails not only the incubation of more fertile eggs but also the healthy chicks and high survival rates. One group of students from EEE Evening program had worked on a project in their final year to meet the high demand of incubation system that meets, all the criterions along with highest production efficiency in a sustainable manner, which includes maximizing the hatchability of healthy chicks with high survival rates and the maximum expression of their genetic growth potential under any condition, but in a low price.

RESEARCH

In addition to classroom and laboratory learning, EEE Department is actively involved in cutting-edge research in the science and technology field. The research collaboration between the students and the faculty members has created a unique research environment here enabling both of them to publish their research work in reputed journals and conferences.

NOVEL IMAGE ENCRYPTION TECHNIQUE USING 3D CHAOTIC MAP

Multimedia data contains text, audio, video, graphic, images and with the increasing use of multimedia data over internet, here comes a demand of secure multimedia data. Image encryption differs from other multimedia components encryption due to some intrinsic features. The combination of chaotic theory and cryptography forms an important field of information security. The latest trend in image encryption is chaos based for some unique characteristics such as the sensitivity to initial conditions, non-periodicity, nonconvergence, and control parameters. The faculty members of the EEE department, Sayeed Islam and Md. Billal Hossain, along with other members, had proposed a non-linier 3D chaos based simple encryption technique where for the first time 3D chaos is used for position permutation and value transformation technique. A paper was presented and published in the International Conference on Informatics, Electronics & Vision (ICIEV), pp. 1-6. IEEE, 2014

HYBRID NEURAL NETWORK FOR EFFICIENT TRAINING

Neural Network is a platform to implement artificial intelligence and universally used neural network is Backpropagation (BP). Local minimum, slower convergence, premature saturation, training pattern overspecialization limits the performance of Backpropagation algorithm. To withstand those problems several modified algorithms was proposed. The faculty members and a group of students of the EEE Department had proposed a faster superintendent algorithm named Hybrid Backpropagation algorithm (HBP). HBP is examined on several benchmark categorize problems like glass, breast cancer, diabetes, horse and Australian credit card. The proposed algorithm was presented and published in the International Conference on Electrical, Computer and Communication Engineering (ECCE), pp. 528-532. IEEE, 2017.

NOVEL NEURO-GENETIC SYSTEM FOR BETTER TRAINING OF NEURAL NETWORK

Local minimum incorporated with premature saturation and slower convergence limits the performance of the Simple Genetic Algorithm based Neural Network (SGA-NN) algorithm. When the network reaches in local minima, the weights of the neural network become idle. To overcome this premature saturation and slow convergence, the faculty members and a group of students of the EEE Department had proposed a new neuro-genetic system named Apical Dominance based Genetic Algorithm based Neural Network (ADGA-NN). As 'Apical Dominance' is a natural genetic event in plants, this algorithm may accelerate the training by updating the stationary weights of the neural network. ADGA-NN is experimented on five actual world's classification problems which are breast cancer, glass, Australian credit card, heart disease and thyroid problem. The proposed system was presented and published in the in the 4th International Conference on Electrical Information and Communication Technology (EICT), pp. 1-6. IEEE, 2019.

CO-CURRICULAR ACTIVITIES

One key feature of the EEE Department is to enhance the learning platform for the students beyond classrooms and laboratories. For this reason, it is actively involved in different co-curricular activities consisting of industrial tours, seminars, national and international events, and project competitions.

INDUSTRIAL TOURS

The EEE Department is actively engaged in organizing tours in industries and factories. Since its establishment, it has been organizing industrial tours each year for the senior batch students (3rd and 4th year) so that the students can get acquainted with their future working field.

Industrial Tour to
Rural Power company, Mymensingh

Students were listening lectures from Plant manager, EM power Lt., Ashulia

EEE Evening Batch Students after their visit to Aminbazar Grid Substation

NATIONAL EVENT

Minister of State for
ICT division of Bangladesh,
ZUNAID AHMED PALAK
visiting the Team's project.

Project team members
with honorable
VC sir of MIU

INTERNATIONAL COMPETITION

On March 5, 2020, the team 'Tesla MIUian' from the EEE Department participated in the MINDSPARKS_2020 innovation challenge. Their presented project idea named "Power Shoe" ranked in the top 30 among thousand contestants. The competition was organized by IIT ROORKEE (India) and AUST.

Team 'Tesla MIUian'
at MINDSPARKS_2020

GREEN CAMPUS

MIU Ashulia Campus has a serene abundance of greenery outside of the hustle and bustle of Dhaka. Beautiful flowers, big trees and numerous medicinal plants in the campus gives a refreshment to the mind as soon as you step foot inside the campus. Coming to the campus, you will find gardeners and cleaners always working to keep the campus clean and green. Students regularly take various initiatives to keep the campus clean and in order.

LIBRARY

RESOURCES

The MIU library boasts a robust collection of books, journals and other resources for all students and faculty members to make academic progress easier. It has 25,000 physical copies of books that encompass 3000 separate titles. It contains books pertaining to the Liberation War and the history of Bangladesh. It also has hard copies of journals published by students and teachers of MIU and other universities as well.

As for recreational reading, the MIU library keeps copies of foreign magazines, job and career related books and magazines and both Bangla and English novels.

We are also proud to present the "Bangabandhu Corner" which contains books and other articles and materials that cover the history of our founding father Bangabandhu Sheikh Mujibur Rahman and his undying contributions to the liberation of our beloved country of Bangladesh.

Finally, we offer on campus access to online journals and books via JSTOR and Emerald (form inside the campus only) which contains an abundance of academic papers that make research a breeze for students and faculty alike.

SERVICES

In the MIU library, students have access to both Bangla and English daily newspapers from 4 or 5 reputable publishers. MIU allows books to be checked out from the library as long as the rules are followed. Apart from that, computers are kept inside the library that have internet access. These computers also allow access to online books and journals via JSTOR and Emerald. Plus, the library keeps audio-visual copies of certain books and provides catalogue search options using KOHA.

STUDENT HOSTEL

Our university offers a safe place for female students. Finding a place to stay can be a great obstacle for some female students who don't have any relatives in Dhaka. Our hostel facilities provide a safe and affordable place where they can feel at home. We have coordinators monitoring the female hostel to maintain security and order. The hostel is close to the campus and living here enables students to save time that would otherwise be wasted during travel.

FREE TRANSPORT FACILITY

MIU provides ample provisions for students to get to the Ashulia campus of MIU and back to the city via a punctual bus transportation system. It has always been free for students. Our university also allows transportation for students when they are participating in co-curricular activities and sports outside the campus.

Transport facility provided by MIU is worth BDT 70,000,000 yearly and for CSE students it is worth BDT 20,000,000 yearly.

BUS SCHEDULE FOR WINTER

Pick and Drop Spots	Time of Arrival to Ashulia Campus		Time of Return from Ashulia Campus	
	1st Trip	2nd Trip	Return Trip-1	Return Trip-2
Mirpur-01	8.15	10.00	1.05	4.35
Rampura Bridge	7.20	None	None	4.35
Notun Bazar (Badda)	7.45	None	1.05	4.35
Uttara (House building)	8.10	10.00	None	4.35
Hamyetpur (savar)	8.05	None	1.05	4.35
Savar (Bus Stand)	8.30	None	None	4.35

BUS SCHEDULE FOR SUMMER

Mirpur-01	8.15	10.00	3.05	5.05
Rampura Bridge	7.20	None	3.05	5.05
Notun Bazar (Badda)	7.45	None	3.05	5.05
Uttara (House building)	8.10	10.00	3.05	5.05
Hamyetpur (savar)	8.05	None	3.05	5.05
Savar (Bus Stand)	8.30	None	3.05	5.05

BUS SCHEDULE FOR FRIDAY

Pick and Drop Spots	Time ofArrival to Ashulia Campus	Time of Return from Ashulia Campus
Mirpur-01	7.30am	8.00pm
Rampura Bridge	7.30am	8.00pm
Notun Bazar (Badda)	7.30am	8.00pm
Uttara (House building)	7.30am	8.00pm
Gazipur	7.30am	8.00pm
Chandura	7.30am	8.00pm
Hamyetpur (savar)	7.30am	8.00pm
Savar (Bus Stand)	7.30am	8.00pm

BEYOND **EDUCATION**

The students of the EEE Department are provided with ample opportunities to be engaged in different extracurricular activities like reunion programs, excursions, sports tournaments, freshers' reception, farewell program etc. The Department believes that these activities are essential for the students to build each facet of their characters.

SPORTS

The students of the EEE Department are always the lead performers in different sports tournaments. They became champions and runners up in the inter departmental sports tournaments like in football and cricket. During class break and leisure, the students are encouraged to play different sports like table tennis, cricket, badminton and volleyball.

CAPTION

1. Champion-Inter Dept. Football Tournament 2017
2. Champion-Inter Dept. Football Tournament 2018
3. Runners up-Inter Dept. Football Tournament 2019
4. A friendly cricket match among the faculty members and the students of EEE Department
5. Waiting for departure to Cox's Bazar
6. A boat trip by students and honorable faculty members of EEE Department

Fresher's Reception & Farewell Program always takes place here to increase the bonding between the new students and the senior and graduating students.

FRESHER'S RECEPTION & FAREWELL PROGRAM

CAPTION

1. A warm farewell awaiting for the graduated students on behalf of EEE department
2. Farewell Program, 2018
3. Farewell Ceremony, 2019

MIU EEE CLUB started its journey from July 9, 2019 with the purpose to increase the involvement of the students in the activities like planning and organizing industrial tours, different events like freshers reception and farewell programs, reunion, workshops, webinars so that students can develop leadership, networking and communication skills in this four year journey at MIU campus.

Recently, another EEE club for Evening program has been approved so that the huge number of students of Evening program can fulfill the same purpose like the present club.

Before Industrial tour to Energypac

Welcome reception of new VC by EEE club

On January 25, 2020, A reunion with BBQ party was arranged where teachers and graduated students of EEE department were invited.

SCHOLARSHIP & WAIVER

I was confused about choosing a right engineering program for my higher education and did not want my parents' laborious income to go in vain. As the time passes, I have realized that studying electrical engineering is not a far cry for the immense cooperation of my teachers and financial support from the authority. Alhamdulillah, I made the right decision.

SHAKI REZWANA
11th Batch, EEE

More than
BDT 4 CRORE WORTH
OF SCHOLARSHIPS **EVERY YEAR**
IN **16 DIFFERENT CATEGORIES**

WAIVER, SCHOLARSHIP AND FINANCIAL AID

MIU provides sixteen different categories of aid in the form waiver, scholarship and financial aid under which students can apply. This is more than what any other university currently offers in Bangladesh. A summary of the types is described below:

1. Special waived package of tk 254,400/- for EEE Regular program
2. Special waived package of tk 180,900/- for EEE Evening program
3. 100% waiver for 3% of total students of each semester, who are from remote and underdeveloped areas and poor but meritorious.
4. 100% waiver for the families of freedom fighters
5. Special waiver for meritorious low-income students (up to 100%)
6. 10% waiver based on SSC and HSC results
7. 20% scholarship on semester results
8. 50% admission fee waiver for all students
9. Additional special waivers (5%) for siblings
10. Additional special waivers (5%) for spouse
11. Additional special waivers (5%) for offspring
12. Special waiver for promotional contribution

DETAILS OF POLICIES
for **WAIVER, SCHOLARSHIP** and **FINANCIAL AID**

I) 100% waiver will be given (as per Private University Act. 2010) to students who fall under the following categories:

a) 3% of total student of each semester, who are from remote and underdeveloped areas and poor but meritorious.

b) 3% of total students of each semester from the freedom fighter's quota

NB: The deserving candidates should apply in the prescribed form.

II) Waiver based on SSC+HSC or Equivalent examinations results:

Scholarship (25% to 100%) is offered to the top 10% students of every program based on SGPA (Semester Grade Point Average) at MIU per semester. For eligibility, students are required to have a minimum SGPA of 3.5 and must take at least 9 credits (for non-pharmacy students) or 15 credits (for Bachelor of Pharmacy students) per semester. If 2 or more students achieve the same SGPA, then CGPA will be considered as a tie-breaker. Furthermore, if CGPA is also equal for those students, then SSC and HSC GPA will be used as tie-breakers. These conditions are not applicable for package programs at Ashulia campus. This waiver scheme is applicable from 2nd semester onwards. Policies regarding percentage of waivers given are summarized in the table below:

Scholarship (in the form of waiver on tuition fee)	**% of total Registered Students Eligible for Scholarship**
100%	1%
50%	2%
25%	7%

III) Special Waiver only for new students (meritorious but from low income group):

Maximum 10% of the total newly enrolled students of the respective semester are entitled to get a special waiver (Financial Aid) who are meritorious but from low-income groups (parents/guardians' income is less than a certain threshold). This waiver is awarded through a process of scrutinization as per the policy of the authority of MIU.

GPA in SSC+HSC or Equivalent Exam (without 4th Subject)	**Tuition fee Waiver**	**Required CGPA/SGPA at MIU Exam**
9.00 - 10.00	Up to 100%	3.30
8.00 - 8.99	Up to 50%	3.00
7.00 - 7.99	Up to 25%	2.70

IV) Additional 5% waiver for siblings, spouse (husband-wife) and offspring (parent-child) will be given for the entire study period for both undergraduate and graduate programs.

OTHER CONDITIONS FOR ENTITLEMENT OF WAIVER AND SCHOLARSHIP:

Waiver based on SSC and HSC/equivalent examination results, and Special Waiver shall remain valid for 4 years/entire program subject to maintaining required SGPA/CGPA at MIU examinations.

A student may avail only one type of waiver/scholarship at a time from the above categories I, II, & III whichever is maximum for him/her.

Waiver/scholarship will not be applicable for retake / improvement courses.

Any student enjoying waiver/scholarship must abide by the rules and regulations of MIU, the failure of which may result in the cancellation of his/her scholarship.

In case of Special Waiver, the authority of MIU reserves the right to change the policy time to time for the greater interest of the University.

B.SC in EEE
147 CREDITS

ADMISSION REQUIREMENTS

Core Credits	60
General Education(GED)Credits	24
Inter-disciplinary Engineering	09
Mathematics Credits	15
Thesis/Project Work	06
Basic Science Credits	12
Technical Elective Credits	21
Total Credits	**147**
Duration Years	4
Number of Semesters	12

ELIGIBILITY for Admission

- At least GPA- 2.5 at SSC & HSC or equivalent. If the students get GPA 2.00 at SSC & HSC or equivalent level, he or she must have a total GPA at least 6.00 in both the Exams.
- At least five subjects at O-Level and two subjects at A-Level with minimum 'B' grade in four subjects and 'C' grade in three subjects.
- Candidates must have science background in SSC & HSC and have Mathematics, Physics and Chemistry in HSC level.

BREAK DOWN OF FEES STRUCTURE

Special Package for Regular Students	=	**2,54,400 Tk.**
Credits Fee : 147 x 1200/-	=	1,76,400 Tk.
Admission Fee : 6,000 × 1	=	6,000 Tk.
Other charges (Semester wise): 6,000 × 12	=	72,000 Tk.
Total Cost for Diploma Holders (Package for EEE Evening Program):	**=**	**1,80,900 Tk.**
Credits Fee : 147 x 700/-	=	1,02,900 Tk.
Admission Fee : 6,000 × 1	=	6,000 Tk.
Other charges (Semester wise): 6,000 × 12	=	72,000 Tk.

Mode of payment

Students have to pay the required fees/charges of any semester in 2 (two) installments;

For 1st semester :
1) The students will pay admission fee and Tk. 6,000 as semester fee at the time of admission.
2) The remaining fees/charges has to be paid before the mid-term examination.

For other semesters :
1) Tk. 10,000 has to be paid at the time of registration. If the fees/charges are less than Tk. 10,000, the students may pay Tk. 6,000 at the time of registration.
2) The remaining fees/charges has to be paid before the mid-term examination.

Academic Calendar

Semesters	Duration	No. of weeks
Spring	January - April	16
Summer	May - August	16
Fall	September - December	16
	Vacation and Breaks	04

N.B.: Minimum credits requirement per semester: 9 Credits

Necessary documents for admission:

1) 3 (three) copies of recent passport size Photographs
2) Photocopies of SSC, HSC or equivalent Transcripts
3) Photocopies of SSC, HSC or equivalent Certificates/Testimonials

PROGRAM

Bachelor of Science in Electrical and Electronic Engineering (B. Sc. in EEE)

PROGRAM DETAILS

PROGRAM OBJECTIVE

The courses in the undergraduate programs are designed to give students a rigorous and comprehensive academic training on both the fundamental and advanced aspects of Electrical and Electronic engineering (EEE). A student in EEE must not only have a sound basis in the fundamentals of engineering but also should be aware of socio-economic problems of the country. Therefore, courses in science, humanities, economics and management are also included in the curricula.

PROGRAM STRUCTURE

Bachelor of Science in Electrical & Electronic Engineering primarily involves the study of a number of core courses, which every EEE engineer should know and a significant number of courses from specialized areas. Core courses build the foundation and specialized courses prepare the students for the specific areas of EEE. To understand the underpinning theory of the courses of EEE, a number of courses on Mathematics, Statistics, Physics, Electrical Engineering, and Computer Science and Engineering have been felt mandatory to include in the syllabus. The curriculum includes a good number of universities required courses known as General Education Courses (GED). Areas of the GED courses include Linguistics (English and Arabic), Liberal Arts and Islamic Studies. The last two semesters will offer the students a number of alternatives to choose from and to specialize in a particular field. Theory and sessional work will be supplemented by project/thesis work, seminars and visits to relevant research and industrial organization.

DEGREE REQUIREMENTS

To obtain the Bachelor of Science degree from the Department of Computer Science and Engineering, each student is required to successfully complete a minimum of 137 credits. In addition to minimum 137 credits, students may also take extra courses from the elective courses for wider specialization. The distribution of the credits are given below:

English Courses	6 credits	
General Education	18 credits	
Mathematics	17 credits	
Basic Sciences	8 credits	
Interdisciplinary Courses	8 credits	
Core Courses	66 credits	
Elective/Concentration Courses	18 credits	
Thesis/Project Work	6 credits	(within last 2 semesters)
Total =	**147 credits**	

LIST of Courses

ENGLISH [6 Credits]

Sl. No.	Course Code	Course Title	Contact Hours / Week	Credits
1	GED111	Fundamentals of English	3	3
2	GED122	Basic Concept of Islam	3	3
		Total (2 Courses) =	**6**	**6**

GENERAL EDUCATION COURSES (GED) [18 Credits]

Sl. No.	Course Code	Course Title	Contact Hours / Week	Credits
1	GaED122	Basic Concept of Islam	3	3
2	GED224	Bangladesh Studies	3	3
3	GED235	Life of Teachings of Prophet Muhammad (SM)	3	3
4	GED316	Quranic Language	3	3
5	GED327	Quran, Science & Humanity	3	3
6	GED338	Environmental Studies	3	3
Optional for Non -Muslim Students	GEA122	History of Bengal	3	3
	GEA316	Comparative Social System	3	3
	GEA327	Peace and Conflict Studies	3	3
		Total (8 Courses) =	**18**	**18**

MATHEMATICS (GED) [17 Credits]

Sl. No.	Course Code	Course Title	Contact Hours / Week	Credits
1	MTH104	Differential Calculus and Co-ordinate Geometry	3	3
2	MTH203	Complex Variables, Fourier And Laplace Transformation	3	3
3	MTH205	Linear Algebra and Vector Analysis	3	3
4	MTH201	Integral Calculus and Differential Equations	3	3
5	STS301	Statistics and Probability	2	2
6	MTH311	Numerical Analysis	3	3
		Total (6 Courses) =	**17**	**17**

BASIC SCIENCE [8 Credits]

Sl. No.	Course Code	Course Title	Contact Hours / Week	Credits
1	CHM103	Engineering Chemistry	3	3
2	CHM104	Engineering Chemistry Lab	3	1.5
3	GED235	Physics	3	3
4	GED316	Physics Lab	3	1.5
		Total (6 Courses) =	**8**	**8**

INTERDISCIPLINARY COURSES [8 CREDITS]

Sl. No.	Course Code	Course Title	Contact Hours / Week	Credits
1	CSE105	Essential Computing	2	2
2	CSE106	Essential Computing Lab	2	1
3	CSE213	Computer Networks	2	2
4	CSE214	Computer Networks Lab	2	1
5	BME201	Basic Mechanical Engineering	2	2
		Total (5 Courses) =	**10**	**8**

EEE CORE COURSES [66 CREDITS]

Sl. No.	Course Code	Course Title	Contact Hours / Week	Credits
1	CSE215	Computer Programming	3	3
2	CSE216	Computer Programming Lab	3	1.5
3	EEE101	Electrical Circuit-I	3	3
4	EEE102	Electrical Circuit-I Lab	3	1.5
5	EEE103	Electrical Circuit-II	3	3
6	EEE106	Electrical Circuit-II Lab	3	1.5
7	EEE105	Electronics-I	3	3
8	EEE108	Electronics-I Lab	3	1.5
9	EEE207	Electronics-II	3	3
10	EEE208	Electronics-II Lab	3	1.5
11	EEE209	Digital Electronics	3	3
12	EEE210	Digital Electronics Lab	3	1.5
13	EEE301	Electrical Machine-I	3	3
14	EEE302	Electrical Machine-I Lab	3	1.5
15	EEE303	Electrical Machine-II	3	3
16	EEE304	Electrical Machine-II Lab	3	1.5
17	EEE315	Signal and System	3	3
18	EEE317	Electromagnetic Fields and Waves	3	3
19	EEE319	Microprocessor and Interfacing	3	3
20	EEE326	Microprocessor and Interfacing Lab	2	1
21	EEE321	Digital Signal Processing	3	3
22	EEE322	Digital Signal Processing Lab	3	1.5
23	EEE323	Communication Engineering	3	3
24	EEE324	Communication Engineering Lab	3	1.5
25	EEE325	Electrical Engineering Materials	3	3
26	EEE330	Electrical Engineering Drawing Lab	2	1
27	EEE443	Control Systems	3	3
28	EEE444	Control Systems Lab	3	1.5
29	EEE445	Transmission and distribution	3	3
		Total (29 Courses) =		**66**

ELECTIVE/CONCENTRATION COURSES (3X3+3X3=18 CREDITS)

Group-A (Power)

Sl. No.	Course Code	Course Title	Contact Hours / Week	Credits
1	EEE429	Energy Conversion-III	2	2
2	EEE430	Energy Conversion-III Lab	2	1
3	EEE431	Power Electronics	2	2
4	EEE432	Power Electronics Lab	2	1
5	EEE433	Operation and Control of Power System	2	2
6	EEE434	Operation and Control of Power System Lab	2	1
7	EEE445	Power Plant Engineering	3	3
8	EEE447	Power System Engineering	3	3
9	EEE449	High Voltage Engineering	3	3
10	EEE451	Power System Protection	2	2
11	EEE453	Power System Protection Lab	2	1
12	EEE454	Renewable Energy	3	3
		Total (12 Courses) =		**24**

Group-B (Electronics)

Sl. No.	Course Code	Course Title	Contact Hours / Week	Credits
1	EEE327	Semiconductor Devices	3	3
2	EEE335	Digital Integrated Circuit Design	2	2
3	EEE336	Digital Integrated Circuit Design Lab	2	1
4	EEE337	Digital Communication Electronics	2	2
5	EEE338	Digital Communication Electronics Lab	2	1
6	EEE457	Semiconductor Processing and Fabrication	3	3
7	EEE459	Optoelectronics	3	3
8	EEE461	Analog and Integrated Circuits	3	3
9	EEE463	VLSI Design	2	2
10	EEE464	VLSI Design Lab	2	1
		Total (10 Courses) =		**21**

Group-C (Communications)

Sl. No.	Course Code	Course Title	Contact Hours / Week	Credits
1	EEE339	RF And Microwave Engineering	2	2
2	EEE340	R And Microwave Engineering Lab	2	1
3	EEE465	Telecommunications Network & Switching	3	3
4	EEE467	Digital Communication	2	2
5	EEE468	Digital Communication Lab	2	1
6	EEE469	Wireless and Mobile Communication	3	3
7	EEE471	Optical Fiber Communication	3	3
8	EEE473	Satellite Communication	3	3
		Total (8 Courses) =		**18**

Group-D (Computer)

Sl. No.	Course Code	Course Title	Contact Hours / Week	Credits
1	EEE341	Microprocessor Based System Design	2	2
2	EEE342	Microprocessor Based System Design Lab	2	1
3	EEE475	Database System	3	3
4	EEE477	Real Time Computer System	3	3
5	EEE479	Computer Architecture	3	3
6	EEE481	Software Engineering	3	3
7	EEE483	Embedded System Design	3	3
		Total (7 Courses) =		**9**

Thesis/ Project Work

Sl. No.	Course Code	Course Title	Credits
1	EEE406	Thesis/ Project Work	6
		Total (1 Course) =	**6**

ENGLISH

GED111 FUNDAMENTALS OF ENGLISH

3 credits 3 hours/week
Word Formation, Nominal Group & Modifiers of Nouns, Verbs &Tenses, Sequence of Tense, Preposition, Model Auxiliaries, Subject –Verb Agreement, Simple Sentence &Its Structure, Use of Passive Expressions, Interrogative Sentence and types of Questions, Imperative & Expletory Sentences, Complex Sentence &Its Structure, Direct &Indirect Speech, Effective Writing

Books:
1. Sadruddin Ahmed: Learning English the Easy Way
2. Raymond Murphy: Intermediate English Grammar
3. Oxford Advanced Learner's Dictionary (Latest edition)

GED213 COMPOSITION AND COMMUNICATION SKILLS

3 credits 3 hours/week
Prerequisite: GED111 English Fundamentals.
Basic skills & Function of language, Basic English Pronunciation & Introduction to IPA, Basic speaking &Writing Skills, Effective Use of Language, Interpreting Different Types of texts in Different Contexts, Developing Language Skills for Producing Speeches & Written Forms, Writing Paragraph, Essay & Summary, CV Writing, Letter (Formal & Informal) &E-mail, Dictation Practice &Listing Comprehension, Reading Comprehension.

Books:
1. Jahirul Islam: An A Handbook of Paragraph Writing
2. Jack C. Richards: New Interchange.
3. Grand Taylor: English Conversation Practice

GENERAL EDUCATION COURSES (GED)

GED122 BASIC CONCEPT OF ISLAM

3 credits 3 hours/week
As a first course on Islam, it deals with the basic concepts of Islam and its message through ages. It offers the student a clear understanding of the fundamental beliefs of Islam and examines the impact of these beliefs in human life. Topics include: Islam - its meaning and message, Islam - the religion of submission to Allah, Islam - the religion of nature, Islam - the message to humanity, Islam - the mission of all Prophets, etc. It also covers Articles of faith or aspects of fundamental beliefs of Islam like belief in the Unity of Allah, belief in the Prophets and prophet hood, and its mission down from Adam (AS) to Prophet Muhammad (sw), belief in the Day of Judgment and life here-after. Finally, it examines the impact of belief in Unity of Allah, the prophet hood and the Day of Judgment on human life.

Books:
1. P.K. Hitti: History of the Arabs, ISBN-0333993497
2. Dr. Syed Mahmudul Hasan: ISLAM, ISBN-9840690214

GED327 QURAN, SCIENCE AND HUMANITY

3 credits 3 hours/week

This course deals with the program of life Islam offers for mankind, its achievements in the past, present situation and future prospects. Topics included in this course are: Man, as the vicegerent of Allah on earth, concept of ethics and morality in Islam, duties and responsibilities of a Muslim towards his! her family, society, state and the humanity at large, the achievement of Islam in culture and civilization. It also deals with the economic system of Islam, and more importantly, it tries to focus challenges facing Islam today and way to address these challenges.

Books:

1. Khurshid Ahmed: Muslim Contribution to Science & Technology, ISBN-9840604147
2. Tahajabir AI Alwani: Ethics of Disagreement in Islam, ISBN-1565641183

GED224 BANGLADESH STUDIES

3 credits 3 hours/week

It is designed to acquaint students with Bangladesh's socio-economic conditions. Emphasis is given on political feature, economic feature and the administrative framework of Bangladesh. The course also encompasses the activities of NGO in rural area and the role of donors in our economic development. This course analyses the process of social, political, and economical changes in Bangladesh while focusing on the factors that determine the direction of these changes. It also examines the national policies that intervene the process of social, political and economic development.

Books:

1. Rounaq Jahan: Bangladesh Politics: Problems & Issues, ISBN-9840510290
2. Sirajul Islam: History of Bangladesh 1704-1971, ISBN-9845 1233 76

GED235 LIFE AND TEACHINGS OF PROPHET MUHAMMAD (SW).

3 credits 3 hours/week

This course builds on the material presented in GED-1201. The course focuses on the basic tenets and rules of Islam. It tells the student what a Muslim should do and what he/she should not. The course presents Islam as the complete code of life. Topics covered in the course are: the pillars of Islam, the prayer (Salah) and the wisdom behind, fasting (Sawm) and its wisdom, payment of obligation charity to the poor (Zakah) and the wisdom behind, and performing' pilgrimage (Hajj) and its far-reaching impact and wisdom. It will also focus on the concepts of Halal and Haram in Islam, the Islamic Shariah (rulings) and its sources, i.e.; the book of Allah (al-Kitab), the tradition of the Prophet (Sunnah), the Consensus of Ummah (Ijma), the analogy (Qiyas) and the reformation (Ijtedah), Jihad –its real concept, the struggle for establishing good and revoking the Evil and so on.

Books:

1. Shayed Ali Ahasan: Moha Nobi, ISBN-984 I I 03655
2. Ahmed, Nur: Islam & Its Holy Prophet as Judged by The non-Muslim World, ISBN-978 I 403323477

GED316 QUR'ANIC LANGUAGE

3 credits 3 hours/week

Introduction to Arabic Alphabets and different forms of Arabic letter.

- Reading Arabic; Reading Practice
- Word for word Translation of Surahs ; Makhraz; Tazweed: Rules of Noon Sakin and Tanween ; Past Tense (فِعْل مَاضِي); Rules of Meem Sakin; Imperfect Tense (فِعْل مُضَارِع); Al Madd ; Negative Imperative (نَهْي) & Imperative (أَمْرَ) Tense ; 21 forms of verb فَعَلَ (commonly used verbs from فِعْل مَاضِي فِعْل مُضَارِع أَمْر نَهْي and اسم فَاعِل); Forms of verb فَتَحَ and جَعَلَ; Wazib Gunnah; اسم مَفْعُول

Forms of verb نَصَر and خَلَقَ ; Qalqala; Word for word Translation of Darud ; Word for word Translation of Du'a Masura ; Rules of RA; Some necessary Arabic conversation; Demonstrative and Relative Pronouns; - Rules of LAM ; Active and Passive verbs; - Sentence Building (جملة) ; Practice of Tazweed rules; Adjectives (صفات و موصوف); Memorizing 99 words which have occurred almost 40,000 times (out of approximately 78000 words) in the Qur'an. ; Practicing understanding Qur'an from the Qur'an according to methodology of the course. Educational and motivational tips

References:

1. Handout distributed by the course Instructor.
2. AlÊ, 'Abdullah Yusuf. (1992). The Meaning of the Qur'Én. Brentwood: Amana corporation.
   Asad, Muhammad. (1980). The Message of the Qur'Én. Gibraltar: DÉr al-AndalËs.
3. Alan Jones, Arabic Through the Qur'an, The Islamic Text Society, Cambridge, UK, 2008
4. AbdulWahid Hamid, Access To Qur'anic Arabic, MELS (Muslim Education & Literary Services, 2003
5. Brustad, kristen, Mahmoud Al-Batal, and Abbas Al-Tonsi. Alif Baa: Introduction to Arabic Letters and Sounds. Washington D.C.: Georgetown University Press, 1995.

GED338 ENVIRONMENTAL STUDIES

3 credits 3 hours/week

Introduction to Environmental Studies ; Meaning & Definition of Environment ; Scope & Approaches of Environmental Studies & Management; Relation to other Sciences; World population growth (pre-industrial period, renaissance period & modern period); Need for Development & Its Impacts on Environment; Fundamentals of Environment; The Universe; the planet earth and Earth structure; Types & Elements of Environment; Physical and Social or Cultural; Ecology & Ecosystem; Definition, meaning and concept of Ecology; Definition of ecosystem; Components of ecosystem; Biotic & Abiotic; Functions of ecosystems; Ecosystem resilience; Ecosystem diversity & conservation; Ecological Production and Energy flow in the Ecosystem ; Source of Energy, Ecological production; Trophic levels, Food chain & food waves; Ecological pyramids, Energy and nutrient flow; Circulation of Matter in the Ecosystem; Biogeochemical cycle; Water cycle, Carbon cycle, Nitrogen cycle; Global Environmental problems; Definition of weather & climate, Global warming, Causes of Global warming; Climate change, Greenhouse gases & Greenhouse effect, Ozone layer depletion; Deforestation & desertification, Impact of Global warming, Climate change & Bangladesh; Protection Measures; Environmental Degradation; Definition, concepts, types, process and causes of environmental degradation; Factors and elements of Environmental degradation; Environmental Pollution ; Definition meaning and types of Environmental Pollution; Pollutants; Sources of Pollutants; Water pollution, Air Pollution, Soil or Land Pollution; Noise pollution; Social pollution; Environmental pollution in the context of Bangladesh; Hazards & Disasters; Definition of hazards, types of hazards; Flood, Cyclone, Drought, Landslide; Earthquake and Tsunami; Hazards & Disasters of Bangladesh; Environmental Management and protection; Environmental Impact Assessment (EIA): Definition, Objectives, Methods & techniques; Environmental policies, sustainable development; National and International agencies; IPCC, IUCN role in environmental protection. Bio-diversity and Wildlife Conservation; Biodiversity: Meaning. Definition, elements and types; causes and consequence of Bio-diversity loss, conservation of Biodiversity. Importance of Bio-diversity; Wildlife: Meaning, causes and consequence of wildlife loss, process of wildlife conservation and importance of wildlife management; Environmental Resources; Meaning and types of Environmental Resources; Environment & food, Economy and public health; Environmental Resources of Bangladesh.

References:

1. A Text book of Environmental Science'' by Guha bakshi-sen-benerjee.
2. "Environmental Geography'' by Savindra sing .
3. ''Disaster in Bangladesh.'' by Nizamuddin.
4. "Environmental degradation Challenges of the 21st century" by Zinatunnessa R.M.M. Khuda

GEA327 PEACE AND CONFLICT STUDIES

3 credits 3 hours/week

Peace: Meaning, concept and dimensions of peace; Positive peace, Negative Peace. Conflict: Meaning and formation; factors of conflict; causes and consequences of conflict. Different forms of conflict and Conflict Resolution; Different parties involve in the conflict; Violence: Structural violence, Direct Violence, Conflict Reclusion, Conflict Management, Conflict Transformation towards peace, Armament and disarmament, world military expenditure and its impact on the development, National development through Peace Education, Culture of Peace and Peace Studies, International Education and Peace Studies, United Nations forums and its role in the Peace Building.

Books:

1. Smoker, Paul, Ruth Davies and Barbara Munske, (eds.): A reader in Peace Studies (Pergamon Press, 1990).
2. Martin Ceadel: Thinking about Peace and War, (Oxford University Press, 1987).
3. Michael Renner, Critical Juncture: The Future of Peace Keeping, (World Watch Paper, 1993).
4. Anima Bose (ed.): Peace and Conflict Resolution in the World Community, (Vikas Publishing House, 1991).
5. Donta, B.D: Conflict Resolution Among Peaceful Society; The Culture of Peacefulness, Journal of Peace Research, Vol, 33, No. 4, 1996, pp.(403-420)

GEA316: COMPARATIVE SOCIAL SYSTEM

3 credits 3 hours/week

Introducing Comparative Social System; Socio-Historical Background of Human Civilization: A Comparison; Origin and development of human civilization: Theological and sociological thinking; Types of civilization; Development of Social System; Conceptualizing globalization, trends of globalization; Factors contributing to globalization; Culture, Society and Life Styles; Diffusion and transmission of culture, socialization and its agencies; Cultural variation in the world: A Comparative Analysis; Crime and Deviance: Concepts and Theories; Conceptualizing crime, deviance and labeling. Patterns of crime in the contemporary world; Theorizing criminal behavior; Family, marriage and intimate relationships; Marriage system and its patterns; Changing life styles and intimate relationships; Economic System and Globalization: Issues on Global Debate; Economic transformation in capitalistic system; Alternative models to capitalism: Communism, socialism, welfare state and Islam; Zakat system as an initiative to alleviate poverty is a society; Beliefs and Religious Systems; Varieties of religion: Political System and State Formation; Concepts of authority; Global spread of Democracy and Islam; Social Problems and Development: Issues of World Politics; Population and environment: Population growth, A Malthusian trap, endangered environment policies; Urbanization: Trends, Mega city, urban problems, planning policies; Social inequality and poverty;

References:

1. Giddense, Anthony. 2009 (6th edition). Sociology. London: The Polity Press
2. MaCionis, John J. 2012. Sociology. New Jersey: Pearson.
3. Wallbank, Thomas W. and Alastair MaCdonald Taylor. 1992. Civilzation: Past and Present.
4. MeKee, Michael and Ian Robertson. 1980. Social Problems. New York: Random House.
5. Bottomore, T.B, Socioloy, George Allen & Unwin Lit. London, 1964

GEA122: HISTORY

3 credits 3 hours/week

Advent of the Muslims, Bakhtiyar Khalji, Rule of the Khalji Chiefs, Bllias Shahi Rule: Shamsuddin Ilias Shah, Sikandar Shah, Ghyasuddin Azam Shah, Raja Ganaesh and his successor, Afgan Rule, Establishment of Maghal rule, Conquest of Bengal by Akbar; Bara Bhuiyans; Subadar Islam Khan, Subadar Mir Jumla; Subadar Shaesta Khan, Advent of the Europeans, Bengal under the Nawabs: Murshid Quli Khan, Alivardi Khan, Sirajuddoula, Indian on the eve of Mughal conquest: Political social and economic condition, Babar and the foundation of the Mughal empire, Humayun and Sher Shah, Akbar: Restoration and recognition of the Empire, Jahangir and Shahajahan, Aurangazeb, Decline and downfall of the Mughal empire, Government, society, art and culture under the Mughul empire, Growth of British power in South Asia: Battle of Polashi, Battle of Buxar, Grant of Diwani, Dual Government, South Asia under company's administration: Administrative,

social, economic and judicial reforms, Land settlement, educational policy, Social and Political Movements: Sir Syed Ahmed Khan and Aligahr Movement, Syed Ameer Ali and Nawab Abdul Latif, Foundation of the All Indian National Congress (1885); Partition of Bangal (1905) Foundation of All Indian Muslim League, Khilafat Movement, Non-Cooperation Movement, Civil Disobedience; Indian Independence Act of 19.

MATHEMATICS

MTH104 DIFFERENTIAL CALCULUS AND CO-ORDINATE GEOMETRY

3 credits 3 hours/week

Differential calculus: Limit, continuity and differentiability. Successive differentiation of various types of functions. Leibnitz's theorem. Rolle's theorem. Mean value theorems. Taylor's and Maclaurin's theorems in finite and infinite forms. Lagrange's form of reminders. Cauchy's form of reminders. Expansion of functions by differentiation and integration. Evaluation of indeterminate forms by L'Hospitals rule. Partial differentiation Euler's theorem. Tangent and normal. Subtangent and subnormal in Cartesian and polar co-ordinates. Determination of maximum and minimum values of functions and points of inflection. Applications. Curvature: radius, circle, centre and chord of curvature. Asymptotes

Coordinate Geometry: 2-Dimensional Co-ordinate Geometry: change of axes transformation of coordinate, simplification of equations of curves. 3- Dimensional Co-ordinate Geometry: system of coordinates, distance between two points, section formula, projection, direction cosines, equations of planes and lines.

Books:

1. Luther Pfahler Eisenhart: Coordinate Geometry, Dover Publishing Inc.
2. A text book on Co-ordinate Geometry: Rahman And Bhattacharjee
3. Howard Anton, Irl Bivens and Stephen Devis: Calculus, John Wiley and Sons.
4. Differential Calculus: B.C. Das

MTH201 INTEGRAL CALCULUS AND DIFFERENTIAL EQUATION

3 credits 3 hours/week

Integral Calculus: Integration by the method of substitution. Standard integrals. Integration by successive reduction. Definite integrals, its properties and use in summing series. Walli's formulae. Improper integrals. Beta function and Gamma function. Area under a plane curve and area of region enclosed by two curves in Cartesian and polar co-ordinates. Volumes of solids of revolution. Volumes of hollow solids of revolution by shell method. Area of surface of revolution. Jacobians. Multiple integrals with applications. Ordinary Differential Equations: Degree and order of ordinary differential equations. Formation of differential equations. Solutions of first order differential equations by various methods. Solution of general linear equations of second and higher orders with constant coefficients. Solution of homogeneous linear equations. Solution of differential equations of the higher order when the dependent or independent variables are absent. Solution of differential equation by the method based on the factorization of the operators. Frobenius method. Partial Differential Equations: Formation of PDEs & First order linear PDEs. Solution of PDEs of first order; Lagrange's Method. Second Order homogeneous & non-homogeneous PDEs with constant coefficients. Wave equations. Particular solutions with boundary and initial conditions. Special Functions: Legendre differential equation and Legendre polynomials, Recurrence relations for Legendre polynomials, Spherical harmonics, Bessel differential equation, Bessel functions, Recurrence relations for Bessel functions, Modified Bessel functions, Hermite differential equation, Hermite polynomials, Hyper-geometric function

Books:

1. M. R. Spiegel: Calculus and Analysis, Schaums's outline series.
2. George F. Simmons: Differential Equations, McGraw-Hill.
3. R. Kent Nagle, Edward B. Saff and Arthur David Snider: Fundamentals of Differential Equations, Addison-Wesley.
4. Integral Calculus: B.C. Das
5. Differential Equation: B.D. Sharma

MTH203 COMPLEX VARIABLE, FOURIER SERIES AND LAPLACE TRANSFORM

3 credits 3 hours/week

Complex variable: Complex number system. General functions of complex variable. Limits and continuity of a function of a complex variable and related theorems. Complex differentiation and the Cauchy-Ricmann equations. Infinite series. Convergence and uniform convergence. Line integral of a complex function. Cauchy integral formula. Liouville's theorem. Taylor's and Laurent's theorem. Singular points. Residue. Cauchy residue theorem. Harmonics solution of laplace's equation, cylindrical harmonics, spherical harmonics. Laplace Transforms: Definition. Laplace transforms of some elementary functions. Sufficient conditions for existence of Laplace transforms. Inverse Laplace transforms. Laplace transforms of derivatives. The unit step function. Periodic function. Some special theorems on Laplace transforms. Partial fraction. Solution of differential equations by Laplace transforms. Evaluation of improper integrals. Fourier Analysis: Real and complex forms of Fourier series. Finite transform. Fourier integral. Fourier transforms and their uses in solving boundary value problems.

Books:

1. Complex Variables and Applications, Schaum's Outline Series.
2. Complex Variable: M.R Spiegel

MTH205 LINEAR ALGEBRA AND VECTOR ANALYSIS

3 credits 3 hours/week

Linear Algebra: Introduction to systems of linear equations, Gaussian elimination, definition of matrices, algebra of matrices, transpose of a matrix and inverse of matrix, factorization, determinants, quadratic forms, matrix polynomials. Euclidean n-space, linear transformation IR n to IR m. Properties of linear transformation from IRn to IRm. Real vector spaces a subspaces. Basis and dimension. Rank and nullity. Inner product spaces. Gram- Schmidt process and QR-decomposition. Eigen values and Eigen vectors. Diagonalization linear transformation: Kernel and Range. Application of linear algebra to electric networks. Vector Analysis: definition of vectors. Equality, addition and multiplication of vectors. Linear dependence and independence of vectors. Differentiation and integration of vectors together with elementary applications. Definitions of line, surface and volume integrals. Gradient of a scalar function, divergence and curl of vector function. Physical significance of gradient, divergence and curl. Various formulae. Integral forms of gradient, divergence and curl. Divergence theorem. Stoke's theorem. Green's and gauss's theorem.

Books:

1. Anton: Elementary Linear Algebra Murray R. Spiegel: Vector Analysis, Schaum's Series.
2. Matrices: M.L Khann

STS 301 STATISTICS AND PROBABILITY

2 credits 2 hours/week

Definition: Data, types of data, processing of data, tabulation, graphical representation of data, variables, various types of variables, preparation of frequency distribution table, graphical representation, frequency polygon, histogram, ogive curve Central Tendency: Central tendency and its measures, mean, median, mode, shape of the frequency curve and inequalities among them. Calculation of mean, median& mode from a given data and median and mode from graph. Dispersion: definition, it measures, range, mean deviation, standard deviation, quartile deviation, co-efficient of variation, estimation of the measures from a given set of data, skewness and kurtosis. Correlation Analysis: definition, formula for calculating correlation co-efficient for a given pairs of data, use of shortcut methods and interpretation of the co-efficient, limits of the co-efficient. Regression Analysis: Concept, bivariate relation between x & y, regression of y on x and that of x on y, estimation of parameters using OLS and their interpretation, relation between regression co-efficient and correlation co-efficient. Probability: Experiment, out course of an experiment, sample space, event, Exclusive event, probability of an event. Additive law of Probability, multiplicative law of Probability Conditional Probability Independence of event, Probability distribution, expectation, mean, variance etc. Probability density function and its properties. Binomial distribution, its mean variance and moment generating function, moments and properties. Poisson distribution, its mean variance and moment generating function, moments and properties. Gama distribution, its mean variance and moment generating function, moments and properties. Beta distribution, its mean variance and moment generating function, moments and properties.Normal distribution, its mean variance and moment generating function, moments and properties.

References:
1. M. A. Miah & M Alimullah Miah : Introduction to Statistics
2. M. N Islam: Introduction to Statistics and Probability.

Books:
1. Walpole Myers, YE: Probability and Statistics for Engineers and Scientists, 7th edition.
2. William Mendenhall, Robert J Beaver and Barbara M. Beaver: Probability and Statistics.

MTH311: NUMERICAL ANALYSIS

Credits: 3.0, 3 hours/week
Introduction, solution of algebraic and transcendental equations: Method of iteration, False position method, Newton-Raphson method, solution of simultaneous linear equation: Cramer's rule, Iteration method, Gauss Jordan Elimination method, Choleski's process, Interpolation: Diagonal and horizontal differences, Differences of a polynomial, Newton's formula for forward and backward interpolation, Spline Interpolation, Integration: General quadrature formula, Trapezoidal rule, Simpson's rule, Weddle'srule, solution of ordinary differential equations: Euler's method, Picard's method, Milne's method, Taylor's series method, Runge- Kutta method, Least squares approximation of functions: Linear and polynomial regression, Fitting exponential and trigonometric functions.

Text Books:
1. Advanced Engineering Mathematics by Erwin Kreyszig E. Kreyszig
2. Numerical Methods for Engineers with software and Programming Applications by Steven C. Chapra and Raymond P. Canale
3. Engineering Mathematics by K. A. Stroud Dexter J. Booth
4. Mathematical Methods for Physics and Engineering by Ken F. Riley, Mike P. Hobson, Stephen J. Bence
5. Numerical Analysis by Richard L. Burden, J. Douglas Faires
6. Introduction to Numerical Analysis by F. B. Hildebrand

BASIC SCIENCES

CHM103: ENGINEERING CHEMISTRY

3 Credits 3hours / week
Atomic Structure, Quantum numbers, Electronic configuration, Periodic table. Properties and uses of noble gases. Different types of chemical bonds and their properties. Molecular structure of compounds. Selective organic reactions. Different types of solution and their compositions. Phase rule, phase diagram of mono-component system. Liquid crystals, chemical equilibriums. Ionization of water and pH concept. Electrical properties of solution. Electrolysis and electroplating. Electroplating and its importance. Electrochemistry; Mechanism of electrolytic conduction. Transport number, Kohl – Rausch's law. Different types of cells, cell emf. Single electrode potentials, secondary cells or Accumulators, Lead accumulator and alkaline accumulator. Nernst Equation. Electrochemical cell; Redox number; electrode potential.
Text Books:
1. Mungi G. Bawendi, Robert A. Alberty, Robert J. Sibly, Physical Chemistry, John Wiley and Sons.
2. Organic chemistry, by Brown and Foote, 2nd Edition.
3. D. D. Ebbing General Chemistry. 7th Edition.

CHM104: ENGINEERING CHEMISTRY LAB

Credit: 1.0, Credit hours/week-2
Experiments based on CHM101.

PHY103 PHYSICS (Heat & Thermodynamics, Waves and Oscillations, and Optics)

3 credits 3 hours/week

Heat & thermodynamics: Principle of temperature measurements: Platinum resistance thermometer, Thermo-electric thermometer, Pyrometer; Kinetic theory of gases: Maxwell's distribution of molecular speeds, Mean free path, Equipartition of energy, Brownian motion, Van der Waal's equation of state, Review of the First law of thermodynamics and its application, Reversible & irreversible processes, Second law of thermodynamics, Carnot; Efficiency of heat engines, Carnot theorem, Entropy and Disorder, Thermodynamic Functions, Maxwell relations, Clausius-Clapeyron equation, Gibbs phase rule, Third law of thermodynamics Waves & Oscillations: Differential equation of a Simple Harmonic Oscillator, Total energy & average energy, Combination of simple harmonic oscillation, Lissajous figures, Spring-mass system, Calculation of time period of torsional pendulum, Damped oscillation, Determination of damping co-efficient. Forced oscillation. Resonance, Two-body oscillation. Reduced mass Differential equation of a progressive wave, Power & intensity of wave motion, Stationary wave, Group velocity & Phase velocity. Physical Optics: Theories of light: Interference of light, Young's double slit experiment, Displacements of fringes & its uses. Fressnel Bi-prism, Interference at wedge shaped films, Newton's rings, Interferometers; Diffraction of light: Fresnel and Fraunhoffer diffraction. Diffraction by single slit. Diffraction from a circular aperture, resolving power of optical instruments, Diffraction at double slit & N-slits- diffraction grating; Polarization: Production & analysis of polarized light, Brewster's law, Malus law, Polaroid. Properties of Matter: States of matter; Elastic properties of solids: Coefficients of elasticity, Energy calculation; Flow of liquids: Equation of continuity, Laminar and turbulent flow, Reynolds number & its significance, Bernoullis theorem and its application; Viscosity: poiseulles equation, Motion in a viscous medium, determination of coefficient of viscosity; Surface tension as a molecular phenomenon, surface energy, Capillarity and angle of contact, Quincke's method

Books:

1. Halliday, Resnick and Walker: Fundamentals of Physics, 7th edition
2. Brijlal: Heat and Thermodynamics, 1st edition
3. Tofazzal Hossain: A Text Book of Heat, 2nd edition.
4. N. Subrahmanyum and Brij Lal: A textbook of Optics, S. Chand and Company Ltd.

PHY104 PHYSICS LAB

1 credit, 2 hours/week

Experiments based on PHY103

INTER-DISCIPLINARY ENGINEERING COURSES

CSE105 ESSENTIAL COMPUTING

2 credits 2 hours/week

Introduction: Brief history and types of computers, application areas, working features of a computer system, Use of Computer, Classification of Computer. , Hardware: Organization and architecture of PC, Motherboards and Microprocessors. Memory units and other functional parts: Primary memory, Secondary memory, I/O Devices, peripheral devices, BIOS, AT/XT, ISA, EISA, PCI Bus Architecture.

Number System Conversion: Decimal, Binary, Octal and Hexadecimal Number Systems; Conversion from one number system to another; Octal and Hexadecimal Addition, subtraction, multiplication and division. Logic gates and Boolean algebra: Basic and Compound Logic gates with their truth tables and circuit design, Basic rules of Boolean algebra, De-Morgan Theorems, Minimization techniques. Software: Classifications, System software, Operating system concepts, importance, components and basic DOS commands, Windows and UNIX operating systems. Application software: Word-word processing, spreadsheet database and presentation software. Multimedia systems, Computer Networks and Internet: Basic concepts of LAN, MAN, WAN and Internet systems, Internet services, online and off-line processing, E-mail and WWW. Selection of computers, hardware, software and cost consideration. Maintenance of PC: Power supply stability, grounding, Effects of surge, surge current and its protection, Effect of static charge on computer devices. Handling of computers cards and chips, computer viruses and virus protection, software troubleshooting and maintenance;

Books:

1. Donald H. Sanders: Computer Concept & Applications, ISBN-0070547440
2. P.Norton: Introduction to Computer, ISBN-0070447438

CSE106 ESSENTIAL COMPUTING SESSIONAL

1 credit, 2 hours/week
Sessional based on CSE105

CSE213 COMPUTER NETWORKS

2 credits, 2 hours/week
Network architectures- layered architectures and ISO reference model: data link protocols, error control, HDLC, X.25, flow and congestion control, virtual terminal protocol. data security, Local area networks, satellite networks, packet radio networks, Introduction to ARPANET, SNA and DECNET, Topological design and queuing models for network and distributed computing systems.

Books:
1. Andrews Tanenboum: Computer Networks, 5th edition, Prentice Hall of India, 2004.
2. W. Stallings: Computer Networking with Internet Protocols, 1st edition, Prentice Hall of India, 2004.
3. U. D. Black: Computer Networks: Protocols Standard and Interfaces, 5th ed., Prentice Hall, 1997.

CSE214 COMPUTER NETWORKS LAB

1 credit, 2 hours/week
Laboratory works based on CSE213.

BME201 BASIC MECHANICAL ENGINEERING

2 credits, 2 hours/week
Introduction to sources of energy, Study of steam generation units, introduction to steam turbine, internal combustion engines, gas turbine and automobile. Introduction to pumps, blowers and compressors. Introduction to basic modes of heat transfer: steady state one dimensional conduction and convection. Introduction to refrigeration and air conditioning systems.

Book:
1. R. L. Timings: Fundamentals of Mechanical Engineering.

EEE CORE COURSES

CSE215 COMPUTER PROGRAMMING

3 credits 3 hours/week
Introduction to digital computers. Programming languages, algorithms and flow charts. Structured Programming using C. Variable and constants, operators, expressions, control statements, function, arrays, pointers, structure unions. User defined data types. Input output and files. Object oriented Programming using C++: introduction, classes and objects; polymorphism; function and operator overloading; inheritance.

Books:
1. E. Balagurusamy: Programming in ANSIC, McGraw-Hill Education.
2. Byron Gottfried: Schaum's Outlines Programming with C, McGraw-Hill.
3. Hertbert Schildt: Teach Yourself C, 3rd Edition, McGraw-Hill

CSE216 COMPUTER PROGRAMMING LAB

1.5 credits, 3 hours/week
This course consists of two parts. In the first part students will perform experiments to verity practically the theories and concepts learned in CSE215. In the second part students will learn program design.

EEE101 ELECTRICAL CIRCUITS I

3 credits, 3 hours/week

DC Circuits: Basic concepts: Voltage, current, power, energy, independent and dependent sources, resistance, Ohm's law, Equivalent Resistance: Series, parallel and series parallel combinations, wye-delta transformation. Kirchoff's current and voltage laws, voltage and current division rules. Electrical circuit analysis Techniques: Nodal and mesh analysis including super node and supermesh. Network theorems: Source conversion, Thevenin's, Norton's and superposition theorems, maximum power transfer theorem and reciprocity theorem. Inductors and capacitors and their series parallel combinations. Natural and step responses of RL and RC circuits. Magnetic Circuits: Basic concepts: Flux, permeability and reluctance. magnetic field strength, magneto motive force (mmt), flux density, magnetization curve. Ohm's law as applicable in magnetic circuits and Ampere's circuital law. Analysis of series, parallel and series-parallel magnetic circuits.

Books:

1. Charles K. Alexander and Mathew N. O. Sadiku: Fundamentals of Electric Circuits, 2nd Edition, McGraw Hill Higher Education, 2004.
2. J. W. Nilsson and S. Riedel: Electric Circuits, 7th ed., Prentice Hall, 2004.

EEE102 ELECTRICAL CIRCUITS I LAB

1.5 credits, 3 hours/week

EEE103 ELECTRICAL CIRCUITS II

3 credits, 3 hours/week

Prerequisite: EEE101: Electrical Circuits I

Basic concepts of AC generation, AC quantities: Instantaneous, average and effective current, voltage and power, impedance, real and reactive power, power factor. Phasor algebra: addition, subtraction, division, multiplication and power root. Phaser diagrams. Analysis of single-phase ac circuits: Series and parallel RL, RC and RLC circuits, nodal and mesh analysis, network theorems in ac circuits, circuits simultaneously: excited by sinusoidal sources of several frequencies. AC transient response of RL and RC circuits. Resonance: Series and parallel resonance, Q-factor. Magnetically coupled circuits. Analysis or poly phase systems: Poly phase systems, three phase supply, balanced and unbalanced systems, and power calculation.

Books:

1. Charles K. Alexander and Mathew N. O. Sadiku: Fundamentals of Electric Circuits, 2nd Edition, McGraw Hill Higher Education, 2004.
2. J. W. Nilsson and S. Riedel: Electric Circuits, 7th ed., Prentice Hall, 2004.
3. J. D. Irwin: Basic Engineering Circuit Analysis, 7th ed., Wiley, 2001.

EEE106 ELECTRICAL CIRCUITS II LAB

1.5 credits 3 hours/week

Laboratory experiments based on EEE101 and EE103

EEE105 ELECTRONICS I

3 credits 3 hours/week

Prerequisite: EEE101: Electrical Circuits I

Semiconductors: intrinsic and extrinsic semiconductors, Fermi level, n type and p type semiconductor. p-n junction diode: structure and physical operation, contact potential current-voltage characteristics of a diode, simplified dc and ac diode models, dynamic resistance and capacitance. Diode circuits: Half wave and full wave rectifiers.

Characteristics of a Zener diode, and Zener shunt regulator. Junction Field-Effect-Transistor (JFET): Structure and physical operation of JFET, transistor characteristics. Metal-Oxide Semiconductor Field-Effect-Transistor (MOSFET): structure and physical operation of MOSFETs, body effect, current- voltage characteristics of MOSFETs, biasing discrete and integrated MOS amplifier circuits, single-stage MOS amplifiers, MOSFET as a switch, CMOS inverter. Bipolar junction transistor (BJT): structure and physical operation, BJT characteristics and different regions of operations, BJT as an amplifier, biasing the BJT for discrete circuits, small signal equivalent circuit models, BJT as a switch. Single stage BJT amplifier circuits and their configurations: Voltage and current gain, input and output impedances.

Books:

1. Adel S. Sedra and Kenneth C. Smith: Microelectronics Circuits, 5th Edition, International Student Edition, Oxford University Press, 2004.
2. David A. Bell. Ashoke K Ghosh: Electronics Devices and Circuits.

EEE108 ELECTRONICS I LAB

1.5 credits 3 hours/week

EEE207 ELECTRONICS II

3 credits 3 hours/week

Prerequisite: EEE105: Electronics I

Frequency response of amplifiers: Poles, zeros and Bode plots, amplifier transfer function, techniques of determining 3 dB frequencies of amplifier circuits, frequency response of single-stage and cascade amplifiers, frequency response of differential amplifiers. Operational amplifiers (Op-Amp): Properties of ideal Op-Amps, non-inverting and inverting amplifiers, inverting integrators, differentiator, weighted summer and other applications of Op-Amp circuits, effects of finite open loop gain and bandwidth on circuit performance, logic signal operation of Op-Amp, dc imperfections. General purpose Op-Amp: DC analysis, small-signal analysis of different stages, gain, 'frequency response of 741 Op-Amp. Negative feedback: properties, basic topologies, feedback amplifiers with different topologies, stability, and frequency compensation. Active filters: Different types of filters and specifications, transfer functions, realization of first and second order low, high and bandpass filters using Op-Amps. Signal generators: Basic principle of sinusoidal oscillation. Op-Amp RC oscillators. LC and crystal oscillators. Power Amplifiers: Classification of output stages, class A, B and AB output stages. Tuned voltage (RF.IF) and power amplifiers (class C).

Books:

1. Adel S. Sedra and Kenneth C. Smith: Microelectronics Circuits, 5th Edition, International Student Edition, Oxford University Press, 2004.
2. M. N. Horenstein: Microelectronic Circuits and Devices, Prentice Hall.

EEE208: ELECTRONICS II LAB

1.5 credits 3 hours/week

Laboratory experiments based on EEE105 and EEE207

EEE209 DIGITAL ELECTRONICS

3 credits 3 hours/week

Prerequisite: EEE105: Electronics I

Introduction to number systems and codes. Analysis and synthesis of digital logic circuits: Basic logic functions, Boolean algebra, combinational logic design, minimization of combinational logic. Implementation of basic static logic gates in CMOS and Bic MOS: DC characteristics, noise margin and power dissipation. Power optimization of basic gates and

combinational logic circuits. Modular combinational circuit design: pass transistor, pass gates, multiplexer, demultiplexer and their implementation in CMOS, decoder, encoder, comparators, binary arithmetic elements and ALU design. Programmable logic devices: logic arrays, field programmable logic arrays and programmable read only memory. Sequential circuits: different types of latches, flip-flops and their design using ASM approach, timing analysis and power optimization of sequential circuits. Modular sequential logic circuit design: shift registers, counters and their applications.

Books:
1. Morris Mano: Digital Design, 3rd Edition, Prentice Hall.
2. T. L. Floyd: Digital Fundamentals, Prentice-Hall

EEE210 DIGITAL ELECTRONICS LAB

1.5 credits 3 hours/week
Laboratory experiments based on EEE105

EEE301 ELECTRICAL MACHINES I

3 credits 3 hours/week
Prerequisite: EEE103: Electrical Circuits II
Review of magnetic field concepts, Electromechanical energy conversion fundamentals: Faraday's law of electromagnetic induction, Flemming's left hand rule and right hand rule and Lenz's law.DC generator: Types, no-load voltage characteristics, build-up of a self-excited shunt generator, critical field resistance, load-voltage characteristic, effect of speed on no-load and load characteristics and voltage regulation. Commutations. Series motor. DC motor: Torque, counter emf.,speed, torque-speed characteristics, starting and speed regulation. Transformer: Ideal transformer - transformation ratio, no-load and load vector diagrams; actual transformer - equivalent circuit, regulation, short circuit and open circuit tests; Efficiency; All- day efficiency parallel operation, autotransformer and three phase transformers. Comparison between generator and motor action.

Books:
1. Rosenblatt, Friedman: Direct and Alternating Current Machinery, 2nd Edition
2. B.L. Theraja, A.K. Theraja: A Text book of Electrical Technology, Vol- II, AC & DC Machines

EEE-302: ELECTRICAL MACHINES I LAB

1.5 credits 3 hours/week
Laboratory experiments based on EEE301

EEE303 Electrical Machines II

3 credits 3 hours/week
Prerequisite: EEE301 Electrical Machines I
Three phase induction motor: Rotating magnetic field, equivalent circuit, vector diagram, torque-speed characteristics, effect of changing rotor resistance and reactance on torque-¬speed curves, motor torque and developed rotor power, no-load test, blocked rotor test, starting and braking, speed control, Circle diagram. Linear Motor, Magnetic Lamination. Introduction to reneable energy: Vector group of Three Phase Transformer, Three Phase Transformer Bank (Harmonics). Single phase induction motor: Theory of operation, equivalent circuit and starting. Synchronous Generator: excitation systems, armature reaction, two reaction theory, equivalent circuit, vector diagrams at different loads, factors affecting voltage regulation, synchronous impedance, synchronous impedance method of predicting voltage regulation and its limitations. Parallel operation: Necessary conditions, synchronizing, circulating current and vector diagram. Synchronous motor: Operation and starting; effect of loading under different excitation condition, effect of

load changing. V-curves and starting, Loss and Efficiency. Excitation for AC Generator.

Books:
1. Rosenblatt, Friedman: Direct and Alternating Current Machinery, 2nd Edition
2. B.L. Theraja, A.K. Theraja: A Text book of Electrical Technology, Vol- II, AC & DC Machines
3. A.E Puchstein, T.C. Lioyd& A.G. Conard: Alternating Current Machines.

EEE304: ELECTRICAL MACHINES II LAB

1.5 credits 3 hours/week
Laboratory experiments based on EEE303

EEE315 SIGNALS AND SYSTEMS

3 credits 3 hours/week
Prerequisites: MTH103: Differential Equations & Complex Variables, MTH105: Linear Algebra and Vector Analysis, EEE103: Electrical Circuits II
Classification of signals and systems: signals - classification, basic operation on signals, elementary signals, representation of signals using impulse function: systems -classification. Properties of Linear Time Invariant (LTI) systems: Linearity, causality, time invariance, memory, stability, invertibility. Time domain analysis of L TI systems: Differential equations - system representation, order of the system, solution technique, zero state and zero input response, system properties: impulse response convolution integral, determination of system properties: slate variable - basic concept, state equation and time domain solution. Frequency domain analysis of LTI systems: Fourier series-properties, harmonic representation, system response, frequency response of LTI systems: Fourier transformation- properties, system transfer function, system response and distortion-less systems. Applications of time and frequency domain analysis: solution of analog electrical and mechanical systems, amplitude modulation and demodulation, time-division and frequency-division multiplexing. Laplace transformation: properties, inverse transform, solution of system equations, system transfer function, system stability and frequency response and application.

Books:
1. Oppenheim, Will sky, and Nawab: Signals and Systems, 2nd Edition, Prentice Hall, 1997.
2. Samir S. Soliman and Mandyan D. Srinath: Continuous and Discrete Signals and Systems.

EEE317 ELECTROMAGNETIC FIELDS AND WAVES

3 credits 3 hours/week
Prerequisites: PHY203 Physics II, MTH101Differential and Integral Calculus and MTH207 Co-ordinate Geometry.
Static electric field: Postulates of electrostatics. Coulomb's law for discrete and continuously distributed charges. Gauss's law and its application, electric potential due to charge distribution., conductors and dielectric in static electric field, flux density -boundary conditions; capacitance electrostatic energy and forces, energy in terms of field equations, capacitance calculation of different geometries; boundary value problems - Poisson's and Laplace's equations in different co-ordinate systems. Steady electric current: Ohm's law, continuity equation. Joule's law, resistance calculation. Static Magnetic field: Postulates of magnetostatics. Biot-Savart's law. Ampere's law and applications, vector magnetic potential, magnetic dipole, magnetization, magnetic field intensity and relative permeability, boundary conditions for magnetic field. magnetic energy, magnetic forces, torque and inductance of different geometries. Time varying fields and Maxwell's equations: Farauay's law of electromagnetic induction. Maxwell's equations-differential and integral forms, boundary conditions, potential functions; time harmonic fields and Poynting theorem. Plane electromagnetic wave: plane wave in loss less media. Doppler effect, transverse electromagnetic wave, polarization of plane wave; plane wave in lossy media, low-loss dielectrics. good conductors; group velocity, instantaneous and average power densities, normal and oblique incidence of plane waves at plane boundaries for different polarization.

Books:
1. William H Hayt Jr, John A Buck: Engineering Electromagnetic, 6th edition.
2. David M. Pozar: Microwave Engineering, Wiley Text Books; 2nd edition.
3. E. C. Jordan and K. G. Balmain: Electromagnetic Waves and Radiating Systems, Prentice-Hall Inc., N. Y., 1968.

combinational logic circuits. Modular combinational circuit design: pass transistor, pass gates, multiplexer, demultiplexer and their implementation in CMOS, decoder, encoder, comparators, binary arithmetic elements and ALU design. Programmable logic devices: logic arrays, field programmable logic arrays and programmable read only memory. Sequential circuits: different types of latches, flip-flops and their design using ASM approach, timing analysis and power optimization of sequential circuits. Modular sequential logic circuit design: shift registers, counters and their applications.

Books:
1. Morris Mano: Digital Design, 3rd Edition, Prentice Hall.
2. T. L. Floyd: Digital Fundamentals, Prentice-Hall

EEE210 DIGITAL ELECTRONICS LAB

1.5 credits 3 hours/week
Laboratory experiments based on EEE105

EEE301 ELECTRICAL MACHINES I

3 credits 3 hours/week
Prerequisite: EEE103: Electrical Circuits II
Review of magnetic field concepts, Electromechanical energy conversion fundamentals: Faraday's law of electromagnetic induction, Flemming's left hand rule and right hand rule and Lenz's law.DC generator: Types, no-load voltage characteristics, build-up of a self-excited shunt generator, critical field resistance, load-voltage characteristic, effect of speed on no-load and load characteristics and voltage regulation. Commutations. Series motor. DC motor: Torque, counter emf.,speed, torque-speed characteristics, starting and speed regulation. Transformer: Ideal transformer - transformation ratio, no-load and load vector diagrams; actual transformer - equivalent circuit, regulation, short circuit and open circuit tests; Efficiency; All- day efficiency parallel operation, autotransformer and three phase transformers. Comparison between generator and motor action.

Books:
1. Rosenblatt, Friedman: Direct and Alternating Current Machinery, 2nd Edition
2. B.L. Theraja, A.K. Theraja: A Text book of Electrical Technology, Vol- II, AC & DC Machines

EEE-302: ELECTRICAL MACHINES I LAB

1.5 credits 3 hours/week
Laboratory experiments based on EEE301

EEE303 Electrical Machines II

3 credits 3 hours/week
Prerequisite: EEE301 Electrical Machines I
Three phase induction motor: Rotating magnetic field, equivalent circuit, vector diagram, torque-speed characteristics, effect of changing rotor resistance and reactance on torque-¬speed curves, motor torque and developed rotor power, no-load test, blocked rotor test, starting and braking, speed control, Circle diagram. Linear Motor, Magnetic Lamination. Introduction to reneable energy: Vector group of Three Phase Transformer, Three Phase Transformer Bank (Harmonics). Single phase induction motor: Theory of operation, equivalent circuit and starting. Synchronous Generator: excitation systems, armature reaction, two reaction theory, equivalent circuit, vector diagrams at different loads, factors affecting voltage regulation, synchronous impedance, synchronous impedance method of predicting voltage regulation and its limitations. Parallel operation: Necessary conditions, synchronizing, circulating current and vector diagram. Synchronous motor: Operation and starting; effect of loading under different excitation condition, effect of

load changing. V-curves and starting, Loss and Efficiency. Excitation for AC Generator.

Books:
1. Rosenblatt, Friedman: Direct and Alternating Current Machinery, 2nd Edition
2. B.L. Theraja, A.K. Theraja: A Text book of Electrical Technology, Vol- II, AC & DC Machines
3. A.E Puchstein, T.C. Lioyd& A.G. Conard: Alternating Current Machines.

EEE304: ELECTRICAL MACHINES II LAB

1.5 credits 3 hours/week
Laboratory experiments based on EEE303

EEE315 SIGNALS AND SYSTEMS

3 credits 3 hours/week
Prerequisites: MTH103: Differential Equations & Complex Variables, MTH105: Linear Algebra and Vector Analysis, EEE103: Electrical Circuits II
Classification of signals and systems: signals - classification, basic operation on signals, elementary signals, representation of signals using impulse function: systems -classification. Properties of Linear Time Invariant (LTI) systems: Linearity, causality, time invariance, memory, stability, invertibility. Time domain analysis of L TI systems: Differential equations - system representation, order of the system, solution technique, zero state and zero input response, system properties: impulse response convolution integral, determination of system properties: slate variable - basic concept, state equation and time domain solution. Frequency domain analysis of LTI systems: Fourier series- properties, harmonic representation, system response, frequency response of LTI systems: Fourier transformation- properties, system transfer function, system response and distortion-less systems. Applications of time and frequency domain analysis: solution of analog electrical and mechanical systems, amplitude modulation and demodulation, time-division and frequency-division multiplexing. Laplace transformation: properties, inverse transform, solution of system equations, system transfer function, system stability and frequency response and application.

Books:
1. Oppenheim, Will sky, and Nawab: Signals and Systems, 2nd Edition, Prentice Hall, 1997.
2. Samir S. Soliman and Mandyan D. Srinath: Continuous and Discrete Signals and Systems.

EEE317 ELECTROMAGNETIC FIELDS AND WAVES

3 credits 3 hours/week
Prerequisites: PHY203 Physics II, MTH101Differential and Integral Calculus and MTH207 Co-ordinate Geometry.
Static electric field: Postulates of electrostatics. Coulomb's law for discrete and continuously distributed charges. Gauss's law and its application, electric potential due to charge distribution., conductors and dielectric in static electric field, flux density -boundary conditions; capacitance electrostatic energy and forces, energy in terms of field equations, capacitance calculation of different geometries; boundary value problems - Poisson's and Laplace's equations in different co-ordinate systems. Steady electric current: Ohm's law, continuity equation. Joule's law, resistance calculation. Static Magnetic field: Postulates of magnetostatics. Biot-Savart's law. Ampere's law and applications, vector magnetic potential, magnetic dipole, magnetization, magnetic field intensity and relative permeability, boundary conditions for magnetic field. magnetic energy, magnetic forces, torque and inductance of different geometries. Time varying fields and Maxwell's equations: Farauay's law of electromagnetic induction. Maxwell's equations-differential and integral forms, boundary conditions, potential functions; time harmonic fields and Poynting theorem. Plane electromagnetic wave: plane wave in loss less media. Doppler effect, transverse electromagnetic wave, polarization of plane wave; plane wave in lossy media, low-loss dielectrics. good conductors; group velocity, instantaneous and average power densities, normal and oblique incidence of plane waves at plane boundaries for different polarization.

Books:
1. William H Hayt Jr, John A Buck: Engineering Electromagnetic, 6th edition.
2. David M. Pozar: Microwave Engineering, Wiley Text Books; 2nd edition.
3. E. C. Jordan and K. G. Balmain: Electromagnetic Waves and Radiating Systems, Prentice-Hall Inc., N. Y., 1968.

EEE319 MICROPROCESSOR AND INTERFACING

3 credits 3 hours/week

Prerequisite: EEE209 Digital Electronics.

Introduction to microprocessors, Intel 8086 microprocessor: Architecture, addressing modes, instruction sets, assembly language programming, system design and interrupt. Interfacing: programmable peripheral interface, programmable timer, serial communication interface, programmable interrupt controller, direct memory access, keyboard and display interface. Introduction to micro-controllers.

Books:

1. Douglas V. Hall: Microprocessor and Interfacing: Programming and Hardware, 2nd ed., Gloence McGraw Hill, 1991.
2. M. Rafiquzzaman: Microprocessors: Theory and Applications: Intel and Motorola, Revised ed., Prentice Hall, 1992.s

EEE326 MICROPROCESSOR AND INTERFACING LAB

1 credit 2 hours/week

Laboratory experiments based on EEE319.

EEE321 DIGITAL SIGNAL PROCESSING

3 credits 3 hours/week

Pre-requisite: EEE315 Signals and Systems

Introduction to digital signal processing (DSP): Discrete-time signals and systems, analog to digital conversion, impulse response, finite impulse response (FIR) and infinite impulse response (IIR) of discrete-time systems, difference equation, convolution, transient and steady state response. Discrete transformations: Discrete Fourier series, discrete-time Fourier series, discrete Fourier transform (DFT) and properties, fast Fourier transform (FFT), inverse fast Fourier transform, Z transformation properties, transfer function, poles and zeros and inverse Z transform. Correlation: circular convolution, Auto-correlation and cross correlation. Digital Filters: FIR filters- linear phase filters, specifications, design using window, optimal and frequency sampling methods: IIR filters specifications, design using impulse invariant, bi-linear Z transformation, least-square methods and finite precision effects.

Books:

1. John G Proakis, Dimitris G Manolakis, Digital Signal Processing, principles, algorithms and applications, 3rd edition, Prentice Hall, 1995.
2. R. A. Roberts and C. T. Mullis, Digital Signal Processing, Addison-Wesley, 1987.

EEE322: DIGITAL SIGNAL PROCESSING LAB

1.5 credits3 hours/week

Laboratory experiments based on EEE321.

EEE323 COMMUNICATION ENGINEERING

3 credits 3 hours/week

Prerequisite: EEE209 Digital Electronics

Overview of communication systems: Basic principles, fundamental elements, system limitations, message source, bandwidth requirements, transmission media types, bandwidth and transmission capacity. Noise: Source, characteristics of various types of noise and signal to noise ratio. Information theory: Measure of information, source encoding, error free communication over a noisy channel, channel capacity of a continuous system and channel capacity of a discrete memory less system. Communication systems: Analog and digital. Continuous wave modulation: Transmission types-base-band transmission,

carrier transmission; amplitude modulation.- introduction, double side band, single side band, vestigial side band, quadrature; spectral analysis of each type, envelope and synchronous detection; angle modulation - instantaneous frequency, frequency modulation (FM) and phase modulation (PM). spectral analysis, demodulation of FM and PM. Pulse modulation: Sampling - sampling theorem. Nyquist criterion, aliasing, instantaneous and natural sampling: pulse amplitude modulation-principle, bandwidth requirements; pulse code modulation (PCM) quantization principle, quantization noise, non-uniform quantization, signal to quantization error ratio, differential PCM, demodulation of PCM: delta modulation (DM) - principle, adaptive DM; line coding - formats and bandwidths. Digital modulation: Amplitude-shift keying - principle, ON-OFF keying, bandwidth requirements, detection, noise performance; phase-shift keying (PSK) -principle, bandwidth requirements, detection, differential PSK, quadrature PSK, noise performance: frequency shift Keying (FSK) - principle, continuous and discontinuous phase FSK, minimum-shift keying, bandwidth requirements, detection of FSK. Multiplexing: Time- division multiplexing (TDM) principle, receiver synchronization, frame synchronization, TDM of multiple bit rate systems; frequency-division multiplexing - principle, de-multiplexing; wavelength-division multiplexing, multiple-access network-time-division multiple-access. frequency-division multiple access: code division multiple- access (CDMA) - spread spectrum multiplexing, coding techniques and constraints of CDMA. Communication system-design: design parameters, channel selection criteria and performance simulation.

Books

1. Simon Haykin: Communication Systems, 4th Edition, John Wiley & Sons Inc. 2001.
2. A. B. Carlson: Communication Systems: An Introduction to Signals and Noise in Electrical Communication, 3rd Edition, McGraw Hill, 1986.

EEE324: COMMUNICATION ENGINEERING LAB

1.5 credits 3 hours/week

Laboratory experiments based on EEE323

EEE325 ELECTRICAL ENGINEERING MATERIALS

3 credits 3 hours/week

Prerequisites: PHY101 Physics I, CHM101 Chemistry

Crystal structures: Types of crystals, lattice and basis, Bravais lattice and Miller indices. Classical theory of electrical and thermal conduction: Scattering, mobility and resistivity, temperature dependence of metal resistivity, Mathiessen's rule, Hall Effect and thermal conductivity. Introduction to quantum mechanics: Wave nature of electrons. Schrodinger's equation, one-dimensional quantum problems-infinite quantum well, potential step and potential barrier; Heisenbergs's uncertainty principle and quantum box. Band theory of solids: Band theory from molecular orbital, Bloch theorem, Kronig-Penny model, effective mass, density-of-states. Carrier statistics: Maxwell-Boltzmann and Fermi-Dirac distributions, Fermi energy. Modem theory of metals: Determination of Fermi energy and average energy of electrons, classical and Quantum mechanical calculation of specific heat. Dielectric properties of materials: Dielectric constant, polarization - electronic, ionic and orientational: internal field, Clausius-Mosotti equation, spontaneous polarization, frequency dependence of dielectric constant dielectric loss and piezoelectricity. Magnetic properties of materials: Magnetic moment, magnetization and relative pennitivity, different types of magnetic materials, origin of ferromagnetism and magnetic domains. Introduction to superconductivity: Zero resistance and Meissner effect. Type I and Type II superconductors and critical current density.

Books:

1. S. O. Kasap, IRWIN, Principles of Electrical Engineering Materials and Devices, 1997.
2. A. I. Dekker, Electrical Engineering Materials, Prentice Hall of India

EEE 330 ELECTRICAL ENGINEERING DRAWING LAB

1 credit 2 hours / week

Introduction to Electrical Services design (All equipment's and elements).Electrical wiring for residential, commercial and industrial buildings (light, fan, conduit layout and circuit diagram).Electrical wiring for residential, commercial and industrial buildings (Power outlet, Telephone, TV- antenna, Conduit layout and Circuit diagram). Low voltage power distribution inside building. Sub- station and essential power. Telephone and Paging system. CCTV, TV-Transmitter antenna signal distribution, Fire detection & alarm system. Cable, BBT and Cable support system. Space requirement for electrical system in a building illumination and types of lighting. Earthing and lightning protection. Electrical safety. Electrical regulations and standards. Auto Cad

References:

Bangladesh National Building Codes [BNBC].
Building Construction Act of Bangladesh 1952, amended |n 2008.
IEE Regulations - IEE U.K. British Standard - B.S.
BOYLESTAD- Introduction to Electrical Engineering.
Shutterworth- Mechanical Electrical system for Construction.
Merrit, F. S. - Building Engineering and system design.
B. L. Theraza - A Text Book of Electrical Technology.
G. A. Wallace - Principles and Practice of Electrical Engineering.
Jhon Hancock Callender - Time Saver Standard Architecture.
Md. Shah AlamTalukder. PEng. - Electrical Services for Buildings and Industries — Design.

EEE443 CONTROL SYSTEMS

3 credits3 hours/week

Prerequisites: EEE315 Signals and Systems, EEE207 Electronics II

Introduction to control systems. Linear system models: Transfer function, block diagram and signal flow graph (SFG). State variables: SFG to state variables, transfer function to state variable and state variable to transfer function. Feedback control system: Closed loop systems, parameter sensitivity, transient characteristics of control systems, effect of third pole and zero on the system response and system types and steady state error. Routh stability criterion. Analysis of feedback control system: Root locus method and frequency response method. Design of feedback control system: Controllability and observability, root locus, frequency response and slate variable methods. Digital control systems: introduction, sampled data systems, stability analysis in Z-domain.

Books:

1. J. J. D'Azzo and C. H. Houpis: Feedback Control System Analysis & Synthesis, second edition, McGraw-Hill, Singapore, 1960.
2. R. C. Dorf and R. H. Bishop: Modern Control Systems, eighth edition, Addison-Wesley Longman Inc, USA.
3. Norman S. Nise: Control System Engineering, John Wiley and Sons, 3rd edition.

EEE446: CONTROL SYSTEMS LAB

1 credit 2 hours/week

Laboratory experiments based on EEE443.

EEE441 TRANSMISSION AND DISTRIBUTION

3 credits 3 hours/week

Transmission System: Types of conductors, resistance, definition of inductance, inductance of conductor due to internal flux, flux linkages between two points external to an isolated conductor, inductance of a single phase two wire line. Capacitance of transmission lines: Capacitance of a three phase with equilateral spacing and unsymmetrical spacing, effect

of earth on the capacitance of three phase transmission lines, bundled conductors, parallel- circuit three-phase lines. Current and voltage relations on a transmission line: Representation of lines, the short transmission line, the medium transmission line, the long transmission line, solution of differential equation, interpretation of the equations, hyperbolic form of the equations, the equivalent circuit of a long line, direct current transmission. General line equation in terms of ABCD constants, relations between constants, charts of line constants, constants of combined networks, measurement and advantages of generalized line constants. Power circle diagram: power circle diagrams, transmitted maximum power, universal power circle diagrams, use of circle diagrams. Voltage and power factor control in transmission systems: Tap changing transformer, introduction regulators, moving coil regulators, booster transformer, power factor control, static condensers in series or parallel, synchronous condensers. Ferranti effect, insulated cables: Cables versus overhead lines, insulating materials, electrostatic stress grading, three core cables, dielectric losses and heating, modern developments, oil-filled and gas-liked cables, measurement of capacitance, cable testing. Insulated of overhead lines: Types of insulators, their constructions and performances, potential distribution, special types of insulators, testing of insulators. Distribution: Distributor calculations, copper efficiencies, radial ring mains and inter connections. Mechanical characteristics of transmission lines:Sag and stress analysis, ice and wind loading. Supports at different elevations, conditions of erection, effect of temperature changes. Transmission lines and cables: overhead and underground. Stability: Swing equation, power angle equation, equal area criterion, multi-machine system, step by step solution of swing equation. transient and steady- state stability and factors effecting stability. Reactive power compensation: theory, steady-state and dynamic VAR compensation. Generation and load modeling. Harmonics. Flexible AC transmission system. High voltage DC transmission system. Electrical power policy.

Books:

1. Peter John Freeman: Electric power transmission and distribution, Harrap, 1974.
2. Gigsby and Leonard L: Electric Power Generation, transmission and distribution.

TECHNICAL ELECTIVE COURSES

GROUP A (POWER)

EEE429 ENERGY CONVERSION III

2 credits 2 hours/week

Prerequisite: EEE303 Electrical Machines II

Special machines: series universal motor, permanent magnet DC motor, unipolar and bipolar brush less DC motors, stepper motor and control circuits. Reluctance and hysteresis motors with drive circuits, switched reluctance motor, electro static motor, repulsion motor, synchro's and control transformers. Permanent magnet synchronous motors. Acyclic machines: Generators, conduction pump and induction pump. Magneto hydrodynamic generators. Fuel Cells, thermoelectric generators, flywheel. Vector control, linear motors and traction. Photovoltaic systems: stand alone and grid interfaced. Wind turbine generators: induction generator, AC-DC-AC conversion.

Book: A. E. Fitzerald: Electric Machinery, Sixth, McGraw Hill.

EEE430: ENERGY CONVERSION III LAB

1 credit 2 hours/week

Laboratory works based on EEE 429.

EEE431 POWER ELECTRONICS

2 credits 2 hours/week

Prerequisite: EEE105 Electronics I

Power semiconductor switches and triggering devices: BJT, MOSFET, SCR, IGBT, GTO, TRIAC, UJT and DIAC. Rectifiers: Uncontrolled and controlled single phase and three phases. Regulated power supplies: Linear-series and shunt, switching buck, buck boost, boost and Cuk regulators. AC voltage controllers: single and three phases. Choppers. DC motor control. Single phase cyclo-converter. Inverters: Single phase and three-phase voltage and current source. AC motor control. Stepper motor control. Resonance inverters. Pulse width modulation control of static converters.

Books:

1. Muhammad H. Rashid: Power Electronics- Circuits, Devices and Applications, 3rd edition, Prentice-Hall of India, 2005.
2. Bimal K. Bose: Modern Power Electronics and AC Drives, Pearson Education, 2004.
3. Schuler and McNamee: Industrial Electronics and Robotics, Tata McGraw-Hill, Singapore.
4. P. C. Sen, Power Electronics: Tata McGraw-Hill publishing Company Ltd., 1987 (1994) New Delhi, India | 5. Cyril V. Lander: Power Electronics, McGraw-Hill Book Company, UK

EEE432: POWER ELECTRONICS LAB

1 credit 2 hours/week

Laboratory experiments based on EEE431

EEE433 OPERATION AND CONTROL OF POWER SYSTEM

2 credits 2 hours/week

Principles of power system operation: SCADA, conventional and competitive environment. Unit commitment, static security analysis, state estimation, optimal power flow, automatic generation cont. and dynamic security analysis.

Books:

1. Jack Casazza: Understanding Electric Power Systems, Wiley.
2. Ron Lenk: Practical Design or Power Supplies, Wiley.
3. Alexandra von Meier: Electric Power Systems, Wiley.
4. Fred I Denny; David E Dismukes: Power system operations and electricity markets.

EEE434 OPERATION AND CONTROL OF POWER SYSTEM LAB

1 credit 2 hours/week

Laboratory experiments based on EEE433

EEE447 POWER SYSTEMS ENGINEERING

3 credits 3 hours/week

Network representation: Single line and reactance diagram of power system and per unit representation. Network Solution; Load flow: Gauss-Seidel method, Network-Rapson method, Fault analysis: Short circuit current and reactance of a synchronous machine. Symmetrical fault calculation of multi-bus system; symmetrical components, sequence networks and unsymmetrical fault calculation; Introduction to C.T & P.T Protection: Introduction to relays, differential protection and distance protection. Introduction to circuit breakers, Stability: Swing equation, power angle equation, equal area criterion; step by step solution of swing equation. Transient and steady- state stability and factors effecting stability; multi-machine system; Reactive power compensation: theory, steady-state and dynamic VAR compensation. Generation and load modeling. Harmonics. Flexible AC transmission system. High voltage DC transmission system. Electrical power policy.

Books:

1. Syed Nasar and F. C. Trutt: Power Systems.
2. Edward Wilson and Kimbark: Power System Stability.
3. Robert H. Miller, James H. Malinowski: Power System Operation.
4. William D. Stevenson JR. - Elements of Power System Analysis.

EEE449 POWER PLANT ENGINEERING

3 credits 3 hours/week

Power Plants: General layout and principles, Turbines: Steam turbine. Gas turbine; Combined cycle gas turbine IC engines; Hydro; Nuclear and thermal power plant, Power plant instrumentation. Selection of location: Technical, Economic and Environmental factors, Load forecasting, Load scheduling: deterministic and probabilistic. Electricity tariff: formulation and types. Load curves: Demand factor, Diversity factor, Load duration curve, Energy load curve, Load factor, Capacity factor and Plant factor. Auxiliary Power Supply System, Peaking Power, IPP. GIS (Gas insulated Substation)

Books:

1. William A Vopat, Tata McGraw-Hill: Power Station Engineering and Economy
2. V. K, Mehata, Rohit Mehta, Ram Nagar, New delhi: Principles of Power System, S. Chand
3. Larry F. Drbal, Kayla L. Westra, Pat G. Boston: Power Plant Engineering, Kluwer Academic Publishers.

EEE451 HIGH VOLTAGE ENGINEERING

3 credits 3 hours/week

High voltage dc: rectifier circuits, voltage multipliers, Van-de-Graff generators, and electrostatic generators. High voltage ac: cascaded transformers and Tesla coil. Impulse voltage: shapes, mathematical analysis, single and multi-stage impulse generators, tripping and control of impulse generators. Breakdown in gas, liquid and solid dielectrics. High voltage measurements and testing. Over voltage phenomena and insulation coordination: lightning and switching surges, basic insulation level, surge diverters, arresters, protector tubes and metal oxide varistors.

Books:

1. M.S. Naidu, V. Kamaraju: High Voltage Engineering, 2nd Edition, 1996, McGraw-Hill.
2. F. W., Jr. Peek, H. K. Humphrey: Dielectric Phenomena in High Voltage Engineering.

EEE453 Power System Protection

2 credits 2 hours/week

Prerequisite: EEE303 Electrical Machines II

Purpose of power system protection. Criteria for detecting faults: over current, differential current, difference of phase angles, over and under voltages, power direction, symmetrical components of current and voltages, impedance, frequency and temperature. Instrument transformers: CT and PT. Electromechanical, and electronic Relays: basic modules, over current, differential, distance and directional. Trip circuits, Relay schemes: Generator, transformer, motor, bus bar, transmission and distribution lines. Circuit breakers: Principle of arc extinction, selection criteria and ratings of circuit breakers, types - air, oil, SF6 and vacuum. Miniature circuit breakers for household and commercial utility use.

Books:

1. Stevenage: Power system protections, Peter Peregrinus Ltd.
2. Paul M. Anderson: Power System Protection, IEEE Press Series

EEE454 Power System Protection Lab

1 credit 2 hours/week

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE453. In the second part, students will design sample systems using the principles learned in EEE453.

EEE455 RENEWABLE ENERGY

3 credits 3 hours/week

Prerequisites: EEE103 Electrical Circuits II, EEE105 Electronics I

Importance of renewable energy, sources; Statistics regarding solar radiation and wind speed; Insulation; geographical distribution, atmospheric factors, measurements; Solar cell; principle of operation, spectral response, factors affecting conversion efficiency, I_V characteristics, maximum power output; PV modules and arrays; stationary and tracking; PV systems; stand alone, battery storage, inverter interfaces with grid; Wind turbine generators; types; operational characteristics; cut-in and cut-out speed, control, grid interfacings, AC-DC -AC link. Fill Factor (FF), Open Circuit voltage, Sort Circuit Current. Biogas plants, types, heaters, improved stoves, types, solar concentrators, classifications, fabrications, uses, solar water, uses, Solar pond, Zero thermal energy, OTEC, Wave energy, Tidal energy.

Books:

1. John Twidell: Renewable Energy Resources, ISBN: 9780419253204
2. Paul Komor: Renewable Energy Policy, 2004.

GROUP B (ELECTRONICS)

EEE327 SEMICONDUCTOR DEVICES

3 credits 3 hours/week

Prerequisite: PHY101 Physics I

Semiconductors in equilibrium, energy bands, intrinsic and extrinsic semiconductors. Fermi levels, electron and hole concentrations, temperature dependence of carrier concentrations. Carrier transport phenomena: carrier drift, carrier diffusion, graded impurity distribution, the Hall Effect. Non equilibrium excess carriers: carrier generation and recombination, mathematical analysis of excess carriers, ambipolar transport, quasi-Fermi energy levels, excess-carrier lifetime, and surface effects. The pn junction: basic structure. the physical principles of the operation of the p-n junction, built-in potential barrier, electric field, space charge width, junction capacitance; minority carrier distribution, ideal current-voltage relationship, generation-recombination currents, transient and ac conditions, time variation of charge, reverse recovery transient and capacitance, solar cells. The Bipolar transistor: basic principle of pnp and npn transistors, emitter efficiency, minority carrier distribution, non-ideal effects, base width modulation, high injection, emitter bandgap narrowing. Metal semiconductor contact: the Schottky barrier diode, ideal junction characteristics, nonideal effects on the barrier height, current-voltage relationship, metal-semiconductor ohmic contacts. Matel-oxide-semiconductor field effect transistor: the two terminal MOS structure, energy band diagram, flat-hand voltage, threshold voltage, ideal C-V characteristics, frequency effects; MOSFET structures, current-voltage relationships, substrate bias effects, frequency limitations; MOS technology.

Books:

1. Donald A. Neamen: Irwin, Semiconductor Physics and Devices Basic Principles.
2. Robert F. Pierret, Semiconductor Device Fundamentals, Addison-Wesley Publishing Company.

EEE335 DIGITAL INTEGRATED CIRCUIT DESIGN

2 credits 2 hours/week

Prerequisite: EEE209 Digital Electronics

Switching, timing, wave shaping, and logic circuits to generate waveforms and functions used in pulse systems, instrumentation and computers. Latches, Flip-Flops and Synchronous System Design. Advanced CMOS Logic Design: Pseudo-NMOS and Dynamic Pre-charging, Domino-CMOS logic, No-Race-Logic, Single-Phase Dynamic Logic, Dynamic Differential Logic. Digital Integrated System Building Blocks: Multiplexers and Decoders, Barrel shifters, counters, digital adders. PLA, Integrated memories: SRAM, DRAM, ROM.

Prerequisite: EEE207.

Books:
1. Ken Martin: Digital Integrated Circuit Design, Oxford University Press, 2000.
2. David A. Hodges and H. G. Jackson: Analysis and Design of Digital Integrated Circuits, McGraw Hill Company, 1983.

EEE336: DIGITAL INTEGRATED CIRCUIT DESIGN LABORATORY

1 credit 2 hours/week
Experiments based on EEE335.

EEE337 DIGITAL COMMUNICATION ELECTRONICS

2 credits 2 hours/week
Prerequisite: EEE323 Communication Engineering
Functional blocks of digital communication systems: PAM, PWM, PPM and PCM. Design of S/II circuits, A/D and D/A converters, and timing (clock generator) circuits. Circuit design using PLL, VCO and multipliers. Design of PAM, PPM, PWM and PCM transmitters and detectors. Special circuits for phase shift keying.

Books:
1. Jack Hudson and Jerry Luecke: Basic Communications Electronics, 1999, Master Publishing.
2. George Kennedy: Electronic Communication, Prentice-Hall, 1999.

EEE338: DIGITAL COMMUNICATION ELECTRONICS LAB

1 credit 2 hours/week
Experiments based on EEE337.

EEE457 SEMICONDUCTOR PROCESSING AND FABRICATION

3 Credits 3 hours/week
Prerequisite: EEE327 Semiconductor Devices
Substrate materials: Crystal growth and wafer preparation, epitaxial growth technique, molecular beam epitaxy, chemical vapor phase epitaxy and chemical vapor deposition (CYD). Doping techniques: Diffusion and ion implantation. Growth and deposition of dielectric layers: Thermal oxidation, CVD, plasma CVD, sputtering and silicon-nitride growth. Etching: Wet chemical etching, silicon and GaAs etching, anisotropic etching, selective etching, dry physical etching, ion beam etching, sputtering etching and reactive ion etching. Cleaning: Surface cleaning, organic cleaning and RCA cleaning. Lithography: Photo-reactive materials, pattern generation, pattern transfer and metalization. Discrete device fabrication: Diode, transistor, resistor and capacitor. Integrated circuit fabrication: Isolation - pn junction isolation, mesa isolation and oxide isolation. B.JT based microcircuits, p-channel and n-channel MOSFETs, complimentary MOSFETs and silicon on insulator devices. Testing, bonding and packaging.

Books:
1. C. T. Sah: Fundamentals of Solid Sate Electronics, World Scientific.
2. M. J. Cooke: Semiconductor Devices, Prentice Hall.

EEE459 OPTOELECTRONICS

3 credits 3 hours/week
Prerequisites: PHY101 Physics I, EEE105 Electronics I
Optical properties in semiconductor: Direct and indirect band-gap materials, radiative and nonradiative recombination, optical absorption, photo-generated excess carriers, and minority carrier lifetime, luminescence and quantum efficiency in radiation. Propellies of light: Particle and wave nature of light, polarization, interference, diffraction and blackbody radiation. Light emitting diode (LED): Principles, materials for visible and infrared LED, internal

and external efficiency, loss mechanism, structure and coupling to optical fibers. Stimulated emission and light amplification:
Spontaneous and stimulated emission. Einstein relations, population inversion, and absorption of radiation, optical feedback and threshold conditions. Semiconductor Lasers: Population inversion in degenerate semiconductors, laser cavity, operating wavelength, threshold current density, power output, hetero-junction lasers, optical and electrical confinement. Introduction to quantum well lasers. Photo-detectors: Photoconductors, junction photo-detectors, PIN detectors, avalanche photodiodes and phototransistors. Solar cells: Solar energy and spectrum, silicon and Schottkey solar cells. Modulation of light: Phase and amplitude modulation, electro-optic effect, acousto-optic effect and magneto-optic devices. Introduction to integrated optics

Books:

1. Vinod K. Sharma, P. C. Mathur, K. N. Tripathi and Avinash Kapur: Optoelectronics: An introduction, BS Publication.
2. Amnon Yariv: Optical Electronics, 4th Edition, Saunders College Publishing.

EEE461 ANALOG INTEGRATED CIRCUITS

3 credits 3 hours/week

Prerequisites: EEE207 Electronics II

Review of FET amplifiers: Passive and active loads and frequency limitation. Current mirror: Basic, cascode and active current mirror. Differential Amplifier: Introduction, large and small signal analysis, common mode analysis and differential amplifier with active load: Noise: Introduction to noise, types, representation in circuits, noise in single stage and differential amplifiers and bandwidth. Band-gap references: Supply voltage independent biasing, temperature independent biasing, proportional to absolute temperature current generation and constant transconductance biasing. Switch capacitor circuits: Sampling switches, switched capacitor circuits, including unity gain buffer, amplifier and integrator. Phase Locked Loop (PLL): Introduction, basic PLL and charge pumped PLL.

Books:

1. Behzad Razavi: Design of Analog CMOS Integrated Circuits, McGraw Hill, 2001.
2. Phillip E. Allen, Douglas R. Holberg: CMOS Analog Circuit Design, 2nd Edition, Oxford University Press, 2002.

EEE463 VLSI DESIGN

2 credits 2 hours/week

Prerequisites: EEE105 Electronics I, and EEE209 Digital Electronics
VLSI technology: Top-down design approach, technology trends and design styles. Review of MOS transistor theory: Threshold voltage, body effect, I-V equations and characteristics, latch-up problems, NMOS inverter, CMOS inverter, pass-transistor and transmission gates. CMOS circuit characteristics and performance estimation: Resistance, capacitance, rise and fall times, delay, gate transistor sizing and power consumption. CMOS circuit and logic design: Layout design rules and physical design of simple logic gates. CMOS subsystem design: Adders, multiplier and memory system, arithmetic logic unit. Programmable logic arrays. I/O systems. VLSI testing.

Books:

1. Neil H.E. Weste and Kamran Eshraghian: Principles of CMOS VLSI Design: A Systems Perspective, Addiso-Wesley publishing company.
2. C. H. Roth, Jr.: Digital Systems Design Using VHDL, 1st ed., Thomson Engineering, 199R.

EEE464: VLSI DESIGN LAB

1 credit 2 hours/week

Laboratory works based on EEE463

GROUP C (COMMUNICATION)

EEE339 RF AND MICROWAVE ENGINEERING

2 credits 2 hours/week

Prerequisites: EEE323 Communication Engineering and EEE317 Electromagnetic Fields and Waves. Coaxial and strip line components: Terminations; Attenuators; Phase shifter; Discontinuities and filters; Impedance matching and tuning. Microwave network analysis: Terrestrial microwave systems: CCIR recommendation on frequency assignments, comparison with radio communication in other frequency bands. Microwave terminal and repeater stations, passive reflectors and repeaters. Fade margins and protection techniques such as hot-standby and diversity reception. Link budget calculations. Satellite microwave systems: Satellite orbits and dynamics. Frequency allocations and satellite footprints. Earth stations and satellite transponders. Noise considerations. Link budget calculations. Multiple access methods. Mobile satellite systems, their uses and illustrative systems. Microwave antennas. Different types of antennas, basic performance analysis. Microwave devices: Microwave transistors, varactor diode, IMPATT diode, Gunn diode, Schottky Barrier diode, backward diode, point contact diode, Klystron, Reflex Klystron, TWT and Magnetron. Rader: Basic principle, Radar equation and range. Factors influencing maximum range, Effect of noise, Power, Frequencies used in Radar, Types of Radar, CW & FM radar; Doppler effect; MTI & Pulse radar.

Books:

1. R. E. Collin: Fundamentals for Microwave Engineering, McGraw-Hill.
2. Devendra K. Mitra: Radio Frequency and Microwave Communications Circuits, Analysis and Design.

EEE340: RF AND MICROWAVE ENGINEERING LAB

1 credit 2 hours/week (Laboratory works based on EEE339.)

EEE465 TELECOMMUNICATIONS NETWORKS AND SWITCHING

3 credits 3 hours/week

Prerequisites: EEE203 Computer Networks, EEE323 Communication Engineering

Telephone Switching: Simple telephone connection, introduction to switching and signaling systems, single and multi- stage space switching analysis and design. Time/Digital switching systems, TS, ST, STS, TST systems, concept of packet switching and ATM, practical systems, circuit switching hierarchy and routing, signaling systems - SS7., telephone instruments, pulse and tone dialing. BORSCHT functions, modems, digital subscribers' loops, telephone traffic theory. Telephone Networks: Motivation for ISDN, New services, network and protocol architecture, transmission channels, user-network interfaces, service characterization, internetworking. ISDN standards, expert systems in ISDN, B-ISDN, voice data integration.

Books:

1. Thiagaranjan Viswanathan: Telecommunication Switching Systems and Networks, Prentice-Hall of India
2. John G. van Bosse: Signaling in Telecommunication Networks, John Wiley and Sons.

EEE467 DIGITAL COMMUNICATIONS

2 credits 2 hours/week

Prerequisite: EEE209 Digital Electronics, EEE323 Communication Engineering

Introduction to communication channel: Communication channels, mathematical model and characteristics; Probability and stochastic processes. Source coding: Mathematical models of information, entropy Huffman code and linear predictive coding. Scrambling/descrambling; Multiplexing techniques; Additive white Gaussian noise (AWGN); Detection techniques for base band digital signals corrupted by AWGN; Eye diagrams and inter symbol interference (ISI): Bit error performance or base hand digital signals in presence of AWUN and ISI; Error control coding schemes; Description of M-ary digital modulation systems (PSK. MSK, QAM); Symbol error performances in the presence of AWGN and ISI and co-channel interference (CCI); Power spectral analyses; Bandwidth requirements and timing recovery circuits; Reliability objectives; System gain; Fade margin requirements for a specific system availability; Design guidelines; Transparent and regenerative transponders; Single channel per carrier (SCPC) systems; Frequency division multiple access (FDMA); Time division multiple access (TDMA) systems; Link budget.

Books:

1. Simon Haykin: Digital Communications, 2001, John Wiley & Sons.
2. Lohn J. Proakis: Digital Communications, McGraw Hill.

EEE468: DIGITAL COMMUNICATIONS LAB

1 credit 2 hours/week (Laboratory works based on EEE467.)

EEE469 WIRELESS AND MOBILE COMMUNICATION

3 credits 3 hours/week (Prerequisite: EEE323 Communication Engineering)

Introduction: Concept, evolution and fundamentals. Analog and digital cellular systems. Cellular Radio System: Frequency reuse, co-channel interference, cell splitting and components. Mobile radio propagation: Propagation characteristics, models for radio propagation, antenna at cell site and mobile antenna. Frequency Management and Channel Assignment: Fundamentals, spectrum utilization, fundamentals of channel assignment, fixed channel assignment, non-fixed channel assignment, traffic and channel assignment. Handoffs and Dropped Calls: Reasons and types, forced handoffs, mobile assisted handoffs and dropped call rate. Diversity Techniques: Concept of diversity branch and signal paths, carrier to noise and carrier to interference ratio performance. Digital cellular systems: Global system for mobile, time division multiple access and code division multiple access.

Books:

1. Simon Haykin and Michael Moher: Modern Wireless Communications, Pearson Education.
2. W. C. Lee: Mobile Communications Engineering, McGraw-Hill

EEE471 OPTICAL FIBER COMMUNICATIONS

3 credits 3 hours/week (Prerequisite: EEE323 Communication Engineering)

Introduction Light propagation through optical fiber: Ray optics theory and mode theory. Optical fiber: types and characteristics, transmission characteristics, fiber joints and fiber couplers, Light source: Light emitting diodes and laser diodes. Detectors: PIN photo-detector and avalanche photo detectors. Receiver analysis: direct detection and coherent detection, noise and limitations. Transmission limitations: chromatic dispersion, nonlinear refraction, four waves mixing and laser phase noises. Optical amplifier: laser and fiber amplifiers, applications and limitations. Multi-channel optical system: Frequency division multiplexing, wavelength division multiplexing and co-channel interference.

Rooks:

1. John M. Senior: Optical Fiber Communications: Principle and Practice, Prentice Hall.
2. Govind P. Agrawal: Fiber-Optic Communication Systems, John Wiley & Sons, Second Edition, 1992.

EEE473 Satellite Communication

3 credits 3 hours/week

Prerequisite: EEE323 Communication Engineering

Brief history and overview of satellite communications, communication satellite systems, communication satellites, orbiting satellites, satellite frequency bands, satellite multi-access formats, the Regulatory Bodies. Frequency allocations. Fundamental orbital laws, GEO, MEO, LEO satellites, subsystems of a communication satellite, earth station, satellite link analysis, attenuation, effect of rain on propagation. Modulation and multiplexing techniques for satellite link, Communication payload, transponders, coverage. Multiple access techniques: FDMA, SPADE, TDMA, CDMA, Antijam advantage of spectral spreading, satellite jamming, DS-CDMA acquisition and tracking, FH-CDMA acquisition and tracking, random access. Phase coherency in satellite systems: carrier phase-noise, phase noise spectra, carrier frequency and phase stability, phase errors in carrier referencing. Satellite ranging systems: ranging systems, component-ranging codes, and tone-ranging systems. Inter satellite links, VSAT satellite system concept, link analysis, mobile-satellite communication systems, mobile satellite channel, direct home TV broadcasting.

Books:

1. Robert M. Gagliardi: Satellite Communication, CBS Publishers and Distributors.
2. W. L. Pritchard, G. H. Suyderhood, R. A. Nelson: Satellite Communication Systems Engineering, 2nd edition, Prentice Hall, New Jersey, 1993.

GROUP D (COMPUTER)

EEE341 MICROPROCESSOR BASED SYSTEM DESIGN (2 credits 2 hours/week)
Prerequisite: EEE319 Microprocessor and Interfacing

Introduction to the design and development of software and computer-interfacing hardware for detective use of microprocessors in process control, data collecting, and other special purpose computing systems. Software topics include assembly language programming, input/output, interrupts, direct memory access, and timing problems.

Books:
1. David J. Comer: Microprocessor-based System Design,Holt, Rinehart, and Winston
2. Nikitas A. Alexandridis: Design of Microprocessor-Based Systems,Prentice Hall
3. Vinod Kumar Bansal: Design of Microprocessor Based Systems,Wiley Eastern Limited

EEE342: MICROPROCESSOR BASED SYSTEM DESIGN LAB

1 credit 2 hours/week (Laboratory works based on EEE341.)

EEE475 DATABASE SYSTEMS

3 credits 3 hours/week Prerequisites: CSE203 Computer Programming)

Database design, entity-relationship and relational model, relational algebra, query language SQL, storage and file structures, query processing, system architectures. Advanced Database Systems: Object-Oriented and Object-Relational Database Systems. Object Databases: objects, classes, methods and messages, inheritance specialization and generalization, conceptual object modeling. Semantic modeling/R model, E/R diagram, Database design with the E/R model.

Books:
1. Elmaari and Nvathe: Fundamentals of Database Systems, Addison Wesley.
2. Abraham Silberschatz, Hnery Korth and S. Sudarshan: Database System Concepts, McGraw-Hill.

EEE477 REAL TIME COMPUTER SYSTEM (3 credits 3 hours/Week)

Prerequisites: EEE209 Digital Electronics, EEE319 Microprocessor and Interfacing, EEE323 Communication Engineering, CSE203 Computer Programming

Operating systems and architectural concepts of real-time systems. Review of I/O programming and basic machine language programming. Interrupt processes in minicomputers and microcomputers. Coding of specific device drivers using absolute addressing status registers, command signals, buffering. Timing considerations and applications. Concurrent processes, wait-send phenomena, and the use of semaphores. Hardware and system concepts. Digital computer interfaces, multiprogramming, bus, structure, interrupt, and time-sharing consideration, digital data transfer, remote consoles, sampling, quantizing, multiplexing and data reconstruction

Books:
1. Silherschatz, Galvin and Gagne: Operating System Concepts, Wiley.
2. Andrew Tanenhaum and Albert S. Woodhull, Operating Systems: Design and Implementation, Prentice Hall.
3. Phillip A. Laplante: Real-Time System Design and Analysis, 3rd Edition, Wiley.

EEE479 COMPUTER ARCHITECTURE

3 credits 3 hours/week

Prerequisites: EEE209 Digital Electronics, EEE319 Microprocessor and Interfacing

Information representation and transfer, instruction and data access methods, the control unit: hardwired and micro programmed, memory organization, I/O systems, channels, interrupts, DMA, Von Neumann SISD organization, RISC and CISC machines. Pipelined machines, interleaved memory system, caches, Hardware and architectural issues of parallel machines, Array processors, associative processors, multiprocessors, systolic processors, data flow computers and interconnection networks, High level language concept of computer architecture.

Books:
1. John L. Hennessy and David A. Patterson: Computer Architecture: A Quantitative Approach.
2. Miles J. Murdocca and Vincent P. Heuring: Computer Architecture and Organization: An Integrated Approach, John Wiley & Sons.

EEE481 SOFTWARE ENGINEERING

3 credits 3 hours/week (Prerequisite: CSE203 Computer Programming)

Introduction: Software, nature and problems of software, engineering vs. software engineering, state of the art of software engineering, characteristics of software, basic elements of engineering Software, software process model, costs of software engineering, software engineering methods, professional and ethical responsibility of a software engineer. Software Processes: Software process and software process model, different software process models: linear sequential, water fall, prototyping, incremental, spiral, advanced software development life cycle and other appropriate models. Requirements and Specification: requirement engineering process software requirements document, requirement validation and evolution, requirement analysis process model, system contest, social and organizational factors, data-now models, semantic data models, object models, Data dictionaries, requirement definition, requirement specification and non-functional requirements, software Prototyping, Basic concepts of different formal software specification techniques. Software Design: Context of software design, design process, design quality and strategies, system structuring, control models, modular decomposition, domain-specific architecture, data-now design, structural decomposition, detailed design, JSP, Coupling and Cohesion, attributes of design, object-oriented design and Component-level design, design principles, user-system interaction, information presentation, user guidance, interface evaluation, design for reuse. Software Validation and Verification: Verification and validation planning, testing fundamentals, including test plan creation and test case generation, black-box and white-box testing techniques, unit, integration, validation: and system testing, object-oriented testing, inspections. Software Evolution: Software maintenance, characteristics of maintainable software, re-engineering, legacy systems, Software reuse and configuration. Software Management: Cognitive fundamentals, management implications, project staffing, software cost estimation techniques, different models (COCOMO, tree, PNR curve, statistical and Delphi), process quality assurance, Software and documentation standards, software metrics and product quality metrics. Zipfs law, Halstead formula, Fan in/Fan out, information Fan in/Fan out, Henry and Kafura's metric, Card and Glass's Systems Complexity, process and product quality, process (analysis, modeling, measurement, SEI process maturity model and classification). Others: Software reliability metrics, software reliability specification, statistical testing and reliability growth modeling, Use of CASE tools and technological support in engineering software, introduction to unilied modeling language-UML.

Books:

1. Stephen R. Schach: Software Engineering, 2nd edition, IRWIN, 1993, 0-256-12998-3
2. Carlo Ghezzi, Mehdi Jazayeri and Dino Mandriold: Fundamental of Software Engineering, 2nd Edition, Prentice-Hall of India, 2003, ISBN 8120322428

EEE483 EMBEDDED SYSTEM DESIGN

3 credits 3 hours/week

Prerequisites: EEE203 Computer Programming, EEE209 Digital Electronics, EEE463 VLSI Design

Characteristics of embedded systems; Application areas: Microprocessors in the Auto Industry. Microprocessors in the Air Travel Industry, Microprocessors in the Games Market; Processing units, Input Systems/Devices, Communication, Execution Environment, Memories (Memory Organization: System Space, Code Space, Data Space, Unpopulated Memory Space, I/O Space), Output Systems/Devices; Embedded System Using C Language and Assembly Language, Real-Time Operating Systems (RTOS), Middleware; Introduction to Design Life Cycle, Product Specifications (Models of computations, Statecharts, SDL, Petri nets, UML, VHDL, levels of hardware modeling, language comparison), Hardware/Software Partitioning, Iteration and Implementation, Hardware/Software Integration, Product Testing and Release. Human resources involved in testing. Maintaining and Upgrading Existing Products; Simulation, Rapid Prototyping and Emulation, Testing, Fault Simulation, Fault Injection, Risk and Dependability Analysis, Formal Verification.

Books

1. David W. Lews: Fundamentals of Embedded Software, Pearson Prentice Hall.
2. Tammy Noergaard and Newness: Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers.
3. P. Raghavan and Auerbach: Embedded Systems: From Hardware to Applications.

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