HITEC UNIVERSITY

Taxila Cantt

SELF ASSESSMENT REPORT

MS Electrical Engineering

Faculty of Engineering and Technology

Heavy Industries Taxila Education City (HITEC) University

May 2023

Prepared by:	**Department of Electrical Engineering**
Supervised by:	**Quality Enhancement Cell**
Reviewed by:	**QEC, Chairman, Dean, Vice-Chancellor**
Endorsed by:	**Chairman, Dean, Vice-Chancellor**

Table of Contents

List of Annexure

1.0 Executive Summary

This self assessment report is being prepared for MS Electrical Engineering from the Department of Electrical Engineering as prescribed by Higher Education Commission. Quality Enhancement Cell was formed in HITEC University in 2011. Program Team and Assessment Team of electrical engineering department were formulated by University to collaborate with QEC to accomplish the following report in line with HEC guidelines with the support of Vice Chancellor and Department Heads.

This self assessment report provides an analysis and evaluation of the academic standards followed and implemented by MS Electrical Engineering Program. HEC prescribed Self Assessment Manual is used as a reference and the program is being evaluated based on 8 criteria and 31 standards of quality improvement. First the Program teams of Electrical Department made the report and then it was further assessed by the assessment team. The report finds the prospects of maintaining and continually enhancing academic standards and student's learning.

This report also investigates the strong and weak areas and other improvements needed by the department. A feedback is then provided in the form of corrective actions and implementation plan for quality assurance and improvement of academic programs in the future.

Objectives

a To initiate the quality improvement process through self assessment as outlined by Higher Education Commission of Pakistan in order to improve the quality in higher education.

b To implement Self-Assessment Manual in MS Electrical Engineering program with a view to improve program quality.

c To identify the areas requiring improvements and prepare the remedial actions in the form of an implementation plan.

Execution

The hierarchy of the execution tree was fundamental to the efficient working of all the stake-holders. Formulation of PT and AT was the very first step towards the goal.

The Self Assessment Manual was distributed to all the faculty members for awareness and especially to the Program and Assessment Teams for SAR. Lectures and workshops were arranged for senior faculty members along with the Registrar, Treasurer, Controller of Examination, Deans and Vice-Chancellor, where qualified professionals of their respective fields taught the role of Quality and Accountability in education and especially in Higher Education.

The senior faculty members then became mentors for the junior faculty members and the knowledge of the subject spread to each and every faculty member along with supporting individuals/groups, until all were on the same page.

Following the lecturing and mentoring, a task distribution seminar was arranged by the chair of the Program Team. In this seminar, 8 criteria with 31 standards in total were distributed as tasks to various faculty members. An internal deadline of one month was given to all the task holders.

All task holders were instructed on the procedure of procurement of information for the completion of tasks. The information from various concerned departments of the university was to be obtained in written form along with initials of the information provider.

Once the criteria were ready, the task holder sent the soft copy for review and proof reading, to the chair of the Program Team. The chair reviewed and proof read in company with the Quality Representative of the respective Department. Once all the corrections and revisions were done in line with the Self Assessment Manual, the task holders sent a signed hard copy and a soft copy to the chair of the Program Team who then incorporated the finished criteria into a single report and the report was given the shape of a draft.

This draft was then sent as a soft copy to the Quality Enhancement Cell, Chairman Electrical Engineering Department, Dean and Vice-Chancellor who gave their valuable inputs. Once the draft was finalized, QEC arranged for the Self Assessment Report of the BS Electrical Engineering Program to be assessed by the Assessment Team in the June 2023.

The findings of the Assessment Team are given in the annexure-G. It outlines the improvements required in the infrastructure, syllabi and training of the faculty and supporting staff. The implementation plan (annexure-H) was prepared after discussion with all the stake-holders and it indicates the resources required to improve the quality.

Self-Assessment Report

2.0 Introduction

Heavy Industries Taxila Education City (HITEC) University is a private sector university. It was established in 2007 and chartered in 2009 by the Government of Punjab. The University is sponsored by Heavy Industries Taxila Education Welfare Trust (HITEWT). The university was established with a vision to produce skilled, moral, ethical and patriotic professionals who can serve the society and who will be the guardians of national, social and religious values.

University Mission Statement

HITEC University will be a center of excellence in teaching, learning and research. We shall instill and inspire intellectual curiosity, lifelong quest of knowledge and a keen urge for social and moral responsibility. The University will establish strong linkages with industry ensuring innovative research leading to economic prosperity of Pakistan.

Department of Electrical Engineering

Department of Electrical Engineering is currently running following intakes of the MS Electrical Engineering Program.

a.	MS Electrical Engineering	2019
b.	MS Electrical Engineering	2020
c.	MS Electrical Engineering	2021
d.	MS Electrical Engineering	2022
e.	MS Electrical Engineering	2023

In addition to above program, department also offers BS and PhD programs in Electrical Engineering.

Program Selected

HITEC University has selected the **PhD Electrical Engineering Program** as first model program for Self Assessment Report (SAR) under the directives of Higher Education Commission (HEC).

Program Evaluation

The program is evaluated based on 8 criteria and 31 standards as given in the Self Assessment Manual provided by HEC.

3.0 Criterion 1: Program Mission, Objectives and Outcomes

Standard 1-1

The program must have documented measurable objectives that support institution mission statements.

Program Mission Statement

MS Electrical Engineering Program aims to produce higher qualified engineers in specialized areas like Communication Systems, Control Systems, and Advanced Electronics. The students are offered state of the art advanced courses to equip them for solving the problems being faced in the industry. The course work also emphasizes risk-reduction, safe professional practices embodying societal and environmental concerns. The students after the MS Degree, can also enroll in PhD program as well.

Program Objectives

To produce MS qualified Electrical Engineers with following attributes:

1. Possessing wider and deeper knowledge in Electrical Engineering.
2. To be able to improve the engineering practices in vogue in the industry they have joined.
3. To be able to create innovative solutions to complex engineering problems in their respective organizations keeping in view societal and environmental concerns.
4. To be able to pursue Doctoral level education and research if desired.

Alignment of Program Objectives with Mission Statements

Program objectives intend to impart not only technical information to students but moral and ethical values as well. HITEC University provides a platform to students to acquire knowledge of pertinent fields and get hands on experience by extensive laboratory work.

Main Elements of Strategic Plan

Curriculum Design

Curriculum of MS Electrical Engineering is carefully designed as per timelines defines by HEC. The MS program comprises 24 credit hours of course work and 6 credit hours of research work followed by research thesis, fully adhering to the Higher Education Commission guidelines and requirements. Research topics for MS students pertain to signal processing, control systems, machine vision, digital communication, and information & coding theory etc.

Program Objectives Assessment

Objective	How Measured	When Measured	Improvement Identified	Improvement Made
1	Student Exit Survey	At the end of the MS Program	Some new topics have been added	Yes
2	Alumni Survey Employer Survey	Every two years	Survey questions have been improved	Yes
3	Alumni Survey Employer Survey	Every two years	Survey questions have been improved	Yes
4	Alumni Survey	Every semester	Mathematics course has been introduced	Yes

Table 1: Program Objectives Assessment

Alumni Surveys were conducted to get their feedback. See Annexure A for cumulative results of Alumni Survey. Employer surveys are in the process of compilation, the survey forms have been sent to employers and a response is awaited.

Standard 1-2

The program must have documented outcomes for graduating students. It must be demonstrated that the outcomes support the program objectives and that graduating students are capable of performing these outcomes.

3.2.1 Program Outcomes

1. Students shall be able to go for higher education (Ph.D) in Electrical Engineering field.
2. Students shall be able to use software related to Electrical Engineering.
3. Students shall have interpersonal skills.
4. Students shall be able to perform technical and non-technical jobs in electrical engineering field.
5. Students shall be able to perform analysis of the systems.
6. Students shall be able to design, develop and implement the solutions.
7. Students shall be able to run existing communication systems.
8. Students shall be able to perform research in related fields.
9. Students shall be able to execute tasks in positive and constructive manner.

Program Objectives	Program Outcomes								
	1	2	3	4	5	6	7	8	9
1	x	x	X						
2			x	x	x	x			
3				x	x	x	x	x	x
4	x								

Table: Outcomes versus Objectives

3.2.2 Standard 1-3

The results of Program assessment and the extent to which they are used to improve the program must be documented.

The program assessment has been done by launching HEC Performa number 1 and 10. The students of the program evaluated the courses and teachers in the program.

Course Evaluation

Courses evaluation is shown in the following graphical chart:

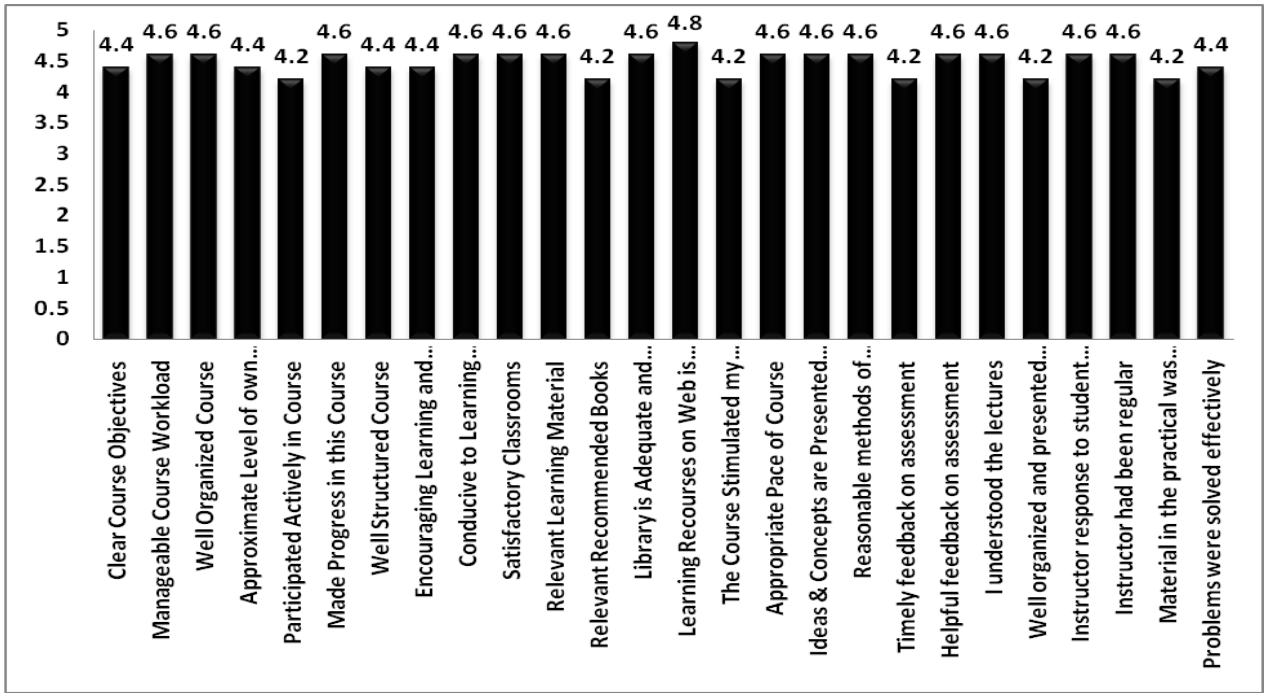

Figure 1: Course Evaluation Bar Chart

Through this evaluation, students have graded the courses against the structure, method of teaching, learning outcomes, objectives and practical implementation of theory. The total graded marks are 5.

See Annexure C (Course Evaluation Survey) for sample course evaluation results. The sample shows the results for one course only while the same has been done for all courses listed below. The results of all other courses have been kept in a separate file for record purposes. Following is the list of courses that are being evaluated by the students along with their course code and graded scores.

Sr. #	Course Name	Evaluation
01	Advance High Voltage Engineering	4.48
02	Dielectric & Electrical Insulations	4.49
03	Advanced Power System Protections	3.97
04	Research Methodologies	4.34
05	Power System Transients	4.34
06	Advanced Linear Control System	3.91

Teachers Evaluation

Teacher's evaluation for semester Fall 2015 is shown in the following graphical charts:

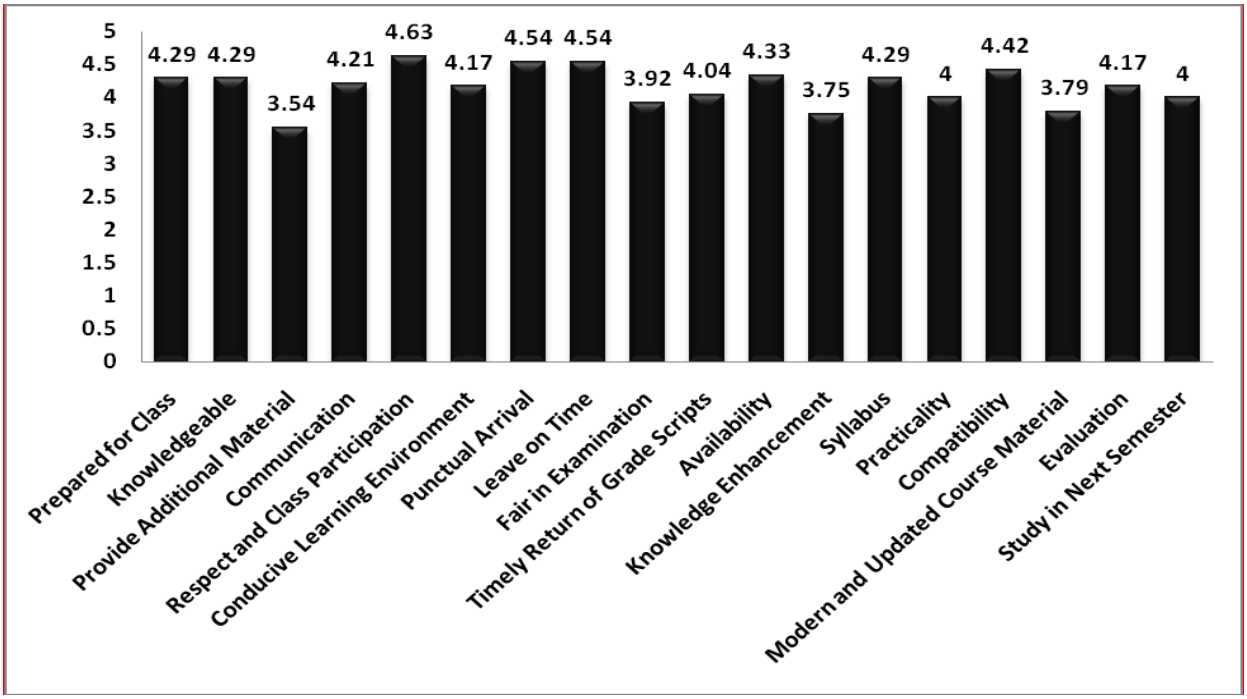

Figure 2: Teachers Evaluation Graph

Through this evaluation, students have graded the teachers against lecture preparation, punctuality, general behavior, subject knowledge and teaching method. The total graded marks are 5. See Annexure D (Teachers Evaluation Survey) for sample teacher evaluation results. The sample shows the results for one teacher only while same has been done for all teachers listed below. The results of all other teachers have been kept in a separate file for record purposes.

Following is the list of teachers that are being evaluated by the students along with the serial number and graded scores.

Sr #		Evaluation
Teacher 1	Advance High Voltage Engineering	4.60
Teacher 2	Dielectric & Electrical Insulations	4.55
Teacher 3	Advanced Power System Protections	4.48
Teacher 4	Research Methodologies	4.48

Teacher 5	Power System Transients	4.42
Teacher 6	Advanced Linear Control System	4.17

Note: The detailed list of evaluation is with Quality Enhancement Cell and can be provided on request.

The Dean and the Chairman of Program discussed the teacher evaluation results and decided to carry out counseling of teachers who are below par. It was also decided to conduct training sessions for teachers who are not performing at expected level.

The strengths and weaknesses of the program are:

Strengths

a. Rigorous, intensive and rewarding program.
b. Capable faculty.
c. Program weaknesses.
d. Insufficient infrastructure.
e. Low number of industry-oriented courses.
f. Low number of design competitions and intra-university linkages.

Weaknesses

a. Low percentage of design contents in syllabi
b. Low number of case studies

Standard 1-4

The department must assess its overall performance periodically using quantifiable measures.

3.1.1 Graduates enrolled in last three years

Enrolled Students			
Program	**2020-21**	**2021-22**	**2022-23 (Upto Spring 2023)**
MS Electrical Engineering	16	07	06

Graduated Students			
Program	**2020-21**	**2021-22**	**2022-23 (Upto Spring 2023)**
MS Electrical Engineering			07

3.1.2 Student Faculty Ratio:

MS Electrical Engineering has 6-1 ratio

3.1.3 Average GPA per semester:

Average GPA per semester for the batch enrolled in year 2022 (Fall) is as under:

Average GPA: 3.00

Average CGPA: 3.00

3.1.4 Average Completion time

The average completion time for Masters Program is 1.5 years and the maximum permitted time is 4 years

3.1.5 Employer Satisfaction

No Employer survey of MS program has been conducted yet.

3.1.6 Students Course Evaluation Rate

Average student evaluation for all courses is 4.25 out of 5.

3.1.7 Students Faculty Evaluation

Students Evaluated faculty. The feedback was taken by QEC staff in the absence of faculty members. 100% teachers are above average grades which mean none of the teacher is below average. All the teachers are above 4.0 which is the topmost tier of the grading hierarchy.

3.1.8 Research

The program faculty published many research papers in different impact factor journals. List attached in Annexure A.

3.1.9 Community Service

HITEC University provides financial assistance for deserving students. It also takes part in disaster relief programs to help victims of flood, earthquake etc. University has its association with different blood donor clubs and it arranges blood camps on regular periods. University also actively takes part in environmental awareness activities and celebrates events like green day etc.

4.0 Criterion 2: Curriculum Design and Organization

Title of Degree Program

MS Electrical Engineering

Definition of credit hour:

One credit hour is 3 hours of theory lecture in a week.

Degree plan

Following is the list of courses taught in the selected program.

Sr #	Course Code	Course Title	Credit Hours
1.	EE-811	Advanced Digital Signal Processing	3-0
2.	EE-812	Digital Image Processing	3-0
3.	EE-813	Real-Time DSP Design & Applications	3-0
4.	EE-814	GIS and Remote Sensing	3-0
5.	CS-829	Advanced Computer Vision	3-0
6.	EE-817	Statistical Signal Processing	3-0
7.	EE-818	Adaptive Signal Processing	3-0
8.	EE-819	Array Signal Processing	3-0
9.	EE-820	Advanced Computer Architecture	3-0
10.	EE-821	Stochastic Systems	3-0
11.	EE-822	Information Coding & Theory	3-0
12.	EE-823	Advanced Digital Communication	3-0
13.	EE-824	Secure Communication	3-0
14.	EE-825	Fuzzy Control Systems	3-0

15.	EE-826	Telecommunication & Switching Principles	3-0
16.	EE-827	Optical Fiber Communication	3-0
17.	EE-828	Smart Antennas	3-0
18.	EE-831	Advanced Linear Control Systems	3-0
19.	EE-832	Nonlinear Control Systems	3-0
20.	CS-811	Advanced Computer Networks	3-0
21.	EE-838	Modern Electrical Drives	3-0
22.	EE-847	Advanced topics in Image and Video Processing	3-0
23.	EE-849	Special topics in Wireless Communications	3-0
24.	EC-802	Advanced Digital Systems Design	3-0
25.	EE-844	Research Methodologies	3-0
26.	EE-851	RF Transmission and Antenna Design	3-0
27.	EE-852	Advanced Engineering Electromagnetic	3-0
28.	EE-853	Nanomaterials Engineering Applications	3-0
29.	EE- 854	Network Optimization	3-0
30.	EE-855	Power System Transients	3-0
31.	EE-856	Satellite Communication	3-0
32.	EE-857	Advanced Power Electronics	3-0
33.	EE-858	High Voltage Engineering	3-0
34.	EE-859	Optimization Techniques in Power System	3-0
35.	EE-860	Power System Operation	3-0
36.	EE-861	Electrical Power Distribution Systems	3-0
37.	EE-862	Reliability Analysis for Power Systems	3-0
38.	EE-863	Advanced Topics in Antenna Design	3-0
39.	EE-866	Semiconductor Physics and Devices	3-0
40.	EE-867	Microwave Network Analysis and Passive Components	3-0
41.	EE-868	Electrical Machine Design	3-0
42.	EE-869	Advance Power System Protection	3-0
43.	EE-870	Wind Energy and Distributed Generation	3-0
44.	EE-872	Advanced Power System Stability & Control	3-0
45.	EE-873	Dielectric and Electrical Insulation Materials	3-0

Courses Information

EE- 811: Advanced Digital Signal Processing

Discrete-time signal and systems; time-domain analysis; frequency-domain analysis; Z-Transform and its properties; solutions of difference equations using Z-Transform, Discrete-time Fourier Series (DTFS), Discrete-time Fourier Transform (DTFT), DFT, and FFT processing; implementation of Discrete-Time systems, FIR, and IIR filters design; random digital signals; MultiMate digital signal processing; linear prediction and optimal filters; *and* power spectrum estimation

EE- 812: Digital Image Processing

Image processing fundamentals; basic grey level transformation; histogram processing; area processing; spatial domain smoothing and sharpening filters; orthogonal and ortho-normal basis functions; transform domain smoothing and sharpening filters; discrete cosine transform; overview of information theory; lossless compression; JPEG compression; morphological image processing; *and* image segmentation

EE- 813: Real-Time DSP Design & Applications

Discrete-time signal processing; data format; microprocessor architecture; peripheral components; real time implementation issues; introduction to DSP architecture; fixed-point DSP; floating point DSP; software development, design, and implementations; designing approach, simulation, and verification; *and* final implementation on fixed and floating-point

EE- 814: GIS and Remote Sensing

GIS and remote sensing; aerial photography; photographic basics; multiband imaging; photo-grammetry; sensing tt systems; multispectral, thermal, and hyper-spectral sensing; earth resource satellites; Landsat and SPOT programs; visual image interpretation; image interpretation keys; applications; essential digital image processing; computer assisted operations; GIS data models and structures; conversion; GIS and remote sensing integration; coordinate space, datum, and map projections; GIS operations; *and* challenges and future trends

CS- 829: Advanced Computer Vision

Color Vision, multiple view geometry, camera calibration, 3D reconstruction, object recognition, optical flow and motion analysis, perceptual grouping, background modeling, detection and tracking, robotic vision, gesture and facial expression recognition, and activity recognition

EE-817: Statistical Signal Processing

Probability, stationary process models, linear systems, spectral representation and Eigen analysis, maximum likelihood estimation, Bayes estimation, Wiener Filtering theory, adaptive optimization (steepest descent algorithm), lease mean square algorithm, RLS algorithm, blind de-convolution

EE- 818: Adaptive Signal Processing

Adaptive signal processing; adaptive filter theory; discrete time signal processing; stationary process; power spectral density; review of linear algebra; linear optimum filter; linear prediction; method of steepest descent; LMS algorithm; frequency-domain adaptive filters; LS and RLS filters; LMS and NLMS; *and* Kalman filters

EE- 819: Array Signal Processing

Introduction to array signal processing; propagating waves; wave number-frequency space; apertures; delay and sum beam forming; filter-and-sum beam forming; convolutional narrowband beam forming; signal to noise constrained optimization; MVDR beam forming; Eigen value method, MUSIC, and ESPRIT; introduction to Cramer-Rao bounds; *and* Cramer-Rao bounds for arrays

EE- 820: Advanced Computer Architecture

Introduction to multi-threaded and multi-core architectures; memory systems for multi-core architectures; programming models; APIs, POSIX, MPI, and Open MP; network on chip; NoC architecture; physical layer, data link layer, and network and transport layer; QoS; *and* network interface design

EE- 821: Stochastic Systems

Definition and characterization of a stochastic process; discrete-time and continuous-time stochastic processes: the first and second order statistics, continuity, derivative, and integral of a stochastic process; time–averages and Ergodic theorems; stationarity; power spectral density; time-series analysis; discrete–time Markov chains; continuous–time Markov chains; *and* Queuing theory

EE- 822: Information and Coding Theory

Information theory; source coding; channel, channel capacity, and channel-coding; linear block codes for error correction; cyclic codes, convolution codes, turbo codes, and trellis coded modulation; introduction to cryptography, symmetric cryptography, and asymmetric cryptography; *and* secure communication using Chass functions

EE- 823: Advanced Digital Communication

Band-limited channels; inter symbol interference and equalization,; fading channel, characteristics and models; the effect of fading on digital communication system and the ways of mitigating this effect; multicarrier communications; spread spectrum and multiple access techniques; CDMA schemes; *and* multiuser detection

EE- 824: Secure Communications

Introduction, communication, and security threats; secure communication algorithms; cryptography and security; conventional cryptography; private and public key encryption; encryption algorithms; key distribution problem; authentication and digital signatures; pseudo-random number generation and its computational complexity; secure speech communication; speech scrambling techniques; spread spectrum; secure GSM systems; *and* recent trends in secure communication

EE- 825: Fuzzy Control Systems

Application of fuzzy logic to analyze and design controllers for non-linear systems; fuzzy sets; fuzzy logic; fuzzy relations and inference engines; framing rules for designing fuzzy controllers and their simulations to ascertain

their performance; Mamdani's and t-s-k's design approaches; *and* model-less design philosophy

EE- 826: Telecommunication & Switching Systems

Telecommunication systems; channel bandwidth, processing power, and storage capacity; Public Switched Telephone Network (PSTN); outside plant; switching systems; Strowger switching systems; Crossbar switching systems; electronic space division switching; time division switching; signaling systems; SS7 signaling; optical fiber transmission systems; traffic engineering; broadband transmission systems; *and* ISDN

EE-827: Optical Fiber Communication

Optical fiber communications, optical fibers and lasers, optical transmitters, optical components, optical pulse propagation in fiber, link performance, optical modulation formats, modulation formats and performance, wavelength division multiplexing, subcarrier multiplexing.

EE- 828: Smart Antennas

Smart antennas; fundamentals of electromagnetic waves; antenna fundamentals; antenna characteristics; types of antennas; antenna array fundamentals; array signal processing fundamentals; types of array processing; characteristics of propagation channel; angle-of-arrival estimation fundamentals; AOA estimation methods; historical developments of smart antennas; beam forming methods; *and* adaptive beam forming

EE- 831: Advanced Linear Control Systems

Advanced concepts in linear control theory; state-space formulation; embodying multi-input/ multi-output systems; state transformation and diagonalization to compute time response from the state questions; system's behavior in terms of various stability criteria and its controllability and observability; state-space design using state feedback, pole-placement, and integral control principles; Linear Quadratic Regulator (LQR) and Linear Quadratic Gaussian (LQG) problems; *and* robustness in systems

EE-832: Nonlinear Control Systems

Existence of various non-linearities which are normally present even in linear systems, details of common physical non-linearities, saturation , friction , relay and dead-zone are ascribed, Non applicability of mathematical tools like Laplace transformation and Z-transformation, phase-plan and function methods to analyses given non-linear control systems, the existence of singular points and limit cycles, phase-plan nonlinear control systems; Liapunoves stability criteria

CS- 811: Advanced Computer Networks

Conceptual knowledge of the architecture, interfaces, protocols and technologies of high-speed networks, implementation in different networks using modern research technologies. routers with IP switching, MPLS, use of ATM and frame relay, ethernet switching, gigabit ethernet, and FDDI, broadband access through DSL and cable modems, network performance, congestion control and traffic management, provision of different List of Elective Courses HITEC University Prospectus 2016 99 levels of quality of service, resource reservation, unicast and multicast routing, and an overview of security in networks

EE-838: Modern Electrical Drives

Analogue and digital instrumentation, motor instrumentation, hardware-in-the-loop, implementation of PID controllers, power semiconductor devices, DC motors and drives, electronic implementation of DC motor drives, induction and synchronous motors overview, characteristics and control strategies, Dynamic d-q model of induction and synchronous motors, MATLAB implementation of d-q models, scalar and vector control of AC motors, control and estimation of synchronous motor drives, phase controlled converters, cyclo-converters, voltage-fed converters

EE- 847: Advanced topics in Image and Video Processing

Axes transformation; ortho-normal bases and their applications; Discrete Cosine Transform and its applications; the JPEG image compression; wavelet transform and multi-resolution image processing; MPEG video standard;

image hashing and watermarking; shape analysis and classification; *and* fuzzy image processing

EE-849: Special Topics in Wireless Communication

Fading and channel models, bit error rate analysis, capacity analysis, outage analysis, space-time coding, introduction to MIMO system, multi carrier communications, OFDM, OFDM-A, cooperative communications; cognitive radio

EC- 802: Advanced Digital Systems Design

Sequential circuits design, design of CSSN and iterative circuits, ASM realization, analysis of asynchronous sequential circuit (ASC), design of ASC, designing vending machine controller, fault diagnosis and testability algorithms, DFT schemes, built-in self- test, synchronous design using programmable devices, sequential circuit with programmable array logic; architecture and application of field programmable logic sequence, architecture with EPLD, PEEL, realization state machine using PLD, Xilinx FPGA, Xilinx 2000/4000 family. VHDL based designing with PLD-ROM, PAL, PLA, sequential PLDs, and case study – Keypad Scanner

EE-844: Research Methodologies

Concepts of research, the need and types of research, steps in conducting research, literature review, methods of literature review, problem formulation, criteria for selecting a problem, identifying variables, evaluating problems, differences among undergraduate and post-graduate research, research at post-graduate level (PhD and MSc). Papers and reports, writing a report and technical paper, contents of a thesis, research proposal, research grants in Pakistan, case study, self-publishing, promoting published work, impact factor of journals, H-index, research attitude, finding research topics, research managements, research ethics and developing a research career

EE-851: RF Transmission and Antenna Design

Wave propagation, transmission losses and frequency selection, Poynting vector, transmission lines, propagation constant, input impedance and SWR,

antenna parameters, isotropic radiators, spherical coordinates, effective area/ aperture, gain, directivity link budget, impedance, return loss, VSWR, polarisation, radiation resistance, far field criteria, beam-width, near/far relations, reciprocity, specific absorption rate, dielectric substrates, CST Microwave Studio 2016, antennas design methodology, parametric analysis, MIMO antennas, capacity formulation, spatial multiplexing and diversity coding, advanced propagation analysis, use of VNA, S-parameters, efficiency measurements, fabrication & testing errors etc., simulation and measurement results, techniques for improving return loss and radiation performances, reconfigurable antennas; antennas research across the globe

EE- 852: Advanced Engineering Electromagnetics

Maxwell equations in differential and integral form; current-field relations; power and energy; electrical properties of matter; dielectrics; polarization and magnetization; semiconductors, superconductors, ferrites, and meta-materials; linear, homogenous, isotropic, and non-dispersive media; time-varying and time-harmonic electromagnetic fields; uniform plane waves; transverse electromagnetic modes; polarization (linear, circular, elliptical); reflection and transmission; waveguides and cavities; scattering; electromagnetic theorems; duality; uniqueness; image theory; equivalence principle; induction theorem; diffraction; *and* Green's functions of the Scalar Helmholtz equation

EE- 853: Nanomaterials Engineering Applications

Nanomaterials (nanoparticles and their composites); elementary consequences of small particle size; variation in material characteristics from bulk to nano; surfaces in nanomaterials; surface energy; synthesis techniques of nanomaterials (physical and chemical processes); Inert-Gas condensation process; Scaling law for vibrations of nanoparticles; nanorods, nanotubes, and nanofluids; thermodynamics of nanoparticles and their phase transformations; magnetic Nanomaterials; optical, electrical, physical, and mechanical properties of Nanomaterials; electrical conductivity in nanomaterials and their composites; bulk metallic and ceramic materials; porosity and grain size; X-Ray and electron diffraction; electron microscopy; nanomaterials in storage media, biomedicine, nano-sensors, and devices; *and*

nanomaterials for energy applications like batteries, super-capacitors, solar cells, and fuel cells

EE- 854: Network Optimization

Introduction to components of optimization problems; classes of optimization problems; convex optimization; dual problems; Lagrange multipliers; sensitivity analysis; examples and applications (transmit power allocation and minimum delay routing); linear optimization; simplex algorithm; duality of linear optimization (minimum cost routing); integer linear optimization; branch and bound; cutting-plane algorithm; heuristics for ILM iterations of branch and bound; feasible sets for relaxation and Lagrangian relaxation; *and* dual function and applications

EE- 855: Power System Transients

Electromagnetic transient analysis; Graphical User Interface; steady-state and time-domain solutions; nodal analysis and modified-augmented nodal analysis; state-space analysis and hybrid analysis; MANA, phasors, and FD representation of signals; Fourier Series; Fourier Transform; Discrete-time frequency analysis; aliasing effect; conservation of information and the Fast Fourier Transform; Frequency-Domain Transient Analysis; multi-rate transient analysis; power system overvoltage's, faults to grounds; load rejection, harmonic resonance, and energization of unloaded transformers; Ferro resonance; switching over voltages; case studies; lightning over voltage; over voltages in gas insulated substations; origin of VFTO in GIS; propagation of VFTs in GISs and 765 kV GIS; *and* statistical calculation

EE- 856: Satellite Communication

Satellite communication; orbital mechanics; satellite look angle; orbital perturbations; satellite subsystems; satellite link design; link margin calculations; rain attenuation; secondary propagation effects; Mux and multiple access; FDMA, TDMA, and Multiple access TDMA; synchronization between earth stations; CDMA access; auto-correlation; CDMA transmission and reception; DS-SS CDMA capacity; statistical bit error rate measurements; advanced satellite communication systems; non-GEO and GEO comparisons;

Cube SAT, VSAT, and global positioning system; leading service providers; *and* Inmarsat and Intelsat

EE- 857: Advanced Power Electronics

Switching voltage regulators; analysis of DC-DC voltage regulator; Buck, Boost, and Buck-Boost converters and analysis for continuous and discontinuous mode; Cuk converter; chopper circuit design; switched mode power supplies; magnetic design considerations and control circuits; inverters; harmonic analysis of single inverters, three phase PWM inverters, current source inverters, variable DC link inverters, circuit design, resonant pulse inverters, multilevel inverters, and controlled rectifiers; harmonic analysis of single phase converters, three phase converters, power factor improvement, digital gate driving circuits, and AC voltage controllers; PWM control techniques; flexible AC transmission systems; importance of reactive power compensation; conventional control mechanisms; *and* phase-angle compensation

EE-858: High Voltage Engineering

High voltage, conduction and breakdown in gases, liquid, dielectrics, Breakdown in soled dielectrics, application of insulating material, generation of high voltage, measurement of high voltages, overvoltage transients in power systems

EE-859: Optimization Techniques in Power System

Economic load dispatch of thermal generating units, generator operating cost, economic dispatch problem on a bus bar, optimal generation scheduling, Newton Raphson method, approximate Newton Raphson method, classical methods to calculate loss co-efficient, transmission loss co-efficient, exact loss formula, evolutionary programming for generation scheduling, fitness function, genetic algorithm operators, random number generation, genetic algorithm solution based on real power search

EE-860: Power System Operation

Generation scheduling in thermal system and their solution, derivation of B-coefficients and incremental transmission loss (ITL), ITL from the Jacobian of N-R load flow, hydro thermal scheduling, unit commitment by dynamic programming. Automatic generation control, load frequency control of single and multi area power systems, Megavar voltage control, AVR for generator excitation control, reactive power dispatch, energy control center, data acquisition and transmission, man-machine interfaces, state estimation, maximum likelihood estimation and weighted least-estimation, bad data identification, concept of power system monitoring, load forecasting, sources of error, estimation of deterministic part, estimation of periodic components, estimation of stochastic component; time series approach

EE- 861: Electrical Power Distribution Systems

Distribution system planning; basic design criteria; network configuration; reliability considerations; load characteristics and types of customers; equipment specification; distribution lines; distribution sub-stations/sub-transmission lines; LV network; primary and secondary systems; distribution system operation; system protection; SCADA; distribution automation; geographical information system; *and* system performance

EE- 862: Reliability Analysis for Power Systems

Definitions and concepts of reliability theory; network reliability modeling; component reliability; important techniques; Markov modeling; lifetime models; NEPLAN reliability module; maintenance optimization techniques and problem formulation; lifecycle cost and analysis; power system regulatory methods; *and* reliability project on academic and real world problem

EE- 863: Advanced topics in Antenna Design

MIMO antennas; capacity formulation; propagation environments for smart phones and WiFi terminals; decoupling and isolation improvement for closely spaced antennas; meandered ground extensions, ground slots, parasitic structures, reconfigurable antennas, varactor, pin- diode, MEMS, FET, and photo-diode switches; antennas designing on CST microwave studio software; fabrication and testing; radiation pattern in anechoic chamber; efficiency measurements using

Wheeler Cap method, envelope correlation coefficient, and diversity gain measurements; channel sounder measurements of MIMO; MIMO capacity measurements; phantoms; *and* SAR simulations and measurements

EE-866: Semiconductor Physics and Devices

Crystal Lattices, Epitaxial Growth, Physical Models, experimental Observations, The Bohr Model, Quantum Mechanics, Atomic Structure and the Periodic Table, Bonding Forces and energy Bands in Solids, Charge Carriers in Semiconductors, Carrier Concentrations, Drift of Carriers in electric and Magnetic Fields, Invariance of the Fermi Level at equilibrium, Optical Absorption, Luminescence, Carrier Lifetime and Photoconductivity, Diffusion of Carriers, Fabrication of p-n Junctions, metal semiconductors, semiconductor hetero junctions, Equilibrium Conditions, Forward- and reverse-Biased Junctions; Steady State Conditions, reverse-Bias Breakdown, The Junction FET, The Metal–Semiconductor FET, The Metal–Insulator–Semiconductor FET, The MOS Field-effect Transistor, BJT Fabrication, Minority Carrier Distributions and Terminal Currents, Frequency Limitations of Transistors

EE-867: Microwave Network Analysis and Passive Components

Wave propagation on lossless Transmission Line, Field analysis and solutions of TL in different modes. Smith chart. Normalized impedance and admittance smith chart, matching with lumped elements, Slotted line, Quarter wave transformer, Analytic and smith-chart solutions, Impedance matching and tuning, Impedance matching networks, Series and parallel resonant circuits. Loaded and unloaded Q, Signal flow graphs, Decomposition of signal flow graph. Application of TRL network analyzer calibration, Load matched to line, Generator matched to load, Microwave network analysis. Transmission line resonators. Excitation of resonators, Scattering matrix and parameters, Power dividers and directional couplers, Three and four port networks, T-junction power divider, Wilkinson power divider, Waveguide directional couplers, Quadrature hybrid, The Lange coupler, The 180 hybrid, The magic T

EE-868: Electrical Machine Design

Transformer Standards and Tolerances, Conventional Transformer Design , Yoke and Tank Design , LT Winding Designs (Spiral, Cylindrical, Disc, Helical) ,HT Winding Designs (Disc, Cross-Over) , Winding Gradient, Weight of Oil, Tank Dimensions, Load Loss, Voltage Regulation, Coil Length ,Load Loss and Similar Parameters , Transformer Design Optimization , Transformer Selection Criteria , Hardware Project for Small Shell Type Transformer Design of Magnetic Circuit , Dimension Selection of Induction Machine , Flux Leakage Calculations with Slot and Teeth Design, Windings Designs of Stator (Concentrated, Distributed, Fractional, Full-Pitch, Integral & Fractional Slot) , Rotor Design of Induction Machine (Wound & Cage) , Resistances Calculations & Parametric Calculations of Overall Design , Windings Design of Salient Pole and Cylindrical Rotors of Alternator , Design Process Hierarchy of Rotating Machines , Heat Transfer Calculations , Projects Pertaining to Re-winding of Machines with Different Types to change their Name-plate Values

EE-869: Advance Power System Protection

Digital frequency relays, relay algorithms, circuit breaker and its operational behaviour, transmission and distribution line protection schemes, fault location identification techniques, transformer, busbar and motors protection, protection zones, digital protection, surge protection, static and dynamic relays, relay settings, load shedding and frequency relays, load shedding schemes, number of load shedding steps, distributed generation protection schemes, relay coordination in interconnected systems, protection of HVDC systems, microgrid protection, recent development and future trends in power system protection

EE-870: Wing Energy and Distributed Generation

Wind turbine structure, parts of wind turbine, power extracted from wind, Betz limit, types of wind turbines, control of wind turbine, onshore and offshore wind farms, integration of wind power, integration challenges, HVDC and HVAC transmission system, LCC-HVDC, VSC-HVDC technologies, wind farm earthing and lightning protection, grid code compliance of wind turbines, inertial support from wind turbine. Types of Distributed Generation (DG),

connecting DG to power system, connection challenges, isolated and grid connected DG systems

EE-872: Advanced Power System Stability & Control

Overview of power system stability, small signal stability, voltage stability, transient stability, rotor angle stability, eigenvalue analysis, modal analysis, synchronous machine modelling for stability studies, static and dynamic loads, active and reactive power control, voltage control, power system damping and oscillations, sub synchronous oscillations, stability in the presence of renewable generation, single and multi-machine stability, stability under faults, stability improvement methods

EE-873: Dielectric and Electrical Insulation Materials

The dominating part of the course is about properties of dielectric materials when they are used as passive electric insulation in high voltage devices. Gases, liquids and solids are covered. The nature of the dielectric response from stimulus of an electric field is discussed: polarisation and depolarisation as a relaxation process and charge transport (conduction) processes. High field effects such as charge injection and dielectric breakdown mechanisms are discussed. Space charges of importance for DC insulation. Aging phenomena and long time behaviour. Representation in time and frequency domain. Relaxation in different frequency bands. Some part is devoted to ‘sensor properties’, i.e. optical/electro-optic, ferroelectric, piezoelectric, and poly electric and electric properties

Standard 2-1

The curriculum must be consistent and support the program's documented objectives.

Sr #	Course Code	Course Title	Credit Hours
1.	EE-811	Advanced Digital Signal Processing	3-0
2.	EE-812	Digital Image Processing	3-0
3.	EE-813	Real-Time DSP Design & Applications	3-0
4.	EE-814	GIS and Remote Sensing	3-0
5.	CS-829	Advanced Computer Vision	3-0
6.	EE-817	Statistical Signal Processing	3-0
7.	EE-818	Adaptive Signal Processing	3-0
8.	EE-819	Array Signal Processing	3-0
9.	EE-820	Advanced Computer Architecture	3-0
10.	EE-821	Stochastic Systems	3-0
11.	EE-822	Information Coding & Theory	3-0
12.	EE-823	Advanced Digital Communication	3-0
13.	EE-824	Secure Communication	3-0
14.	EE-825	Fuzzy Control Systems	3-0
15.	EE-826	Telecommunication & Switching Principles	3-0
16.	EE-827	Optical Fiber Communication	3-0
17.	EE-828	Smart Antennas	3-0
18.	EE-831	Advanced Linear Control Systems	3-0
19.	EE-832	Nonlinear Control Systems	3-0
20.	CS-811	Advanced Computer Networks	3-0
21.	EE-838	Modern Electrical Drives	3-0
22.	EE-847	Advanced topics in Image and Video Processing	3-0
23.	EE-849	Special topics in Wireless Communications	3-0
24.	EC-802	Advanced Digital Systems Design	3-0
25.	EE-844	Research Methodologies	3-0
26.	EE-851	RF Transmission and Antenna Design	3-0
27.	EE-852	Advanced Engineering Electromagnetic	3-0
28.	EE-853	Nanomaterials Engineering Applications	3-0

29.	EE- 854	Network Optimization	3-0
30.	EE-855	Power System Transients	3-0
31.	EE-856	Satellite Communication	3-0
32.	EE-857	Advanced Power Electronics	3-0
33.	EE-858	High Voltage Engineering	3-0
34.	EE-859	Optimization Techniques in Power System	3-0
35.	EE-860	Power System Operation	3-0
36.	EE-861	Electrical Power Distribution Systems	3-0
37.	EE-862	Reliability Analysis for Power Systems	3-0
38.	EE-863	Advanced Topics in Antenna Design	3-0
39.	EE-866	Semiconductor Physics and Devices	3-0
40.	EE-867	Microwave Network Analysis and Passive Components	3-0
41.	EE-868	Electrical Machine Design	3-0
42.	EE-869	Advance Power System Protection	3-0
43.	EE-870	Wind Energy and Distributed Generation	3-0
44.	EE-872	Advanced Power System Stability & Control	3-0
45.	EE-873	Dielectric and Electrical Insulation Materials	3-0

Table 4: Standard 2-1 Requirement (table 4.4)

Standard 2-2

Theoretical backgrounds, problem analysis and solution design must be stressed within the program's core material.

Elements	Courses	
Theoretical Background	EE 811	Advanced Digital Signal Processing
	EE 826	Telecommunication & Switching Principles
	EE 831	Advanced Linear Control Systems
Problem Analysis	EE 855	Power System Transients
	EE 823	Advanced Digital Communication
	EE 832	Advanced Linear Control Systems
	EE 883	Dielectric & Electrical Insulations
Solution Design	EE 869	Advance Power System Protection
	EE 855	Power System Transients
	EE 858	Advance High Voltage Engineering

	EE 825	Fuzzy Control Systems
	EE 834	Optical Control Systems

Table 5: Standard 2-2 Requirement (table 4.5)

Standard 2-3

The Curriculum must satisfy the core requirements for the program as specified by the respective accreditation body.

MS Electrical Engineering program is recognized by Higher Education Commission (HEC). Minimum Requirements for each program (Program Semester Credit Hours):

Program	Theory Courses	Research Thesis
MS Electrical Engineering	24	6

Table 6: Program Credit Hours

Standard 2-4

The curriculum must satisfy the major requirements for the program as specified by the respective accreditation body.

Same as Standard 2-3.

Standard 2-5

The curriculum must satisfy general education, arts and professional and other discipline requirements for the program as specified by the respective accreditation body.

Same as standard 2-3 and Standard 2-1 (table 4.4) as defined above.

Standard 2-6

Information technology component of the curriculum must be integrated throughout the program

Not applicable.

Standard 2-7

Oral and written communication skills of the student must be developed and applied in the program.

Students go through course presentations and research methodology, which develop the oral and written communication skills of the students. Students have to write a thesis and present their work in thesis defense in 4th semester.

5.0 Criterion 3: Laboratories and Computing Facilities

5.1 Standard 3-1

Laboratory manuals/documentation/instructions for experiments must be available and easily accessible to faculty and students.

Not applicable.

5.2 Standard 3-2

There must be support personal for instructions and maintaining the laboratories.

Not applicable.

5.3 Standard 3-3

The University computing infrastructure and facilities must be adequate to support program's objectives.

Not applicable.

6.0 Criterion 4: Student Support and Advising

Since the launch of HITEC University in year 2007, all its programs have started and finished on schedule. The culture in HITEC is that teachers and students have facility of frequent interaction, even after classes, for any professional and academic advice. This aspect is even highlighted and

indicated by the students in the feedback on HEC Performa number 10, taken by the QEC in the university.

Standard 4-1

Courses must be offered with sufficient frequency for students to complete the program in a timely manner.

The department circulates a list of postgraduate courses to be offered by the PhD qualified faculty. A student registers in minimum three and maximum four courses. The minimum number of the students needed for offering a course is 6. The practice is followed in all the teaching semesters. Over the years, our experience shows that this scheme gives ample opportunities to complete the MS coursework in three semesters quite comfortably. The fourth semester is meant for research and writing a thesis. Thus, an average student cannot complete all requirements for the MS degree in 1.5 years time frame.

Standard 4-2

Courses in the major area of study must be structured to ensure effective interaction between students, faculty and teaching assistants.

The department ensures that postgraduate courses are offered in well-considered chronological sequences, leading towards the assigned research projects of the students.

Standard 4-3

Guidance on how to complete the program must be available to all students and access to qualified advising must be available to make course decisions and career choices.

The department has dedicated a senior faculty member as the postgraduate advisor. He advises the students to select courses and in doing so, he consults the HOD as well as the PhD faculty. This ensures a smooth process of course selection. During the research phase, each student has a dedicated

supervisor as well. He keeps guiding the students regularly till the end of the research defense.

7.0 Criterion 5: Process Control

Standard 5-1

The process by which students are admitted to the program must be based on quantitative and qualitative criteria and it should be clearly documented. This process must be periodically evaluated to ensure that it is meeting its objectives.

Our university has a clearly defined and well documented admission process. It is as given below. The prospective candidate should have:

- BE/BSc Engineering degree in the relevant discipline from an HEC recognized university.
- Minimum CGPA 2.00/4.00 or 50% marks.
- GAT General conducted by NTS with minimum 50% cumulative score.

Additionally, the candidates are also interviewed. For this purpose, the department has an Admission Committee comprising HOD and at least two senior faculty members. So far, this process of admission is working to our satisfaction. However, we remain conscientious of reviewing it whenever the need would arise.

Standard 5-2

The process by which students are registered in the program and monitoring of students' progress to ensure timely completion of the program must be documented. This process must be periodically evaluated to ensure that it is meeting its objectives.

As mentioned earlier, the postgraduate program supervisor keeps track of the performance of each student and HOD also, individually, keeps a check on the progress as well. The controller of examinations department keeps in

custody all the results and raises an alarm whenever a student is likely to get into difficulties situation.

Standard 5-3

The process of recruiting and retaining highly qualified faculty members must be in place and clearly documented. Also processes and procedures for faculty evaluation, promotion must be consistent with institution mission statement. These processes must be periodically evaluated to ensure that it is meeting with its objectives.

Vacant and newly created positions are advertised on the university website and also in the national newspapers, applications are received by the Registrar office, scrutinized by the respective Deans, and call letters are issued to the short-listed candidates on the basis of experience, qualification, publications and other qualities/activities as determined by the University in the light of HEC guidelines.

The candidates are interviewed by the University Selection Board. Selection of candidates is approved by the BOG. Induction of new candidates depends upon the number of approved vacancies.

Faculty members are retained by giving them good remuneration, favorable teaching environment, research facilities and management support.

On semester basis faculty performance is evaluated basing on HEC Performa number 10 by the students, HOD recommendations and with the counter signature of Dean and Vice Chancellor. The additional annual increment is based on the recommendations of the HOD, Dean and the Vice Chancellor.

Standard 5-4

The process and procedures used to ensure that teaching and delivery of course material to the students emphasizes active learning and that course learning outcomes are met. The process must be periodically evaluated to ensure that it is meeting its objectives.

Students are the recipient of the delivery of course material, through their teachers. The program is actively evaluated by HOD, Dean, In Charge program and QEC. The feedback of the taught course is best instrument to measure that the course learning outcomes are met. The students give feedback on Performa number 1 regarding course contents and how it was delivered. Through Performa number 10, students evaluate and comment on teacher's efforts, put in to deliver the course contents, his general conduct in the class, the environment, he/she, maintains and extra efforts, he/she makes to satisfy students, thirst for knowledge.

Faculty feedback is also taken on HEC Performa number 2 (Faculty Course Review Report – Annexure C) and Performa number 5 (Faculty Survey – Annexure - E) which is a very useful activity to evaluate the course contents, learning and teaching environments and overall teachers satisfaction level. Course evaluation by teachers also indicates what percentage of desired outcome has been achieved by the course contents and what needs to be improved or changed.

This exercise is done twice a year. The feedback is discussed with HOD, Dean and In-charge program, who focus on making improvements in the weak areas, identified by the students. Teacher's evaluation Performa's are fed to the computer and bar charts are made. Each teacher is graded out of 5 marks. The comparative bar charts indicate level of performance of teachers, as visualized by the students. QEC formally submits these bar charts to HOD, Dean and Vice Chancellor for their information and taking of necessary corrective actions.

Standard 5-5

The process that ensures that graduates have completed the requirements of the program must be based on standards, effective and clearly documented procedures. This process must be periodically evaluated to ensure that it is meeting its objectives.

HEC criteria for enduring the fulfillment of all the requirements are strictly followed in the University for the Award of MS degree. It consists of either

passing 10 postgraduate courses or 8 courses and a research thesis. Also, our requirement is that a student must achieve a minimum CGPA of 2.5 out of 4.00. The minimum duration for Masters Program is 1.5 years and the maximum permitted time is 4 years. The complete process is well documented and well publicized. The appropriateness of this process is reviewed through faculty and student feedback forms by the QEC Directorate.

8.0 Criterion 6: Faculty

8.1 Standard 6-1

There must be enough full time faculties who are committed to the program to provide adequate coverage of the program areas/courses with continuity and stability. The interests and qualifications of all faculty members must be sufficient to teach all courses, plan, modify and update courses and curricula. All faculty members must have a level of competence that would normally be obtained through graduate work in the discipline. The majority of the faculty must hold a Ph.D. in the discipline.

There are five PhD faculty members, specialist in the fields of DSP, digital image processing, adaptive signal processing, computer and machine vision and advanced computer networks. Including these following ranks are available in the electrical department:

- Professor – 1
- Associate Professor – 1
- Assistant Professor – 3

Program Area of Specialization	Course Code	Course Title	No of PhD Faculty
Electrical Engineering	EE-811	Advanced Digital Signal Processing	*
	EE-812	Digital Image Processing	
	EE-813	Real-Time DSP Design & Applications	

	EE-814	GIS and Remote Sensing	
	CS-829	Advanced Computer Vision	
	EE-817	Statistical Signal Processing	*
	EE-818	Adaptive Signal Processing	
	EE-819	Array Signal Processing	
	EE-820	Advanced Computer Architecture	
	EE-821	Stochastic Systems	*
	EE-822	Information Coding & Theory	
	EE-823	Advanced Digital Communication	*
	EE-824	Secure Communication	*
	EE-825	Fuzzy Control Systems	*
	EE-826	Telecommunication & Switching Principles	*
	EE-827	Optical Fiber Communication	
	EE-828	Smart Antennas	*
	EE-831	Advanced Linear Control Systems	*
	EE-832	Nonlinear Control Systems	*
	CS-811	Advanced Computer Networks	
	EE-838	Modern Electrical Drives	
	EE-847	Advanced topics in Image and Video Processing	
	EE-849	Special topics in Wireless Communications	*
	EC-802	Advanced Digital Systems Design	
	EE-844	Research Methodologies	*
	EE-851	RF Transmission and Antenna Design	*
	EE-852	Advanced Engineering Electromagnetic	*
	EE-853	Nanomaterials Engineering Applications	
	EE- 854	Network Optimization	*
	EE-855	Power System Transients	*
	EE-856	Satellite Communication	*
	EE-857	Advanced Power Electronics	*
	EE-858	High Voltage Engineering	*
	EE-859	Optimization Techniques in Power System	*
	EE-860	Power System Operation	*
	EE-861	Electrical Power Distribution Systems	*
	EE-862	Reliability Analysis for Power Systems	
	EE-863	Advanced Topics in Antenna Design	*

	EE-866	Semiconductor Physics and Devices	
	EE-867	Microwave Network Analysis and Passive Components	
	EE-868	Electrical Machine Design	
	EE-869	Advance Power System Protection	*
	EE-870	Wind Energy and Distributed Generation	*
	EE-872	Advanced Power System Stability & Control	*
	EE-873	Dielectric and Electrical Insulation Materials	*

* Faculty teaching other courses can also teach these courses

Table 1: Courses Taught vs. Availability of Faculty

The ratio of faculty vis-ã-vis courses being taught is satisfactory. The present faculty is in position to take up all courses of post graduate students. Each faculty member is assigned subjects along with approved syllabus at the beginning of the semester. The faculty member prepares lecture plans and delivers to his / her students. Remaining restricted to the approved syllabus, the faculty member can update the already taught subject material according to the current developments in the field. Thus students are kept updated to the latest developments. Each faculty member is assigned access to the internet. Time table is scheduled in such a way so as to provide enough time to each teacher for research work. The courses being taught and commitment of the faculty is shown in the Table 1 for prescribed regular courses.

8.2 Standard 6-2

All faculty members must remain current in the discipline and sufficient time must be provided for scholarly activities and professional development. Also, effective programs for faculty development must be organized.

University has an efficient and committed faculty. Each faculty member is assigned to teach subjects according to the syllabus prescribed in the light of HEC and PEC directives. Every faculty member is provided an opportunity at

the end of semester through faculty satisfaction report to evaluate his/her performance and comment on the suitability of the contents of curriculum being taught by him according to the latest trends / developments. If deemed necessary, suitable changes to the curricula are made by a board in the light of the suggestions of the concerned faculty member.

University encourages the researchers by providing them a nominal amount after publication of research paper. Enough time is provided to the faculty members for devoting their time to research in their fields. The faculty members are assisted by university through provision of internet facility and library.

8.3 Standard 6-3

All faculty members should be motivated and have job satisfaction to excel in their profession.

Students' feedbacks about their teachers are received after termination of each semester. Basing on these feedbacks, faculty members graded best by their students are awarded with appreciation letters. Letter of caution is served to the faculty member with whom students are not satisfied.

The faculty survey as per Performa prescribed by HEC is evaluated and basing on the inputs of the Performa, the system is further improved to provide beneficial teaching / learning environment. Faculty Surveys results are attached as per Annexure G.

9.0 Criterion 7: Institutional Facilities

9.1 Standard 7-1

The institution must have the infrastructure to support new trends in learning such as e-learning.

The university has provided e-learning facilities to faculty members and students. Students have been provided a number of computer systems in the library to access e-learning section. Every student has been provided with

user ID to access the e-learning resources from within the university library. Our library hosts over 12,000 e-books on all relevant subjects.

The support staff to look after the e-learning resources is sufficient in number, trained and responsive. The university has provided enough funding to support the e-learning.

9.2 Standard 7-2

The library must possess an up-to-date technical collection relevant to the program and must be adequately staffed with professional personnel.

Our library holds more than 21,000 titles on all relevant engineering, sciences, mathematics, and humanities subjects. We add nearly 2,000 titles every year. Our library staff members are all duly qualified in library science subjects and also help the students for searching the required material. The library also provides 22 dedicated computers which students use for web browsing.

9.3 Standard 7-3

Class-rooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities.

The department has ample classrooms. These are very well furnished and also contain electric heaters and air conditioners. At most every classroom has installed multimedia projector. Similarly, faculty offices are well-equipped and well-furnished.

10.0 Criterion 8: Institutional Support

10.1 Standard 8-1

There must be sufficient support and financial resources to attract and retain high quality faculty and provide the means for them to maintain competence as teachers and scholars.

University allocates enough financial resources each year to hire competent faculty as required.

As already listed in standard 5-3, Faculty members are retained by giving them favorable teaching environment and management support. Most important point is that our pay scales for faculty are highly competitive and better than most of our competing institutions, including NUST.

As listed in standard 6-2, Faculty members are provided with adequate resources for research and academic activities to maintain their competence. Faculty members have access to the internet and library materials for academic and research activities. Professional training is also provided to faculty if required to enhance their capabilities. The university has schemes in place to reward faculty for each published research paper, chapter of a book, or the complete book. Similarly, travel grants up to 1,000/- rupees are available for attending a conference.

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10.2 Standard 8-2

There must be an adequate number of high quality graduate students, research assistants and Ph.D. students.

The university follows the guidelines of HEC for admission in MS programs. The department has very vibrant postgraduate and doctoral programs. The university provokes its students to enhance their academic qualification. Also, all T/As and R/As are selected from our under study postgraduate students.

10.3 Standard 8-3

Financial resources must be provided to acquire and maintain Library holdings, laboratories and computing facilities.

The library holds more than 21,000/- titles and 12,000/- e-books. Sufficient numbers of computers are available for students. A computerized online search facility is also available.

Our laboratories are very well-equipped with the latest equipment and facilities. The university takes pride in the fact that our laboratories have been replicated by a number of other universities.

11.0 Conclusion

The self assessment report of the Department of Electrical Engineering, HITEC University is an important document, which gives strengths and weaknesses of the program. The management is striving hard to improve infrastructure for establishment of conducive environment for studies. The faculty is focused on imparting quality education, introducing innovative techniques for conducting quality research to produce competent engineers. The report has been prepared after evaluating the program in the light of 8 criterion and 31 standards given in HEC's Self Assessment Manual. The program mission objectives and outcomes are assessed and strategic plans are presented to achieve the goals, which are again measurable through definite standards. Teachers' evaluation revealed satisfactory standards, the score of thirty-nine teachers of the program ranged from 4.17 and 4.60. Students' course evaluation score ranged between 3.91 and 4.49 with a mean of 4.20 points in 0-5 scale. Alumni surveys revealed variable results regarding knowledge, interpersonal skills, management and leadership skill. Weaknesses are identified which are related to lack of career counseling, laboratories and equipment. Improvements in curriculum design and infrastructure are suggested which are based upon set, well defined and approved criteria. Pre-requisites are fully observed, examinations are held according to fixed schedules, academic schemes are prepared well in advance, transparent admission, registration and recruiting policy, excellent student teacher ratio are some of the strong areas of this program. The number of courses along with titles and credit hours for each semester are thoroughly planned. Their efficacy was measured through different standards and it was found to be satisfactory. The need of refresher courses for the fresh faculty on methods of teaching cannot be over emphasized.

Proper steps are taken to guide the students for program requirements, communication, meetings, tutorial system, tours, students-teacher interaction

etc. Some improvements have been suggested regarding the process control covering admission, registration, recruiting policy, courses and delivery of material, academic requirements, performance and grading. The university, Pakistan Engineering Council as well as Higher Education Commission has set forth proper rules, which are properly followed. At present there are thirty-nine faculty members who are highly qualified in their fields. However, faculty members need motivation for advanced knowledge, research and external training.

Institutional facilities were measured through Criterion 7; infrastructure, library, class room and faculty offices and in each case, short comings and limitations are highlighted. Institutional facilities need to be strengthened. Accordingly, institutional support will greatly promote and strengthen academic, research, management and leadership capabilities.

In conclusion, the strong and weak areas of the program are as under:-

11.1 Strong Areas

- Curriculum Design, development and organization are based upon set, well defined and approved criteria.
- Rigorous, intensive and rewarding research program.
- Capable Faculty.
- Examinations on schedule.
- Academic Schemes fully prepared in advance.
- The number of courses along with their titles and credit hours for each semester, course contents for degree program is fully planned.
- Transparent admission, registration and recruiting policy.
- PEC & HEC rules fully followed.
- Excellent Student-Teacher ratio.

11.2 Weaknesses

- Inadequate research space and facilities for students.
- Direct access of IEEE publications and digital library.

Annexure – A: Research Papers

Sr. No.	Name of Authors	Title of Research Paper	Name of Journal Indexed by ISI	Impact Factor
Dr. Muhammad Ali Mughal				
1.	**Mughal, M.A**.; Ejaz, T.; Arshad; Hussain	Metaheuristic Regression Equations for Split-Ring Resonator Using Time-Varying Particle Swarm Optimization Algorithm	Electronics	**2.690**
2.	**Mughal, M.A.;** Ma, Q.; Xiao, C	Photovoltaic Cell Parameter Estimation Using Hybrid Particle Swarm Optimization and Simulated Annealing	Energies	**2.676**
3.	Shoukat, Abdullah; **Mughal, Muhammad Ali**; Gondal, S Younus; Umer, Farhana; Ejaz, Tahir; Hussain, Ashiq;	Optimal parameter estimation of transmission line using chaotic initialized time-varying pso algorithm	Computers Materials and Continua	**3.860**
4.	Arshad, **Mughal MA**, Nekahi A, Khan M, Umer F	Influence of Single and Multiple Dry Bands on Critical Flashover Voltage of Silicone Rubber Outdoor Insulators: Simulation and Experimental Study	Energies	**2.676**
5.	Khurshid, A.; **Mughal, M.A**.; Othman, A.; Al-Hadhrami, T.; Kumar, H.; Khurshid, I.; Arshad; Ahmad, J.	Optimal Pitch Angle Controller for DFIG-Based Wind Turbine System Using Computational Optimization Techniques	Electronics	**2.690**
6.	Awais Hanif, **Mughal, M.A.**	Human Gait Recognition based on Sequential Deep	Computers Materials and Continua	**3.860**

		Learning and Best Features Selection		
Dr. Kashif Imdad				
1	Salahuddin, Humayun, **Kashif Imdad**, Muhammad Umar Chaudhry, Muhammad Munwar Iqbal, Vadim Bolshev, Aamir Hussain, Aymen Flah, Vladimir Panchenko, and Marek Jasiński.	"Electric Vehicle Transient Speed Control Based on Vector Control FM-PI Speed Controller for Induction Motor."	Applied Sciences 12, no. 17 (2022): 8694**.**	**(IF 2.887)**
2	Salahuddin, Humayun, **Kashif Imdad**, Muhammad Umar Chaudhry, Dmitry Nazarenko, Vadim Bolshev, and Muhammad Yasir.	"Induction Machine-Based EV Vector Control Model Using Mamdani Fuzzy Logic Controller."	Applied Sciences 12, no. 9 (2022): 4647.	**(IF 2.887)**
3	**Imdad, Kashif**, and Ijaz Hussain	"An Extensive Study on Condition Monitoring of Distribution Transformer under Transients."	University of Wah Journal of Science and Technology (UWJST) 4 (2020): 27-36.	**(Y Category HEC)**
4	Faisal, Haseeb, **Kashif Imdad**, Najeeb Hussain, and Faisal Sharif.	"Frequencies Dominations for Different Rating of Distribution Transformer under Transients	." International Journal of Engineering Works 7, no. 04 (2020).	**(Y Category HEC)**
5	Khan, Saadat Ullah, Muhammad Rafiq, and **Kashif Imdad**	"Temporal Effects of Thermal Stresses on Solid Dielectric Materials under Diverse Voltage Conditions."	Pakistan Journal of Engineering and Technology 5, no. 2 (2022): 11-16.	**(Y Category HEC)**
Dr. Raza Ali Shah				
1	M Rehman, RA Shah	contactless small-scale movement monitoring system using software defined radio for early diagnosis of COVID-19	IEEE Sensors	3.3
2	M Rehman, RA Shah	Improving machine learning classification accuracy for breathing	IEEE Sensors	3.3

		abnormalities by enhancing dataset		
3	I Ahmed, S Shoaib, RA Shah	Quad Sector HMSIW Tapered Slot Antenna Array for Millimeter-Wave Applications	Electronics	2.4
4	MB Khan, M Rehman, A Mustafa, RA Shah, X Yang	Intelligent Non-Contact Sensing for Connected Health Using Software Defined Radio Technology	Electronics	2.4
Dr. Nizam Uddin				
1	Nizam-Uddin, N., Abdulkawi, W. M., Elshafiey, I., & Sheta, A	Towards an efficient system for hyperthermia treatment of breast tumors	Biomedical Signal Processing and Control	3.880
2	Abdulkawi, W. M., Nizam-Uddin, N., Sheta, A. F. A., Elshafiey, I., & Al-Shaalan, A. M	Towards an Efficient Chipless RFID System for Modern Applications in IoT Networks	Applied. Sciences. 2021, 11(19), 8948 (MDPI)	2.679
3	Humayun, Fahad, Abbas Khan, Sajjad Ahmad, Wang Yuchen, Guoshen Wei, N. Nizam-Uddin, Zahid Hussain	Abrogation of SARS-CoV-2 interaction with host (NRP1) Neuropilin-1 receptor through high-affinity marine natural compounds to curtail the infectivity: A structural-dynamics data	Computers in Biology and Medicine Elsevier	4.589
4	Khan, Abbas, Jianjun Gui, Waqar Ahmad, Inamul Haq, Marukh Shahid, N. Nizam-Uddin,	The SARS-CoV-2 B.1.618 variant slightly alters the spike RBD–ACE2 binding affinity and is an antibody escaping variant: a computational structural perspective	RSC Advances	3.119
5	Khan, A., Wei, D.Q., Kousar, K., Abubaker, J., Ahmad, S., Ali, J., Al- Mulla, F., Ali, S.S., Nizam- Uddin, N., Sayaf, A.M	Preliminary Structural Data Revealed That the SARS-CoV-2 B.1.617 Variant's RBD Binds to ACE2 Receptor Stronger Than the Wild Type to Enhance the Infectivity	ChemBioChem	3.14

6	Khan, A., Khan, S., Saleem, S., Nizam-Uddin, N., Mohammad, A., Khan	Immunogenomics guided design of immunomodulatory multi-epitope subunit vaccine against the SARS-CoV-2 new variants, and its validation through in silico cloning and immune simulation	Computers in Biology and Medicine, Volume 133, June 2021, 104420	4.589
7	Zeb, A., Ali, S.S., Azad, A.K., Safdar, M., Anwar, Z., Suleman, M., Nizam-Uddin, N., Khan	Genome-wide screening of vaccine targets prioritization and reverse vaccinology aided design of peptides vaccine to enforce humoral immune response against Campylobacter jejuni	Computers in Biology and Medicine Volume 133, June 2021, 104412	4.589
8	Ahmad, N., Ali, S.S., Ahmad, S., Hussain, Z., Qasim, M., Suleman, M., Ali, S., Nizam-Uddin, N., Khan, A. and Wei	Computational Modeling of Immune Response Triggering Immunogenic Peptide Vaccine Against the Human Papillomaviruses to Induce Immunity Against Cervical Cancer	Viral ImmunologyVol. 34, No. 7	2.257
9	Haq AU, Khan A, Khan J, Irum S, Waheed Y, Ahmad S, Nizam-Uddin N, Albutti A, Zaman N, Hussain Z, Ali SS	Annotation of Potential Vaccine Targets and Design of a Multi-Epitope Subunit Vaccine against Yersinia pestis through Reverse Vaccinology and Validation through an Agent-Based Modeling Approach	Vaccinces (MDPI)	4.422
10	Nizam-Uddin, N., Abdulkawi, W. M., Elshafiey, I., & Sheta, A	Toward a multi-target multi-channel hyperthermia treatment system: Proof of concept with numerical simulations	International Journal of Heat and Mass Transfer Volume 150, April 2020, 119257	5.584

Annexure – B: Faculty Resume

Sr. No	Name	PEC #	Designation	Joining Date	Details of Qualifications			Specialization	Experience Teaching (Total Years)	Dedicated / Shared
					Degree	Year	Institution			
1.	Dr. Tahir Nadeem Malik	Elect/4987	Professor	11/9/2019	PhD	2009	UET Taxila	Power	33	Dedicated
					MS	1993	UET Lahore	Power		
					BS	1985	UET Lahore	Power		
2.	Dr. Raza Ali Shah	Elect/17894	Associate Professor	4/12/2011	PhD	2015	AIT, Thailand	ICT	22	Dedicated
					MS	2009	AIT, Thailand	ICT		
					BS	2000	UET Peshawar	Electrical Engineering		
3.	Dr. Muhammad Ali Mughal	ELECT/ 25636	Assistant Professor	15-2-2018	PhD	2018	Beihang University, Beijing China	Electrical Machines and Electric Apparatus	13	Dedicated
					MS	2014	Beihang University, Beijing China	Power Electronics & Drives		
					BS	2008	Quaid-e-Awam University Nawabshah	Electrical Engineering (Power)		
4.	Dr. Kashif Imdad	Elect/24868	Assistant Professor	01/11/2007	PhD	2017	UPC, Barcelona Spain	Elect. Power Systems	15	Dedicated
					MS	2010	UET Taxila	Elect Power Systems		
					BS	2007	UET	Elect Power		

							Peshawar	System		
5.	Dr. Nizam Uddin	Elect/18583	Assistant Professor	07-2-2020	PhD	2018	King Saud University, Riyadh (Saudi Arabia)	Communication & Biomedical Engineering	15	Dedicated
					MS	2005	Edinburgh Napier University, UK	Electronics Engineering		
					BS	2002	NWFP University	Electrical Engineering		

Annexure – C: Student Course Evaluation

Previous Form

CORE QUESTIONS

Course Content and Organization	**Strongly Agree**	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
1. The course objectives were clear	☐	☐	☐	☐	☐
2. The Course workload was manageable	☐	☐	☐	☐	☐
3. The Course was well organized (e.g. timely access to materials, notification of changes, etc.)	☐	☐	☐	☐	☐
4. Comments					

Student Contribution					
5. Approximate level of your own attendance during the whole Course	☐<20%	☐21-40%	☐41-60%	☐61-80%	☐>81%
	Strongly Agree	**Agree**	**uncertain**	**Disagree**	**Strongly Disagree**
6. I participated actively in the Course	☐	☐	☐	☐	☐
7. I think I have made progress in this Course	☐	☐	☐	☐	☐
8. Comments					

Learning Environment and Teaching Methods	**Strongly Agree**	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
9. I think the Course was well structured to achieve the learning outcomes (there was a	☐	☐	☐	☐	☐

good balance of lectures, tutorials, practical etc.)					
10. The learning and teaching methods encouraged participation.	☐	☐	☐	☐	☐
11. The overall environment in the class was conducive to learning.	☐	☐	☐	☐	☐
12. Classrooms were satisfactory	☐	☐	☐	☐	☐
13. Comments					

Learning Resources	**Strongly Agree**	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
14. Learning materials (Lesson Plans, Course Notes etc.) were relevant and useful.	☐	☐	☐	☐	☐
15. Recommended reading Books etc. were relevant and appropriate	☐	☐	☐	☐	☐
16. The provision of learning resources in the library was adequate and appropriate	☐	☐	☐	☐	☐
17. The provision of learning resources on the Web was adequate and appropriate (if relevant)	☐	☐	☐	☐	☐
18 Comments					

Quality of Delivery	**Strongly Agree**	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
19. The Course stimulated my interest and thought on the subject area	☐	☐	☐	☐	☐
20. The pace of the Course was appropriate	☐	☐	☐	☐	☐
21. Ideas and concepts were presented clearly	☐	☐	☐	☐	☐
22.Comments					

Assessment	**Strongly Agree**	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
23. The method of assessment were reasonable	☐	☐	☐	☐	☐
24. Feedback on assessment was timely	☐	☐	☐	☐	☐
25. Feedback on assessment was helpful	☐	☐	☐	☐	☐
26. Comments					

Additional Core Questions

Instructor / Teaching Assistant Evaluation	**Strongly Agree**	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
27. I understood the lectures	☐	☐	☐	☐	☐
28. The material was well organized and presented	☐	☐	☐	☐	☐
29. The instructor was responsive to student needs and problems	☐	☐	☐	☐	☐
30. Had the instructor been regular throughout the course?	☐	☐	☐	☐	☐

Tutorial	**Strongly Agree**	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
30. The material in the tutorials was useful	☐	☐	☐	☐	☐
31. I was happy with the amount of work needed for tutorials	☐	☐	☐	☐	☐
32. The tutor dealt effectively with my problems	☐	☐	☐	☐	☐

Practical	**Strongly Agree**	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
33. The material in the practicals was useful	☐	☐	☐	☐	☐
34. The demonstrators dealt effectively with my problems.	☐	☐	☐	☐	☐

Overall Evaluation

35.The best features of the Course were:

36.The Course could have been improved by:

Equal Opportunities Monitoring (Optional)

37. The University does not tolerate discrimination on any irrelevant distinction (e.g. race, age, gender) and is committed to work with diversity in a wholly positive way. Please indicate below anything in relation to this Course which may run counter to this objective:

Demographic Information: (Optional)

38. Full/part time study: Full Time ☐ Part Time ☐

39.Do you consider yourself to be disabled: Yes ☐ No ☐

40. Domicile:

41.Gender: Male ☐ Female ☐

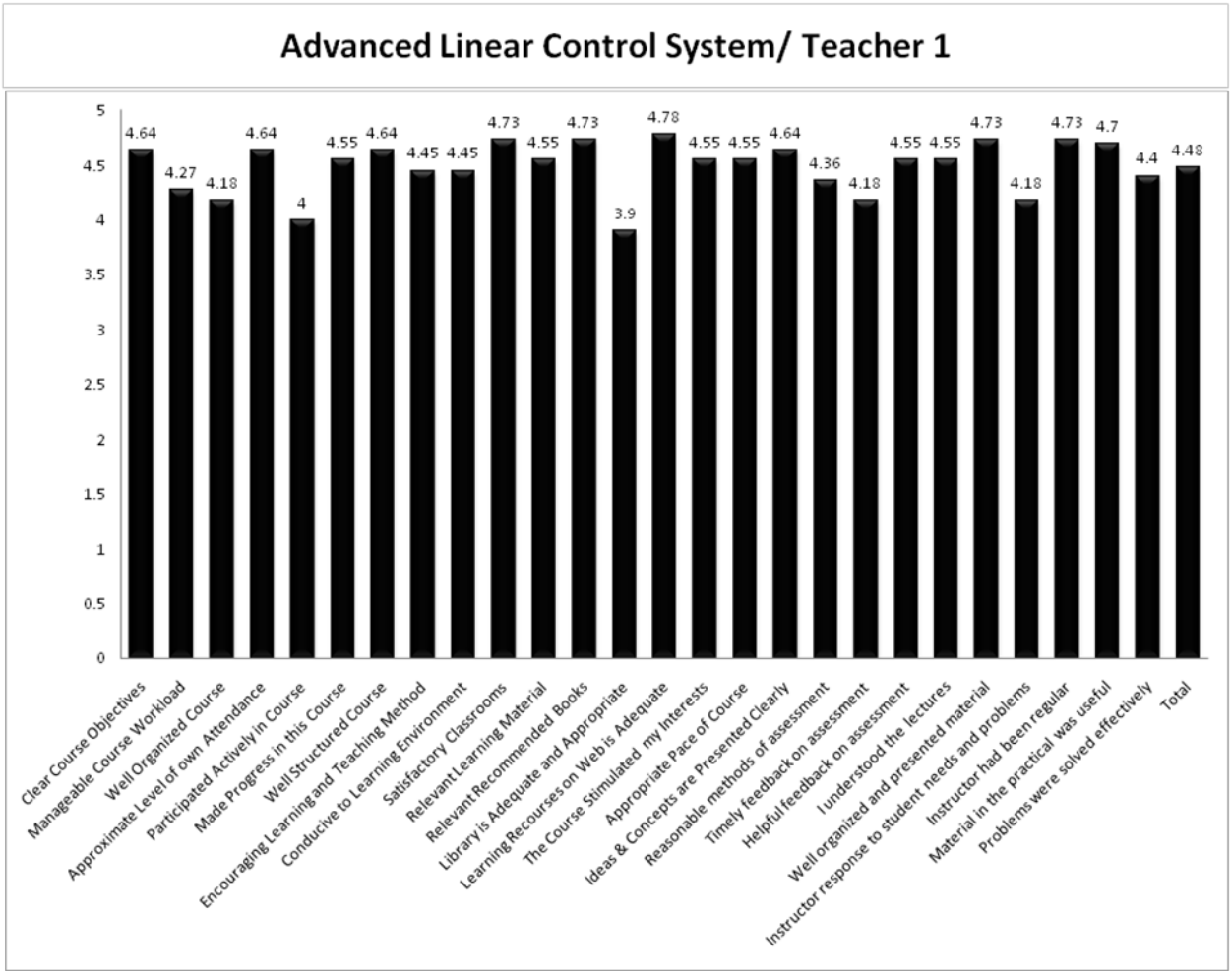
42. Age Group: less than 22 ☐ 22-29 ☐ over 29 ☐

43. Campus: Distance Learning/ Collaborative ☐

Updated Form (Effective from Spring 2016)

Statements	Score
1. The Class Room facilities and overall environment were conducive to learning.	
2. The recommended Textbook was student-friendly i.e. a student can easily follow it after attending the class lecture.	
3. The library resources, i.e. other books, internet facility, magazines etc. were adequate in supporting the learning.	

4. The concepts were clearly explained.	
5. The course created interest in me to know more about it.	
6. Quizzes, Sessionals and Assignments etc. were helpful in learning this course.	
7. The lab experiments were synchronized with the theory classes.	
8. The lab experiments were helpful in learning the subject.	
9. The lab support was satisfactory.	
10. The course workload was manageable.	
11. I had the knowledge of pre-requisite subjects and mathematics for this course.	Yes/No
Additional Comments:	



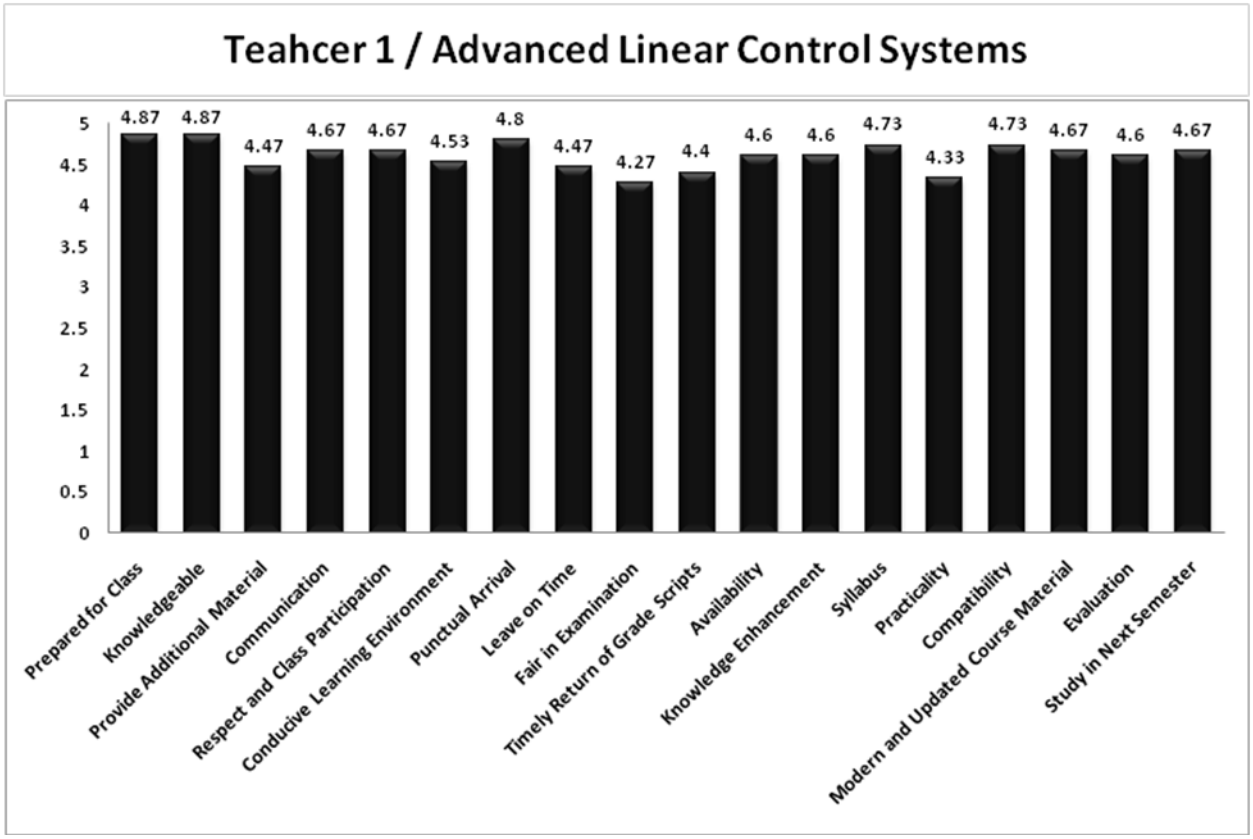
Annexure – D: Student's Teacher Evaluation

Previous Form

Points	**Instructor's Name** Course Name
1. The instructor is prepared for each class	
2. The instructor demonstrates knowledge of the subject	
3. The instructor provides additional material apart from the textbook	
4. The instructor communicates the subject matter effectively	
5. The instructor shows respect towards students and encourage class participation	
6. The instructor maintains an environment that is conducive to learning	
7. The instructor arrives on time	
8. The instructor leaves on time	
9. The instructor is fair in examination	
10. The instructor returns the grade scripts etc in a reasonable amount of time	
11. The instructor is available during the specified office hours and for class consultation	
12. The subject matter presented in the course has increased your knowledge of the subject	
13. The syllabus clearly states course objectives requirements, procedures and grading	
14. The course integrates theoretical course concepts with real world applications	
15. The assignment and exams covered the materials presented in the course	
16. The course material is modern and updated	
17. Do you want to be taught by this teacher in next semester?	

Updated Form (Effective from Spring 2016)

Statements	Score
1. The teacher distributed the course plan well in time for the current semester.	
2. The course plan contained objectives, topics, Course Learning Outcomes (CLOs), Grading policy etc.	
3. The teacher was punctual.	
4. The teacher communicated the subject matter clearly and effectively and solved sufficient examples.	
5. The teacher encouraged class participation.	
6. The teacher was fair in marking exam papers.	
7. The teacher returned all marked quizzes, assignments, sessionals etc. in reasonable amount of time.	
8. The teacher was available for consultation during the specified visiting hours.	
9. The teacher encouraged use of Library resources to supplement learning of course topics.	
10. The teacher covered all topics as given in the course plan.	
11. The teacher clearly indicated those questions which were meant for CLOs evaluation.	
12. The teacher encouraged innovative thinking.	
13. You want to be taught by this teacher in the next semester	
Additional Comments:	



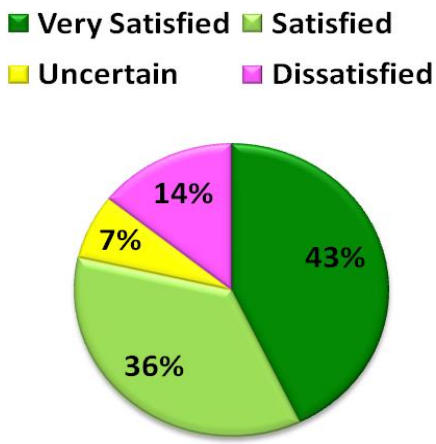
Annexure – E: Faculty Survey

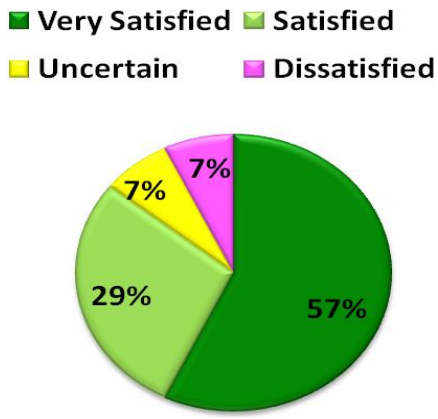
Q1. You are satisfied with your pursuits like teaching, research and the secondary duties.

Q2. The overall environment in the department provide intellectual stimulation for improvement

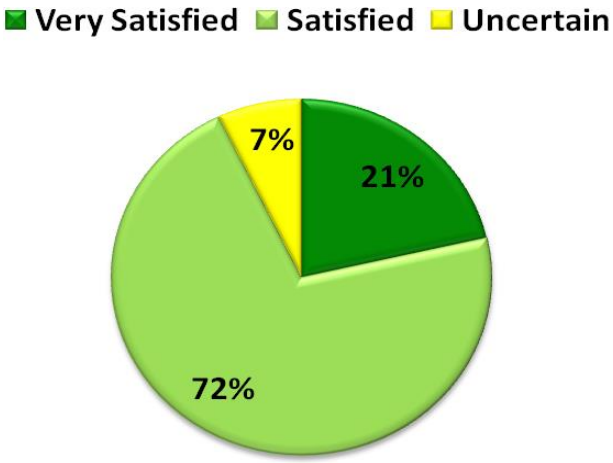
Q3. The overall workload is reasonable

Q4. The cooperation you receive from your department / colleagues

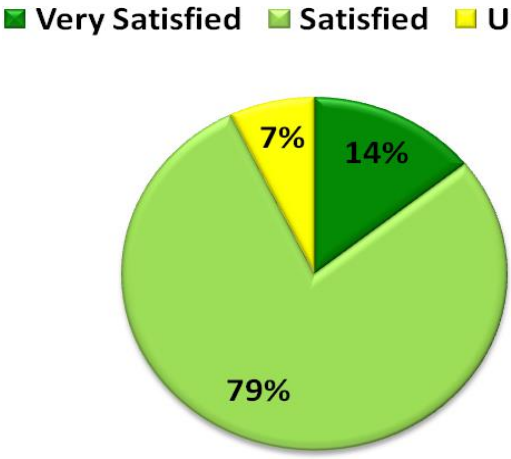




Q5. Whenever needed, the mentoring is available to you

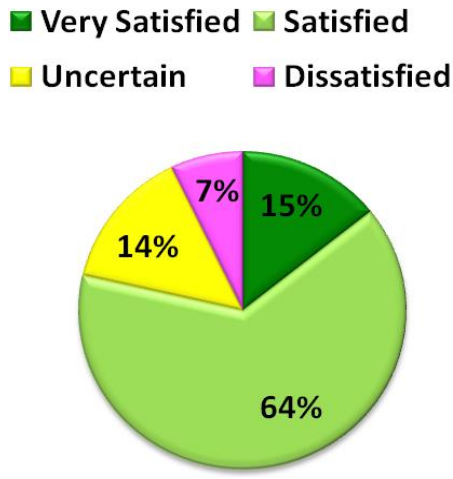


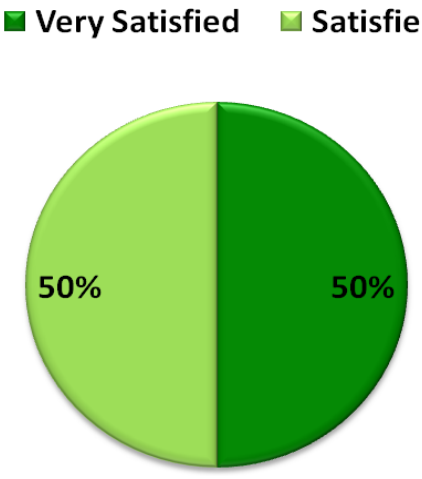
Q6. You are satisfied with the administrative support from the University



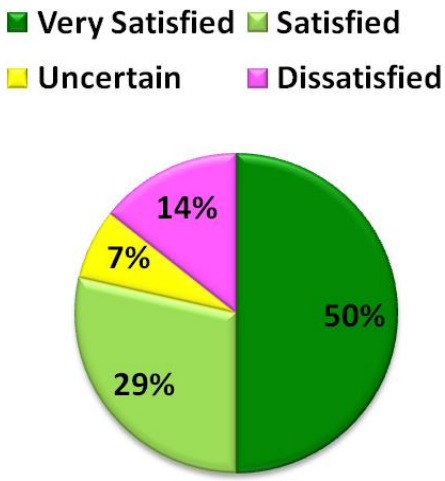
Q7. You are quite clear about the faculty promotion policies and processes

Q8. You are satisfied with the prospects for advancement in your career

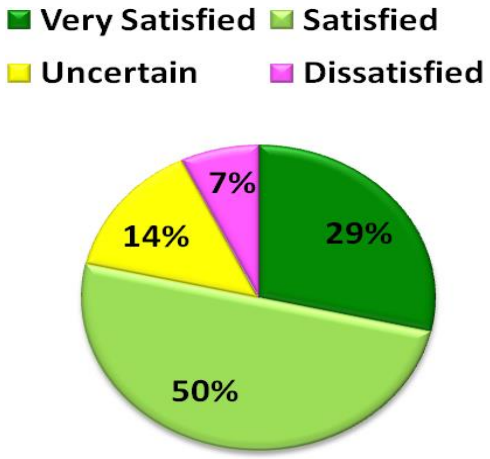




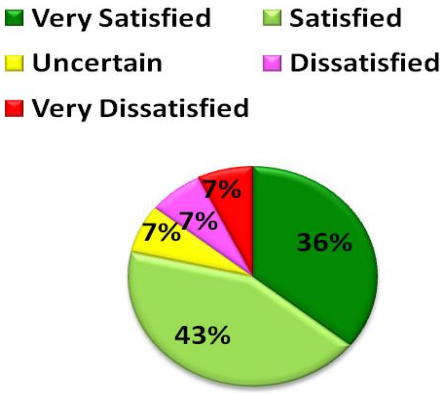
Q9. You are satisfied with the speed of redressal of complaints in the University



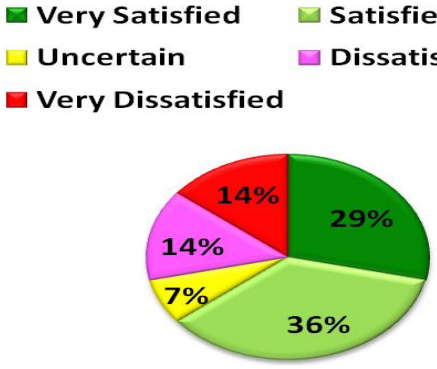
Q10. Your salary package is commensurate with your qualification and experience



Q11. Your perception about job-security in the present position



Q12. Your primary and secondary duties permit you to have sufficient quality-time for yourself and your family



Annexure – F: Faculty Course Review Report

Department of Electrical Engineering is running 45 courses for the MS Electrical Engineering program. All courses curriculum is reviewed periodically by the faculty to assess its effectiveness and contribution in achieving program objectives. Course review also contributes towards making any changes in the syllabi and enhancements required in areas identified as a result of Alumni Survey and Graduating Students Feedback.

PT members launched HEC Performa 2 (Faculty of Course Review Report) to all the faculty members, to obtain their feedback about courses.

The summary of the overall feedback of all courses identified the following improvement points:

a. Change in course curriculum to emphasis on design component.
b. Provision of more technical resources to execute final projects

Board of Studies scrutinized these points and presented in the Board of Faculty that will review and suggest the implementation as deemed necessary.

Annexure – G: Rubric Report

Self Assessment Report					
Criterion 1 – Program Mission, Objectives and Outcomes Weight = 0.20					
Factors	**Score**				
1. Does the program have document measurable objectives that support faculty/ college and institution mission statements?	5	**4**	3	2	1
1. Does the program have documented outcomes for graduating students?	5	4	**3**	2	1
2. Do these outcomes support the Program objectives?	5	4	3	**2**	1
3. Are the graduating students capable of performing these outcomes?	5	4	**3**	2	1
4. Does the department assess its overall performance periodically using quantifiable measures?	5	4	**3**	2	1
5. Is the result of the Program Assessment documented?	5	**4**	3	2	1
Total Encircled Value (TV)	**19**				
SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.20	**15.2**				

Criterion 2– Curriculum Design and Organization Weight = 0.15					
Factors	**Score**				
1. Is the curriculum consistent?	5	**4**	3	2	1
2. Does the curriculum support the program's documented objectives?	5	**4**	3	2	1
3. Are the theoretical background, problem analysis and solution design stressed within the program's core material?	5	**4**	3	2	1
4. Does the curriculum satisfy the core requirements laid down by PEC?	5	**4**	3	2	1
5. Does the curriculum satisfy the major requirements laid down by HEC and the PEC?	5	**4**	3	2	1
6. Does the curriculum satisfy the professional requirements as laid down by PEC?	5	**4**	3	2	1
7. Is the information technology component integrated throughout the program?	5	**4**	3	2	1
8. Are oral and written skills of the students developed and applied in the program?	5	4	**3**	2	1
Total Encircled Value (TV)	**31**				
SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.15	**11.625**				

Criterion 3– Laboratories and Computing Facilities Weight = 0.15					
Factors	**Score**				
1. Are the laboratory manuals/ documentation/ instructions etc. for experiments available and readily accessible to faculty and students?	5	**4**	3	2	1
2. Are there adequate number of support personnel for instruction and maintaining the laboratories?	5	**4**	3	2	1
3. Are the University's infrastructure and facilities adequate to support the program's objectives?	5	**4**	3	2	1
Total Encircled Value (TV)	**12**				
SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.15	**12**				

Criterion 4– Student Support and Advising	Weight = 0.10				
Factors	**Score**				
1. Are the courses being offered in sufficient frequency and number for the students to complete the program in a timely manner?	5	**4**	3	2	1
2. Are the courses in the major area structured to optimize interaction between the students, faculty and teaching assistants?	5	**4**	3	2	1
3. Does the university provide academic advising on course decisions and career choices to all students?	5	**4**	3	2	1
Total Encircled Value (TV)	**12**				
SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.10	**8**				

Criterion 5– Process Control	Weight = 0.10				
Factors	**Score**				
1. Is the process to enroll students to a program based on quantitative and qualitative criteria?	**5**	4	3	2	1
2. Is the process above clearly documented and periodically evaluated to ensure that it is meeting its objectives?	5	**4**	3	2	1
3. Is the process to register students in the program and monitoring their progress documented?	5	**4**	3	2	1
4. Is the process above periodically evaluated to ensure that it is meeting its objectives?	5	**4**	3	2	1
5. Is the process to recruit and retain faculty in place ad documented?	5	**4**	3	2	1
6. Are the process for faculty evaluation & promotion consistent with the institution mission?	5	**4**	3	2	1
7. Are the process in 5 and 6 above periodically evaluated to ensure that they are meeting their objectives?	5	**4**	3	2	1
8. Do the processes and procedures ensure that teaching and delivery of course material emphasize active learning and that course learning outcomes are met?	5	4	**3**	2	1
9. Is the process in 8 above periodically evaluated to ensure that it is meeting its objectives?	5	4	**3**	2	1
10. Is the process to ensure that graduates have completed the requirements of the program based on standards and documented procedures?	5	**4**	3	2	1
11. Is the process in 10 above periodically evaluated to ensure that it is meeting its objectives?	5	**4**	3	2	1
Total Encircled Value (TV)	**43**				
SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.10	**7.81**				

Criterion 6– Faculty	Weight = 0.10				
Factors	**Score**				
1. Are there enough full time faculty members to provide adequate coverage of the program areas/courses with continuity and stability?	5	**4**	3	2	1
2. Are the qualifications and interest of faculty members sufficient to teach all courses, plan, modifies and updates courses and curricula?	5	**4**	3	2	1
3. Do the faculty members possess a level of competence that would be obtained through graduate work in the discipline?	5	4	**3**	2	1
4. Do the majority of faculty members hold a Ph.D. degree in their discipline?	5	4	**3**	2	1
5. Do faculty members dedicate sufficient time to research to remain current in their disciplines?	5	4	3	**2**	1
6. Are there mechanisms in place for faculty development?	5	4	3	**2**	1
7. Are faculty members motivated and satisfied so as to excel in their profession?	5	**4**	3	2	1

Total Encircled Value (TV)	**22**
SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.10	**6.29**

Criterion 7– Institutional Facilities	**Weight = 0.10**				
Factors	**Score**				
1. Does the institution have the infrastructure to support new trends such as e-learning?	**5**	**4**	**3**	**2**	**1**
2. Does the library contain technical collection relevant to the program and is it adequate staffed?	**5**	**4**	**3**	**2**	**1**
3. Are the class rooms and offices adequately equipped and capable of helping faculty carry out their responsibilities?	**5**	**4**	**3**	**2**	**1**
Total Encircled Value (TV)	**13**				
SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.10	**7.33**				

Criterion 8– Institutional Support	**Weight = 0.10**				
Factors	**Score**				
1. Is there sufficient support and finances to attract and retain high quality faulty?	**5**	**4**	**3**	**2**	**1**
2. Are there an adequate number of high quality graduate students, teaching assistants and Ph.D. students?	**5**	**4**	**3**	**2**	**1**
Total Encircled Value (TV)	**8**				
SCORE 1 (S1) = [TV/ (No. of Question * 5)] * 100 * 0.10	**8**				

Overall Assessment Score = S1 + S2 + S3 + S4 + S5 + S6 + S7 + S8
= 15.2 + 11 + 12 + 8 + 7.81 + 6.29 + 7.33 + 8
= 75.63