**INDIRA GANDHI INSTITUTE OF TECHNOLOGY, SARANG**
ଇନ୍ଦିରା ଗାନ୍ଧୀ ବୈଷୟିକ ଅନୁଷ୍ଠାନ, ସରାଙ୍ଗ

**An Autonomous Institute of Govt. of Odisha**
**Department of Electronics and Telecommunication Engineering**

# COURSE FILE

**NAME OF THE COURSE: Internet of Things (IoT)**

**Academic year the course is taught: 2018-2019**

**COURSE CODE: PCP7H007 (3L-0T-0P)**

**YEAR & SEMESTER: 4th Year & 7th Semester**

**BRANCH: Electronics & Telecommunication Engineering**

**MAX MARKS: 50 (Internal) + 100 (External)**

**Course Instructor: Prof. Urmila Bhanja**

**Professor**

**Department of ETC Engineering**

**Contact no: 9437142056**

**Email Id: urmila@igitsarang.ac.in**

## Vision

- To be a place of academic excellence in frontier areas of Electronics and Telecommunication Engineering.
- To create an educational environment and be a part of nationally acclaimed department so as to meet the challenges by bridging the gap between academia and industry.
- To promote competitive academic programs through research activities and ambience that supports intellectual growth and skill acquisition.

## Mission

**M1:** To grow as a diverse, socially responsible learning community to provide well equipped innovators, Scientists, Engineers with pioneering expertise, entrepreneurs, academicians and thinkers of tomorrow in the field of electronics and telecommunication engineering.

**M2:** Facilitating improve technologies, bringing out vital services to the society by strengthening quality of life with leadership and self-sufficiency. To sustain enthusiasm among the students for an approach towards nation building.

**M3:** To inculcate the spirit of innovation among the aspirants' technologists.

## Program Educational Objectives (PEOs)

**PEO I:** The key objective of Electronics and Telecommunication Engineering Program is to augment Student's ability through quality technical education.

**PEO II:** To impart domain knowledge required by the industries so that students are readily deployable.

**PEO III:** To ensure an environment where students, faculty and staffs are encouraged to enhance their intellectual inquisitiveness and develop their technical as well as professional expertise through continuous developmental programs.

**PEO IV:** Graduates/postgraduates will interact with their peers from other disciplines in industry and society to contribute the economic growth of the country.

**PEO V:** Developing communication and interpersonal skills and preparing them for providing self-employment. Growing problem analysis and solving capability through industrial training and projects.

## Program Specific Outcomes (PSOs)

1. Gain detailed knowledge of various contemporary domains to identify research.
2. Have strong skills in learning new programming environments as it is used to develop algorithm for software application.

## Program Outcomes (POs) Defined by NBA

**PO1.** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2.** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3.** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4.** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5**. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6**. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7.** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8**. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9.** Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10**. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11**. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12**. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

**Course description and objectives:**

Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices.

**COURSE OUTCOME:**

1. Able to understand the application areas of IOT·
2. Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks·
3. Able to understand building blocks of Internet of Things and characteristics.

**COURSE PREREQUISITES: Knowledge in wireless communication and networks**

## 1. Syllabus: BPUT

B.Tech(ETC/ECE)SyllabusforAdmissionbatch2017-18 7th / 8th semester

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:

· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I

Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II

M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III

Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV

IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:

1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:

1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1- 118–43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

## 2. Student's attendance Sheet (Attached)

## 3. Evaluation Scheme (BPUT):

| Internal -I | Internal-II | Semester Examination | Total |
|---|---|---|---|
| 25 | 25 | 100 | 150 |
| First internal test including Assignments, viva, attendance, participation of the students in the class, quiz test (decided by the concerned teacher) | Second internal test including Assignments, viva, attendance, participation of the students in the class, quiz test (decided by the concerned teacher) | Purely based on the written examination score at the university level | **GRADE:O (≥90%)**<br>**GRADE: E**<br>**(80% to 89%)**<br>**GRADE: A**<br>**(70% to 79%)**<br>**GRADE: B**<br>**(60% to 69%)**<br>**GRADE: C**<br>**(50% 59%)**<br>**GRADE: D**<br>**(37% to 49%)**<br>**GRADE: F (fail)**<br>**≤ 37%** |

## 4. Lesson Plan:

| SL.NO. | MODULE/LESSON | BRIEF OUTLINE OF COURSE CONTENT | No of classes/Lecture hours required | Course outcome mapping |
|---|---|---|---|---|
| 1 | MODULE I | Introduction & Concepts: Introduction to Internet of Things | (1 class) | CO1 |
| 2 | | Physical Design of IOT, Logical Design of IOT | (1 class) | CO1 |
| 3 | | IOT Enabling Technologies | (2 classes) | CO2 |
| 4 | | IOT Levels. Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Lifestyle | (6 classes)<br>Assignments in form of presentations and vivas are taken from the students. Students are asked to collect information from Journals/Internet | CO2 |
| 5 | | **Total classes in hours** | **(10classes)** | |
| 6 | MODULE II | M2M, Difference between IOT and M2M | (1 class) | CO1,CO2 |
| 7 | | SDN and NFV for IOT, Software defined Networking, Network Function Virtualization | (3 classes) | CO1 |
| 8 | | Need for IOT Systems Management, Simple Network Management Protocol | (2 classes) | CO3 |
| 9 | | Limitations of SNMP, Network Operator Requirements | (2 classes) | CO1 |
| 10 | | NETCONF, YANG, IOT Systems management with NETCONF-Yang | (2 classes) | CO1, CO2 |
| | | **Total classes in hours** | **(10 classes)** | |
| 11 | MODULE III | Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology | (4 classes) | CO1,CO2,CO3 |
| 12 | | Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Package | (3 classes)<br>Students install and practice and questions are asked as viva | CO1,CO2,CO3 |
| | | **Total classes in hours** | **(7 classes)** | |
| 13 | MODULE IV | IOT Physical Devices & Endpoints: a brief introduction | (1 class) | CO1,CO2,CO3 |
| 14 | | What is an IOT Device, Exemplary Device | (1 class) | CO1,CO2,CO3 |
| 15 | | Board, Linux on Raspberry Pi, Interfaces | (1 class) | CO1,CO2,CO3 |
| 16 | | Programming& IOT Devices | (1 class) | CO1,CO2,CO3 |
| 17 | | **Total classes in hours** | **(4 classes)** | |

**Textbook:**

1. VijayMadisetti, Arshdeep Bahga," Internet of Things A Hands-On- Approach",2014, ISBN:978 0996025515

**Reference books:**

1. Adrian McEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978- 1-118-43062-0

2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:098997370

## 5. Teaching Methodology and Tools used

For delivering the course content power point presentation was made. To clearly explain few at times white board and marker pen were used. PPTs are circulated among the students as class notes at the end of the lectures.

## 6. Program Outcomes

| | |
|---|---|
| **PO1** | Engineering Knowledge |
| **PO2** | Problem Analysis |
| **PO3** | Design/development of solutions |
| **PO4** | Conduct investigations of complex Problems |
| **PO5** | Modern tool usage |
| **PO6** | The engineer and society |
| **PO7** | Environment and sustainability |
| **PO8** | Ethics |
| **PO9** | Individual and team work |
| **PO10** | Communication |
| **PO11** | Project management and finance |
| **PO12** | Life-long learning |

## 7. Course Outcomes

| | |
|---|---|
| **CO1** | Able to understand the application areas of IOT |
| **CO2** | Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks |
| **CO3** | Able to understand building blocks of Internet of Things and characteristics |

**CO Attainment:**

**CO1=2.526**

**CO2=2.47**

**CO3=2.53**

## 8. Mapping between course outcomes and program outcomes

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **2** | **1** | **3** | **2** | | | | | **3** | | **2** |
| **CO2** | **2** | **2** | **2** | **2** | **2** | | | | | **2** | | **2** |
| **CO3** | **3** | **2** | **2** | **1** | **1** | | | | | **3** | | **1** |
| **Direct Attainment** | **8** | **6** | **5** | **6** | **5** | | | | | **8** | | **5** |
| **PO Attainment** | **2.51** | **2.50** | **2.50** | **2.50** | **2.50** | **-** | **-** | **-** | **-** | **2.51** | **-** | **2.50** |

**Correlation levels 1, 2 or 3 are defined as below:**

**1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)**

## 9. Mapping between course outcomes and program specific outcomes

| CO | PSO1 | PSO2 |
|---|---|---|
| CO1 | 2 | 1 |
| CO2 | 3 | 1 |
| CO3 | 3 | 1 |
| Direct Attainment | 8 | 3 |
| PSO Attainment | 2.86 | 2.87 |

**Correlation levels 1, 2 or 3 are defined as below:**

**1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)**

## 10. Terminal-I Question paper (offline)

**Sub: IoT, 7th Semester, B. Tech, All questions carry equal marks (any five)**

**Full Mark: 25, Time: 1hr**

| Q. No | Answer all the questions | CO | Marks |
|---|---|---|---|
| 1 | Describe few challenges of IoT? Explain different link layer protocols used in IoT? | CO1 | 5 |
| 2 | Briefly explain the difference between REST API and Web Socket API. | CO1, CO2, CO3 | 5 |
| 3 | Explain briefly the COAP application layer protocol and mention one of its applications. | CO1, CO2, CO3 | 5 |
| 4 | Explain cloud platform as a service. Give one example it. | CO1, CO2, CO3 | 5 |
| 5 | Briefly explain a smart forest fire detection system embedded with all the advanced features. | CO1, CO2, CO3 | 5 |
| 6 | Write a python program, which includes a function to calculate factorial of a number. | CO1 | 5 |
| 7 | Write the output of the following code. What do you understand by instance and attribute?<br>Class Human:def_init_(self, name=none): (self.name=name,def man(self):if self.name:print("Hi, I am a man with a name"+ self.name)else: print("Hi, I am a Robot without a name")x=Human()x.man();y=Human("Ashok")y.man() | CO1 | 5 |

## 11.Terminal -II Question paper (offline)

**Sub: IoT, 7th Semester, B. Tech, Full Mark: 25, Time: 1hr**
**Answer any three. Question no 1. Is compulsory.**

| Q. No | Answer all the questions | CO | Marks |
|---|---|---|---|
| 1.a | Mention three applications of M2M | CO1,CO2 | 2 |
| 1.b | Mention M2M communication protocols | CO1, CO2 | 2 |
| 1.c | Briefly explain the advantages of NFV | CO2, CO3 | 2 |
| 1.d | Differentiate IoT and M2M | CO1, CO3 | 2 |
| 1.e | What are the resources that are mapped to functional devices for home automation IoT system at the deployment level? | CO1, CO3 | 3 |
| 1.f | Explain what are the interfaces are available for Raspberry Pi. | CO2, CO3 | 2 |
| 2.a | Write a Python program for controlling an LED with a switch with Raspberry Pi. | CO1, CO3 | 3 |
| 2.b | Briefly explain limitations of simple network management protocol. | CO3 | 3 |
| 3.a | What is the need of SDN. Briefly explain SDN architecture. | CO3 | 3 |

| | | | |
|---|---|---|---|
| | | | |
| 3.b | Explain the protocol layers of NETCONF. | CO3 | 3 |
| 4.a | What are the different data types present in python? | CO3 | 3 |
| 4.b | Write the output of the following code.<br>name = input (“what is your name?”)<br>print(“Nice to meet you “+name+”!”)<br>age=input(“Your age?”)<br>print(“so,you are already “+age ”years old”+name+”!”) | CO3 | 3 |

## 12.Sample Answer sheets Terminal-1 (hard copy attached)

## 13.Sample Answer sheet Terminal-II (hard copy attached)

## 14.Question paper analysis (Terminal-I)

| Serial Number | Category (Bloom's Taxonomy) | Question Numbers | Number of questions | Weightage (%) |
|---|---|---|---|---|
| 1 | Remembrance | 1,2 | 2 | 28 |
| 2 | Understanding | 1,2,3,4,6,7 | 6 | 85 |
| 3 | Applications | 3,4 | 2 | 28 |
| 4 | Analysis | 5 | 1 | 14 |
| 5 | Design | 5 | 1 | 14 |

## 15.Question paper analysis (Terminal-II)

| Serial Number | Category (Bloom's Taxonomy) | Question Numbers | Number of questions | Weightage (%) |
|---|---|---|---|---|
| 1 | Remembrance | 1.e,1.f,2.b,3.a,3.b,4.a | 6 | 50 |
| 2 | Understanding | 1.a, 1.b,1.c,1,d,1.e,2.a,3.b,4.b | 8 | 66 |
| 3 | Applications | 1.b,1.f | 1 | 16 |
| 4 | Analysis | 1 | 1 | 8 |
| 5 | Design | 1 | 1 | 8 |

# 16.Timetable Individual

Department of Electronics and Telecommunication,
Indira Gandhi Institute of Technology, Sarang, Dhenkanal-759146
TT-2018-19(Odd Sem)

Name of the Faculty: Dr. U Bhanja

| | 1st | 2nd | 3rd | 4th | 5th | | 6th | 7th | 8th |
|---|---|---|---|---|---|---|---|---|---|
| | 8.00-8.50AM | 8.50-9.40AM | 9.40-10.30AM | 10.30-11.20AM | 11.20-12.10PM | | 2.00-2.50PM | 2.50-3.40PM | 3.40-4.30PM |
| MON | | | | | IOT (7th BT) | LUNCH | Minor Project (7th BT) | | |
| TUE | | | | IOT (7th BT) | | | | | |
| WED | | | | | | | Minor Project (7th BT) | | |
| THU | | | PROJECT (3rd Sem MTech) | | | | | | |
| FRI | | | | | | | | PROJECT (3rd Sem MTech) | |
| SAT | | | | | | | | | |

Head of the Department

Electronics and Telecommunication Engineering

# 17.Terminal mark

**Department of Electronics and Telecommunication Engineering Indira Gandhi Institute of Technology, Sarang, 7th Sem, 2020-21**



Biju Patnaik University of Technology, Odisha, Rourkela

Welcome IGIT, SARANG Log Out

Skin: Hay

HOME STUDENT ENROLLMENT MY ACCOUNT CORRESPONDENCE FACULTY COLLEGE REGISTRATION REPORT(S) EXAMINATION

| | |
|---|---|
| Institution Name: | BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA |
| Branch/Sem: | B.Tech.(ELECTRONICS & TELECOMMUNICATION ENGINEERING) / 7 |
| Subject: | PCP7H007 / THEORY / Internet of Things (IOT) |

**PREVIEW REPORT**

| Sr.No. | Roll No | Name | Internal Attendance | Internal Marks | Internal In Word | Practical Attendance | Practical Marks | Practical In Word |
|---|---|---|---|---|---|---|---|---|
| 1 | 1501105516 | ABHISEK BASTIA | P | 36 | Thirty-Six | NA | NA | NA |
| 2 | 1501105517 | AJIT SAHOO | P | 37 | Thirty-Seven | NA | NA | NA |
| 3 | 1501105519 | ANKITA MOHAPATRA | P | 45 | Forty-Five | NA | NA | NA |
| 4 | 1501105520 | ASISH BEHERA | P | 37 | Thirty-Seven | NA | NA | NA |
| 5 | 1501105521 | AVEET KUMAR AGARWAL | P | 46 | Forty-Six | NA | NA | NA |
| 6 | 1501105523 | CHANDAN KUMAR SINGH | P | 38 | Thirty-Eight | NA | NA | NA |
| 7 | 1501105524 | DEBAJANI NAYAK | P | 45 | Forty-Five | NA | NA | NA |
| 8 | 1501105525 | DIBYAJYOTI NANDA | P | 37 | Thirty-Seven | NA | NA | NA |
| 9 | 1501105526 | DILIP KUMAR MANGARAJ | P | 42 | Forty-Two | NA | NA | NA |
| 10 | 1501105527 | JAGDISH KUMAR NAIK | P | 29 | Twenty-Nine | NA | NA | NA |
| 11 | 1501105528 | JANMAJAYA PRADHAN | P | 47 | Forty-Seven | NA | NA | NA |
| 12 | 1501105529 | KUNDAN SIRODHARYA PARDIA | P | 28 | Twenty-Eight | NA | NA | NA |
| 13 | 1501105530 | MANMAY ROUT | P | 50 | Fifty | NA | NA | NA |
| 14 | 1501105531 | NIKITA MUNDU | P | 46 | Forty-Six | NA | NA | NA |
| 15 | 1501105532 | NIKUNJ PATEL | P | 37 | Thirty-Seven | NA | NA | NA |
| 16 | 1501105534 | PINAK KUMAR RATH | P | 34 | Thirty-Four | NA | NA | NA |
| 17 | 1501105536 | PRASANTI SANTOSH ROY | P | 49 | Forty-Nine | NA | NA | NA |
| 18 | 1501105537 | RAJAT KUMAR DALAI | P | 31 | Thirty-One | NA | NA | NA |
| 19 | 1501105538 | ROJALIN MALIK | P | 43 | Forty-Three | NA | NA | NA |
| 20 | 1501105539 | SAJAN BEHERA | P | 34 | Thirty-Four | NA | NA | NA |
| 21 | 1501105540 | SAKSHI GATYAN | P | 50 | Fifty | NA | NA | NA |
| 22 | 1501105541 | SANDEEP KUMAR PATRA | P | 40 | Forty | NA | NA | NA |
| 23 | 1501105542 | SHAHAMIN RASHID | P | 48 | Forty-Eight | NA | NA | NA |
| 24 | 1501105543 | SHYAM PRASAD BEHERA | P | 37 | Thirty-Seven | NA | NA | NA |
| 25 | 1501105544 | SOBHAGINI PANDEY | P | 46 | Forty-Six | NA | NA | NA |
| 26 | 1501105545 | SOM BISMAYA | P | 42 | Forty-Two | NA | NA | NA |
| 27 | 1501105546 | SOUMITRI PANDA | P | 43 | Forty-Three | NA | NA | NA |
| 28 | 1501105547 | SOUMYA RANJAN DALUA | P | 40 | Forty | NA | NA | NA |
| 29 | 1501105548 | SUBHASHREE PRIYADARSHINEE | P | 48 | Forty-Eight | NA | NA | NA |
| 30 | 1501105550 | SUKANYA MAHALIK | P | 44 | Forty-Four | NA | NA | NA |
| 31 | 1501105551 | SWAGAT ROUT | P | 44 | Forty-Four | NA | NA | NA |
| 32 | 1501105552 | SWAPNIL ROY | P | 47 | Forty-Seven | NA | NA | NA |
| 33 | 1501105553 | SWETAPADMA PANDA | P | 38 | Thirty-Eight | NA | NA | NA |
| 34 | 1501105554 | TUSHAR RANJAN PANDA | P | 39 | Thirty-Nine | NA | NA | NA |
| 35 | 1501105555 | U.S.VISHAAL | P | 32 | Thirty-Two | NA | NA | NA |
| 36 | 1501105556 | YASH RANJAN MOHAPATRA | P | 35 | Thirty-Five | NA | NA | NA |
| 37 | 1501105557 | SANDEEP SAHU | P | 43 | Forty-Three | NA | NA | NA |
| 38 | 1501105558 | SIDDHESWAR NAHAK | P | 46 | Forty-Six | NA | NA | NA |
| 39 | 1501105559 | SOURAV SUBUDHI | P | 34 | Thirty-Four | NA | NA | NA |
| 40 | 1621105191 | ANIMOL AICH | P | 41 | Forty-One | NA | NA | NA |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 41 | 1621105193 | BIKEN SAHOO | P | 32 | Thirty-Two | NA | NA | NA |
| 42 | 1621105198 | JYOTIRMAYEE SAMAL | P | 40 | Forty | NA | NA | NA |
| 43 | 1621105202 | PRAGYAN TANAYA TAPASWINI | P | 39 | Thirty-Nine | NA | NA | NA |
| 44 | 1621105203 | PRATYUSHA RATH | P | 39 | Thirty-Nine | NA | NA | NA |
| 45 | 1621105204 | PRIYADARSHINI PATRA | P | 45 | Forty-Five | NA | NA | NA |
| 46 | 1621105205 | PRIYANKA DALAI | P | 37 | Thirty-Seven | NA | NA | NA |
| 47 | 1621105206 | PRIYANKA MOHAPATRA | P | 40 | Forty | NA | NA | NA |
| 48 | 1621105207 | RAJAT SEKHAR NANDA | P | 28 | Twenty-Eight | NA | NA | NA |
| 49 | 1621105208 | RASMITA BEHERA | P | 40 | Forty | NA | NA | NA |
| 50 | 1621105210 | SEKH ZABID BOX | P | 38 | Thirty-Eight | NA | NA | NA |
| 51 | 1621105211 | SK SAFI ULLA | P | 35 | Thirty-Five | NA | NA | NA |
| 52 | 1621105213 | SONALI SAHOO | P | 42 | Forty-Two | NA | NA | NA |
| 53 | 1621105214 | SONALIKA SAMAL | P | 42 | Forty-Two | NA | NA | NA |
| 54 | 1621105215 | SOUMYARANJAN PATTANAIK | P | 30 | Thirty | NA | NA | NA |
| 55 | 1621105216 | SUBHASMITA BEHERA | P | 44 | Forty-Four | NA | NA | NA |
| 56 | 1621105217 | SUBHRA BEHURIA | P | 40 | Forty | NA | NA | NA |
| 57 | 1621105218 | SUSMITA DAS | P | 41 | Forty-One | NA | NA | NA |
| 58 | 1621105220 | UDAYA BHASKAR BEHERA | P | 35 | Thirty-Five | NA | NA | NA |
| 59 | 1621105221 | BIJAYANTI LAKRA | P | 40 | Forty | NA | NA | NA |
| 60 | 1621105222 | SURYAKANTA SAHANI | P | 36 | Thirty-Six | NA | NA | NA |

## 18.Semester Mark (a sample copy)

# Biju Patnaik University of Technology, Odisha

**Welcome!** **Login**

◉ Regular Subject(s) History ○ Honor(s)/Minor(s) Subjects History

Reg.No: 1501105542
Name: SHAHAMIN RASHID
College: INDIRA GANDHI INSTITUTE OF TECHNOLOGY, SARANG
Branch: B.Tech.(ELECTRONICS & TELECOMMUNICATION ENGINEERING)

| Sl.No. | Subject Code | Subject | Credit | Last History | Final Grade |
|---|---|---|---|---|---|
| **1st Semester** | | | | | |
| 1 | 15HM3101 | ENGLISH COMMUNICATION SKILL | 3 | 2015-16 A | A |
| 2 | 15BE2103 | THERMODYNAMICS | 3 | 2015-16 C | C |
| 3 | 15BS1101 | MATHEMATICS - I | 4 | 2015-16 C | C |
| 4 | 15BE2101 | BASICS OF ELECTRONICS | 4 | 2015-16 E | E |
| 5 | 15BE2105 | PROGRAMMING IN C | 5 | 2015-16 E | E |
| 6 | 15BS1103 | CHEMISTRY | 4 | 2015-16 E | E |
| 7 | 15BE7102 | ENGINEERING WORKSHOP | 2 | 2015-16 O | O |
| | | Total Credits : | 25 | SGPA : | 8.12 |
| **2nd Semester** | | | | | |
| 1 | 15BS1102 | PHYSICS | 4 | 2015-16 A | A |
| 2 | 15HM3102 | BUSINESS COMMUNICATION | 3 | 2015-16 A | A |
| 3 | 15BE2104 | MECHANICS | 3 | 2015-16 C | C |
| 4 | 15BE2102 | BASIC ELECTRICAL ENGINEERING | 4 | 2015-16 E | E |
| 5 | 15BE2106 | DATA STRUCTURE USING C | 5 | 2015-16 E | E |
| 6 | 15BS1104 | MATHEMATICS - II | 4 | 2015-16 O | O |
| 7 | 15BE7101 | ENGINEERING DRAWING | 2 | 2015-16 A | A |
| | | Total Credits : | 25 | SGPA : | 8.44 |
| **3rd Semester** | | | | | |
| 1 | PET3I001 | SEMICONDUCTOR DEVICES | 4 | 2016-17 A | A |
| 2 | PET3I102 | NETWORK THEORY | 4 | 2016-17 A | A |
| 3 | PEK3E001 | ENGINEERING ECONOMICS | 3 | 2016-17 B | B |
| 4 | PET3I101 | ANALOG ELECTRONIC CIRCUITS | 4 | 2016-17 E | E |
| 5 | PET3I103 | SIGNAL & SYSTEMS | 4 | 2016-17 E | E |
| 6 | PET3I104 | DIGITAL ELECTRONICS | 4 | 2016-17 O | O |
| | | Total Credits : | 23 | SGPA : | 8.57 |
| **4th Semester** | | | | | |
| | | Grand Total Credits: | 179 | CGPA : | 8.43 |

| Sl.No. | Subject Code | Subject | Credit | | Last History | Final Grade |
|---|---|---|---|---|---|---|
| 1 | PET4I103 | ELECTRICAL AND ELECTRONICS MEASUREMENT | 4 | 2016-17 A | | A |
| 2 | PET4I102 | ELECTRICAL MACHINES & POWER DEVICES | 4 | 2016-17 B | | B |
| 3 | PET4I104 | MICROPROCESSOR & MICROCONTROLLER | 4 | 2016-17 B | | B |
| 4 | PMA4E001 | APPLIED MATHEMATICS-III | 3 | 2016-17 B | | B |
| 5 | PET4I101 | ELECTROMAGNETICS ENGINEERING | 4 | 2016-17 E | | E |
| 6 | POB4E003 | ORGANIZATIONAL BEHAVIOR | 3 | 2016-17 E | | E |
| 7 | PET4I201 | SKILL PROJECT AND HANDS ON | 3 | 2016-17 O | | O |
| | | Total Credits : | 25 | | SGPA : | 8.08 |

5th Semester

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | PET5I101 | CONTROL SYSTEMS | 4 | 2017-18 A | | A |
| 2 | PET5I102 | DIGITAL SIGNAL PROCESSING | 4 | 2017-18 A | | A |
| 3 | PET5I103 | ANALOG COMMUNICATION | 4 | 2017-18 A | | A |
| 4 | PET5H002 | DIGITAL VLSI DESIGN | 4 | 2017-18 B | | B |
| 5 | PET5J001 | FIBER OPTICS & OPTOELECTRONICS DEVICES | 4 | 2017-18 E | | E |
| 6 | PET5I201 | ADVANCE LAB - I (VLSI & EMBEDDED SYSTEM LAB) | 4 | 2017-18 O | | O |
| | | Total Credits : | 24 | | SGPA : | 8.33 |

6th Semester

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | PET6I101 | DIGITAL COMMUNICATION | 4 | 2017-18 A | | A |
| 2 | PET6J002 | COMPUTER NETWORK AND DATA COMMUNICATION | 4 | 2017-18 A | | A |
| 3 | PMG6M001 | ENVIRONMENTAL SCIENCE & ENGINEERING | 3 | 2017-18 A | | A |
| 4 | PET6I102 | HIGH FREQUENCY ENGINEERING | 4 | 2017-18 B | | B |
| 5 | PET6J009 | CRYPTOGRAPHY & NETWORK SECURITY | 4 | 2017-18 E | | E |
| 6 | PEN6E101 | BUSINESS COMMUNICATION & SKILL FOR INTERVIEW | 3 | 2017-18 O | | O |
| 7 | PET6H301 | INDUSTRIAL LECTURE # | 1 | 2017-18 O | | O |
| 8 | PMC6F201 | YOGA | 1 | 2017-18 O | | O |
| | | Total Credits : | 24 | | SGPA : | 8.42 |

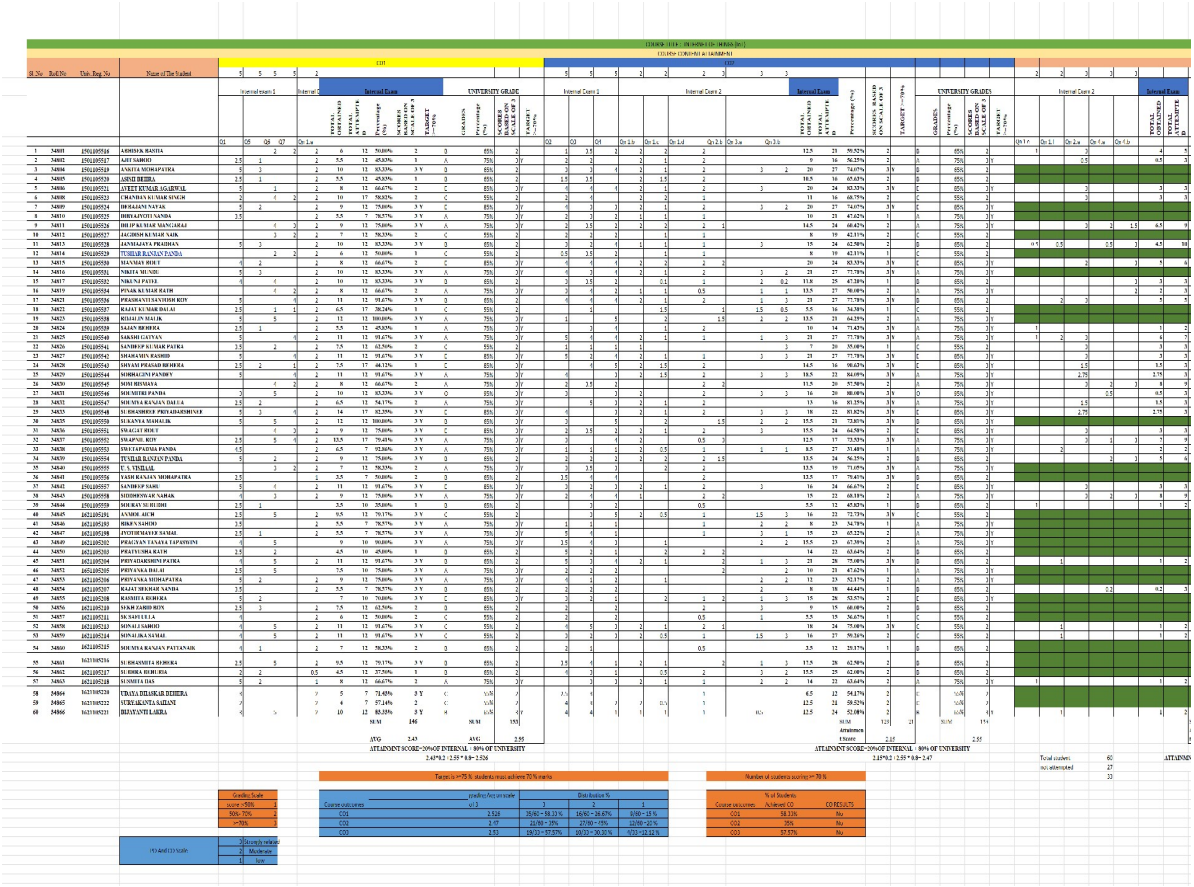
7th Semester

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | PCP7H012 | MARKETING MANAGEMENT | 3 | 2018-19 A | | A |
| 2 | PET7J003 | DIGITAL IMAGE PROCESSING | 3 | 2018-19 A | | A |
| 3 | PCP7H007 | INTERNET OF THINGS (IOT) | 3 | 2018-19 E | | E |
| 4 | PET7J007 | WIRELESS SENSOR NETWORKS | 3 | 2018-19 E | | E |
| 5 | PET7N201 | SEMINAR | 2 | 2018-19 O | | O |
| 6 | PET7N202 | MINOR PROJECT | 4 | 2018-19 O | | O |
| | | Total Credits : | 18 | | SGPA : | 9 |

8th Semester

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | PET8J002 | BIOMEDICAL SIGNAL PROCESSING | 3 | 2018-19 A | | A |
| 2 | PCP8H001 | ENTREPRENEURSHIP DEVELOPMENT | 3 | 2018-19 C | | C |
| 3 | PET8N201 | SEMINAR | 2 | 2018-19 O | | O |
| 4 | PET8N202 | MAJOR PROJECT | 7 | 2018-19 O | | O |
| | | Total Credits : | 15 | | SGPA : | 8.8 |
| | | Grand Total Credits: | 179 | | CGPA : | 8.43 |

## 19.CO Attainment



## 20.CO-PSO Attainment

| CO | PSO1 | PSO2 |
|---|---|---|
| CO1 | 2 | 1 |
| CO2 | 3 | 1 |
| CO3 | 3 | 1 |
| | 2.86 | 2.87 |

## 21.Concluding Remarks of the course by the instructor

- Lecture was delivered fully through the offline platform including all the examinations.
- Students attended the class in offline mode.

- Lecture notes were distributed among the students.
- White board and Marker pen were used to further explain the Python Module.
- Students practice the python programs available through open-source platform.
- Mapping of the course outcomes and certain program outcomes match well.
- The course is to be redesigned further to match with certain program outcomes.
- Overall, the course module was completed successfully.

**INDIRA GANDHI INSTITUTE OF TECHNOLOGY, SARANG**

**ଇନ୍ଦିରା ଗାନ୍ଧୀ ବୈଷୟିକ ଅନୁଷ୍ଠାନ, ସରାଙ୍ଗ**

**An Autonomous Institute of Govt. of Odisha**
**Department of Electronics and Telecommunication Engineering**

# COURSE FILE

**Name of the Course: Computer Network and Data Communication (CNDC)**

**Academic year the course is taught: 2018-2019**

**Course Code: PET6J002 (4L-0T-0P)**

**Year & Semester: 3rd Year & 6th Semester**

**Branch: Electronics & Telecommunication Engineering**

**Max Marks: 50 (Internal) + 100 (External)**

**Course Instructor:** **Prof. Urmila Bhanja**
**Professor**
**Department of ETC Engineering**
**Contact no: 9437142056**
**Email Id: urmila@igitsarang.ac.in**

## Vision

- To be a place of academic excellence in frontier areas of Electronics and Telecommunication Engineering.
- To create an educational environment and be a part of nationally acclaimed department so as to meet the challenges by bridging the gap between academia and industry.
- To promote competitive academic programs through research activities and ambience that supports intellectual growth and skill acquisition.

## Mission

**M1:** To grow as a diverse, socially responsible learning community to provide well equipped innovators, Scientists, Engineers with pioneering expertise, entrepreneurs, academicians and thinkers of tomorrow in the field of electronics and telecommunication engineering.

**M2:** Facilitating improve technologies, bringing out vital services to the society by strengthening quality of life with leadership and self-sufficiency. To sustain enthusiasm among the students for an approach towards nation building.

**M3:** To inculcate the spirit of innovation among the aspirants' technologists.

## Program Educational Objectives (PEOs)

**PEO I:** The key objective of Electronics and Telecommunication Engineering Program is to augment Student's ability through quality technical education.

**PEO II:** To impart domain knowledge required by the industries so that students are readily deployable.

**PEO III:** To ensure an environment where students, faculty and staffs are encouraged to enhance their intellectual inquisitiveness and develop their technical as well as professional expertise through continuous developmental programs.

**PEO IV:** Graduates/postgraduates will interact with their peers from other disciplines in industry and society to contribute the economic growth of the country.

**PEO V:** Developing communication and interpersonal skills and preparing them for providing self-employment. Growing problem analysis and solving capability through industrial training and projects.

## Program Specific Outcomes (PSOs)

1. Gain detailed knowledge of various contemporary domains to identify research.
2. Have strong skills in learning new programming environments as it is used to develop algorithm for software application.

## Program Outcomes (POs) Defined by NBA

**PO1.** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2.** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3.** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4.** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5**. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6**. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7.** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8**. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9.** Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10**. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11**. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12**. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

**Course description and objectives:**

The course makes the students explore data communication, OSI model, TCP/IP model of local area network and LAN wireless network.

**COURSE OUTCOME:**

1. Able to understand in detail about different layers of OSI and TCP/IP model·
2. Able to realize error control, flow control and media access control protocols.
3. To learn the services provided to the end users.

**COURSE PREREQUISITES: Knowledge in analog and digital communications**

## 1. Syllabus: BPUT

### PET6J002 COMPUTER NETWORK AND DATA COMMUNICATION

**Module – I (12 Hrs)**
Overview of Data Communication Networks, Protocols and standards, OSI Reference model, TCP/IP Protocol.
Physical Layer: Analog Signals, Digital Signals, Data Rate Limits, Transmission Impairment, Data rate limit, Digital Transmission: Digital-to-Digital conversion, Analog-to-Digital conversion, Transmission modes, Analog Transmission: Digital-to-Analog conversion, Analog-to-Analog conversion, Multiplexing: Frequency Division Multiplexing (FDM), Wave Division Multiplexing (WDM), Time Division Multiplexing (TDM), Transmission Media: Guided Media (Twisted-Pair Cable, Coaxial Cable and Fiber-Optic Cable) and unguided media (wireless), Switching: Circuit Switched Network, Datagram Network, Virtual-Circuit Network , Telephone Network, Dial-up Modems and Digital Subscriber Lines.
**Module – II (10 Hrs)**
Error Detection and correction: Types of Errors, Error Detection mechanism (Linear codes, CRC, Checksum), Error Correction mechanism: Hamming Encoding.
Data Link Control and Protocols: Flow and Error Control, Stop-and-Wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ, HDLC and Point-to-Point Protocol
Multiple Access: Random Access (ALOHA, CSMA, CSMA/CD, CSMA/CA), Controlled Access (Polling, Reservation, Token Passing), Channelization (FDMA, TDMA, CDMA).
Wired LANs (Ethernet): Traditional Ethernet, Fast Ethernet, Gigabit Ethernet.
**Module – III (10 Hrs)**
Wireless LANs: IEEE 802.11 and Bluetooth.
Connecting Devices: Passive Hub, Repeater, Active Hub, Bridge, Two layers Switch, Router, Three layers Switch, Gateway.
Virtual Circuit Networks: Frame Relay, Architecture & layers, ATM: Design goals, Architecture & layers.
Network Layer: IPV4 addresses, IPV6 addresses, Internet Protocol: Internetworking, IPV4 datagram, IPV6 packet format and advantages. Network Layer Protocols: ARP, RARP, IGMP and ICMP. Routing: Unicast Routing Protocols and Multicast Routing Protocols.
Transport Layer: Process to Process Delivery, User Datagram Protocol (UDP) and Transmission Control Protocol (TCP).
**Module – IV (08Hrs)**
Domain Name System (DNS): Name Space, Domain Name Space, DNS in Internet, Resolution and Dynamic Domain Name System (DDNS), Remote logging, Electronic Mail (SMTP) and file transfer (FTP), WWW: Architecture & Web document, HTTP: Transaction & Persistent vs. Nonpersistent connection.
Introduction to Wi-Fi and Li-Fi Technology.

**Text Books:**

1. Data Communications and Networking, Behrouz A. Forouzan, Tata McGraw-Hill.
2. Computer Networks, A. S. Tannenbum, D. Wetherall, Prentice Hall, Imprint of Pearson.
3. Data Communication and Networks, Bhushan Trivedi, Oxford University Press.

**Reference Book:**

1. Network for Computer Scientists & Engineers, Zheng, Oxford University Press.
2. Computer Networks A system Approach, Larry L, Peterson and Bruce S. Davie, Elsevier.
3. Computer Networks, Natalia Olifer, Victor Olifer, Willey India.
4. Data and Computer Communications, William Stallings, Prentice Hall, Imprint of Pearson.

## 2. Student's attendance Sheet (Attached)

## 3. Evaluation Scheme (BPUT):

| **Internal -I** | **Internal-II (online)** | **Semester Examination** | **Total** |
|---|---|---|---|
| 25 | 25 | 100 | 150 |
| First internal test including Assignments, viva, attendance, participation of the students in the class, quiz test (decided by the concerned teacher) | Second internal test including Assignments, viva, attendance, participation of the students in the class, quiz test (decided by the concerned teacher) | Purely based on the written examination score at the university level | **GRADE:O (≥90%)**<br>**GRADE: E**<br>**(80% to 89%)**<br>**GRADE: A**<br>**(70% to 79%)**<br>**GRADE: B**<br>**(60% to 69%)**<br>**GRADE: C**<br>**(50% 59%)**<br>**GRADE: D**<br>**(37% to 49%)**<br>**GRADE: F (fail)**<br>**≤ 37%** |

## 4. Lesson Plan:

| SL.NO. | MODULE/LESSON | BRIEF OUTLINE OF COURSE CONTENT | No of classes/Lecture hours required | Course outcome mapping |
|---|---|---|---|---|
| 1 | MODULE I | Introduction & Concepts: Introduction to OSI Model, TCP/IP Model | (4 classes) | CO1 |
| 2 | | Physical layer in detail | (8 classes) | CO1 |
| 4 | | | | CO2 |
| 5 | | **Total classes in hours** | **(12 classes)** | |
| 6 | MODULE II | Data link layer: Error control | (2 classes) | CO1,CO2 |
| 7 | | Flow Control | (3 classes) | CO1 |
| 8 | | Medium Access Control | (3 classes) | CO3 |
| 9 | | Wired Ethernet LAN | (2 classes) | CO1 |
| | | **Total classes in hours** | **(10 classes)** | |
| 11 | MODULE III | Layer 2 switch, layer 3 switch, Bridges, Gateways Wireless LAN, Bluetooth, IEEE 802.11 | 6 classes | CO1, CO2, CO3 |
| 12 | | | | CO1, CO2, CO3 |
| | | Passive hub, repeaters, | 2 classes | |
| | | Network layers, TCP, UDP | 2 classes | |
| | | **Total classes in hours** | **(10 classes)** | |
| 13 | MODULE IV | Dynamic domain name system, SMTP | (2 classes) | CO1, CO2, CO3 |
| 14 | | SMTP, FTP, HTTP | (2 classes) | CO1, CO2, CO3 |
| 15 | | Introduction to WiFi and LiFi Technology | (4 classes) | CO1, CO2, CO3 |
| 16 | | | | CO1, CO2, CO3 |
| 17 | | **Total classes in hours** | **(8 classes)** | |

**Text Books:**

1. Data Communications and Networking, Behrouz A. Forouzan, Tata McGraw-Hill.
2. Computer Networks, A. S. Tannenbum, D. Wetherall, Prentice Hall, Imprint of Pearson.
3. Data Communication and Networks, Bhushan Trivedi, Oxford University Press.

**Reference Book:**

1. Network for Computer Scientists & Engineers, Zheng, Oxford University Press.
2. Computer Networks A system Approach, Larry L, Peterson and Bruce S. Davie, Elsevier.
3. Computer Networks, Natalia Olifer, Victor Olifer, Willey India.
4. Data and Computer Communications, William Stallings, Prentice Hall, Imprint of Pearson.

## 5. Teaching Methodology and Tools used

For delivering the course content power point presentation was made. Few at times white board and marker pen were used for detail explanation of the students. PPTs are circulated among the students as class notes at the end of the lectures. The class was held offline completely, and the examination was conducted under BPUT.

## Program Outcomes

| | |
|---|---|
| **PO1** | Engineering Knowledge |
| **PO2** | Problem Analysis |
| **PO3** | Design/development of solutions |
| **PO4** | Conduct investigations of complex Problems |
| **PO5** | Modern tool usage |
| **PO6** | The engineer and society |
| **PO7** | Environment and sustainability |
| **PO8** | Ethics |
| **PO9** | Individual and team work |
| **PO10** | Communication |
| **PO11** | Project management and finance |
| **PO12** | Life-long learning |

## 6. Course Outcomes

| | |
|---|---|
| **CO1** | Able to understand in detail about different layers of OSI and TCP/IP model· |
| **CO2** | Able to realize error control, flow control and media access control protocols. |
| **CO3** | To learn the services provided to the end users. |

**CO Attainment:**

**CO1=2.41**

**CO2=2.41**

**CO3=2.36**

## 7. Mapping between course outcomes and program outcomes

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | | 3 | | | | | | 3 | | |
| **CO2** | 2 | 2 | | 2 | | | | | | 2 | | |
| **CO3** | 3 | 2 | 2 | 1 | 1 | | | | | 3 | | |
| **Direct Attainment** | 8 | 6 | 2 | 6 | 1 | | | | | 8 | | |
| **PO Attainment** | 2.39 | 2.39 | 2.36 | 2.41 | 2.36 | - | - | - | - | 2.39 | - | |

**Correlation levels 1, 2 or 3 are defined as below:**

**1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)**

## 8. Mapping between course outcomes and program specific outcomes

| CO | PSO1 | PSO2 |
|---|---|---|
| CO1 | 1 | |
| CO2 | 3 | 1 |
| CO3 | 2 | 1 |
| Direct Attainment | 6 | 2 |
| PSO Attainment | 2.39 | 2.38 |

**Correlation levels 1, 2 or 3 are defined as below:**

**1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)**

## 9. Terminal-I Question paper (offline) Answer all questions

**Sub: CNDC, 6th Semester, B. Tech, Full Mark: 30, Time: 1hr**

| Q. No | Answer all the questions | CO | Marks |
|---|---|---|---|
| 1 | **Briefly describe the functions of data link layer?** | CO2, CO3 | 2 |
| 2 | **Describe briefly the most efficient flow control mechanism?** | CO2, CO3 | 5 |
| 3 | **What is the required bandwidth of a low-pass channel if we need to send 1 Mbps by using baseband transmission?** | CO1, CO2, CO3 | 3 |
| 4 | **The loss in a cable with 0.3 dB/km has a power of 2 mW, what is the power of the signal at 5 km** | CO1, CO2 | 3 |
| 5 | **Discuss the types of line encoding used in local area network?** | CO1, CO2 | 2 |

| | | | |
|---|---|---|---|
| 6 | **We need to send 265 kbps over a noiseless channel with a bandwidth of 20 kHz. How many signal levels do we need?** | CO1, CO2 | 3 |
| 7 | **Describe difference between bit rate and baud rate?** | CO1, CO2 | 3 |
| 8 | **Explain the difference among coaxial cable, twisted pair wire and fiber optic cable?** | CO1, CO2 | 5 |
| 9 | **Explain digital subscriber line** | CO1, CO2 | 4 |

## 10. Terminal -II Question paper (offline)

**Sub: CNDC, 6h Semester, B. Tech, Full Mark: 25, Time: 1hr**
**Answer any five the questions, All questions carry equal marks.**

| Q. No | Answer all the questions | CO | Marks |
|---|---|---|---|
| 1 | How the efficiency of flow control mechanism is improved. Write briefly with examples of pure ALOHA and slotted ALOHA. | CO1, CO2 | 5 |
| 2 | Briefly write the advantages of CSMA/CA protocol over the ALOHA and slotted ALOHA protocol. | CO1, CO2 | 5 |
| 3 | What is pipelining? In which context it is used in flow control? | CO1, CO2, CO3 | 5 |
| 4 | Write down briefly different access techniques that are used in CSMA/CD protocol | CO1, CO2 | 5 |
| 5 | Explain and design a CRC (7,4) code. Explain the transmitter and receiver of a CRC (7,4) code | CO1, CO2 | 5 |
| 6 | Explain briefly Go back and ARQ protocol. Explain how it improves the flow control over other techniques | CO1, CO2 | 5 |
| 7 | What is flow control? Why is it needed? What are the drawbacks of simple Flow and error control techniques | CO1, CO2, CO3 | 5 |

## 11.Sample Answer sheets Terminal-I (hard copy of answer sheets attached)

## 12.Sample Answer sheet Terminal-II (hard copy of answer sheets attached)

## 13.Question paper analysis (Terminal-I)

| Serial Number | Category (Bloom's Taxonomy) | Question Numbers | Number of questions | Weightage (%) |
|---|---|---|---|---|
| 1 | Remembrance | 1,2 3.10 | 4 | 36 |
| 2 | Understanding | 4,5,6,7,8,9,11 | 7 | 63 |
| 3 | Applications | 3-9, 11 | 8 | 72 |
| 4 | Analysis | nil | nil | 0 |
| 5 | Design | nil | nil | 0 |

## 14.Question paper analysis (Terminal-II)

| Serial Number | Category (Bloom's Taxonomy) | Question Numbers | Number of questions | Weightage (%) |
|---|---|---|---|---|
| 1 | Remembrance | 1-7 | 7 | 100 |
| 2 | Understanding | 1-7 | 7 | 100 |
| 3 | Applications | 3, 7 | 2 | 28 |
| 4 | Analysis | nil | nil | nil |
| 5 | Design | nil | nil | nil |

# 15.Timetable Individual

Department of Electronics and Telecommunication,
Indira Gandhi Institute of Technology, Sarang, Dhenkanal-759146
TT-2018-19(Even Sem)

Name of the Faculty: Dr. Urmila Bhanja

| | 1st | 2nd | 3rd | 4th | 5th | | 6th | 7th | 8th |
|---|---|---|---|---|---|---|---|---|---|
| | 8.00-8.50AM | 8.50-9.40AM | 9.40-10.30AM | 10.30-11.20AM | 11.20-12.10PM | | 2.00-2.50PM | 2.50-3.40PM | 3.40-4.30PM |
| MON | | | M.Tech Project(4th sem) | | | LUNCH | MAJOR PROJECT (8th BT) | | |
| TUE | | | | | CNDC (6th BT- RN: H4) | | M.Tech Project(4th sem) | | |
| WED | | MAJOR PROJECT (8th BT) | | | | | MAJOR PROJECT (8th BT) | | |
| THU | | | | CNDC (6th BT- RN: H4) | CNDC (6th BT- RN: H4) | | MAJOR PROJECT (8th BT) | | |
| FRI | | | | CNDC (6th BT- RN: H4) | | | M.Tech Project(4th sem) | | |
| SAT | | | M.Tech Project(4th sem) | | | | | | |

Head of the Department

Electronics and Telecommunication

# 16.Terminal mark (CNDC)

**Department of Electronics and Telecommunication Engineering Indira Gandhi Institute of Technology, Sarang 7th Sem, 2018-19**

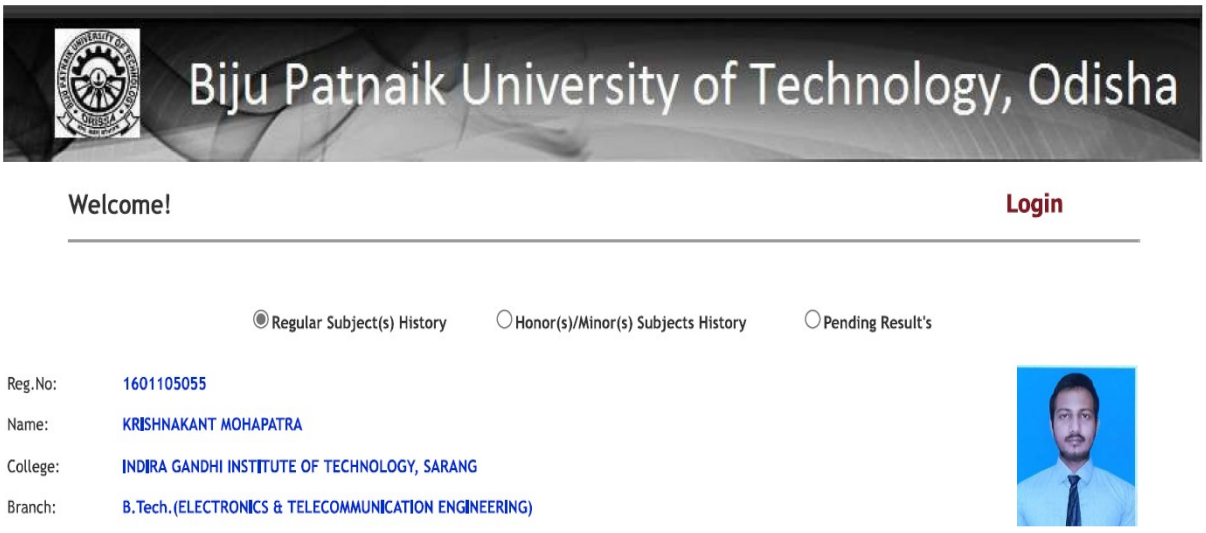
| | |
|---|---|
| Institution Name: | **BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA** |
| Branch/Sem: | **B.Tech.(ELECTRONICS & TELECOMMUNICATION ENGINEERING) / 6** |
| Subject: | **PET6J002 / THEORY / COMPUTER NETWORK AND DATA COMMUNICATION** |

## PREVIEW REPORT

| Sr.No. | Roll No | Name | Internal Attendance | Internal Marks | Internal in Word | Practical Attendance | Practical Marks | Practical In Word |
|---|---|---|---|---|---|---|---|---|
| 1 | 1601105044 | ABHISHEK KAR | P | 30 | Thirty | NA | NA | NA |
| 2 | 1601105045 | ANIMESH SINHA | P | 39 | Thirty-Nine | NA | NA | NA |
| 3 | 1601105046 | ASHISH KUMAR SAHU | P | 39 | Thirty-Nine | NA | NA | NA |
| 4 | 1601105047 | ASMEETA PATTANAYAK | P | 38 | Thirty-Eight | NA | NA | NA |
| 5 | 1601105048 | BASUDEV DASH | P | 37 | Thirty-Seven | NA | NA | NA |
| 6 | 1601105049 | BIBEKANANDA NAYAK | P | 40 | Forty | NA | NA | NA |
| 7 | 1601105050 | BISHAL KUMAR SENAPATI | P | 33 | Thirty-Three | NA | NA | NA |
| 8 | 1601105051 | CHANDAN HEMBRAM MUNDA | P | 35 | Thirty-Five | NA | NA | NA |
| 9 | 1601105053 | DIKSHA PADHI | P | 42 | Forty-Two | NA | NA | NA |
| 10 | 1601105054 | KAJOL NAYAK | P | 43 | Forty-Three | NA | NA | NA |
| 11 | 1601105055 | KRISHNAKANT MOHAPATRA | P | 41 | Forty-One | NA | NA | NA |
| 12 | 1601105056 | M SASWAT | P | 27 | Twenty-Seven | NA | NA | NA |
| 13 | 1601105057 | NEELASHA BAA | P | 43 | Forty-Three | NA | NA | NA |
| 14 | 1601105059 | NIKITA PAL | P | 40 | Forty | NA | NA | NA |
| 15 | 1601105060 | NISHIGANDHA SETHY | P | 40 | Forty | NA | NA | NA |
| 16 | 1601105061 | NITU PANDA | P | 44 | Forty-Four | NA | NA | NA |
| 17 | 1601105063 | PIYUSH ANURAG | P | 25 | Twenty-Five | NA | NA | NA |
| 18 | 1601105064 | PRATYUSH KUMAR NANDA | P | 33 | Thirty-Three | NA | NA | NA |
| 19 | 1601105065 | RAJESH KUMAR GUPTA | P | 41 | Forty-One | NA | NA | NA |
| 20 | 1601105066 | ROHANEET BEHERA | P | 25 | Twenty-Five | NA | NA | NA |
| 21 | 1601105067 | SAMPURNA PATI | P | 42 | Forty-Two | NA | NA | NA |
| 22 | 1601105068 | SAMYAT SAHU | P | 43 | Forty-Three | NA | NA | NA |
| 23 | 1601105069 | SANJEEV MAJHI | P | 31 | Thirty-One | NA | NA | NA |
| 24 | 1601105070 | SHARIF MAJHI | P | 32 | Thirty-Two | NA | NA | NA |
| 25 | 1601105071 | SHIVA SANDHYA SAHOO | P | 45 | Forty-Five | NA | NA | NA |
| 26 | 1601105072 | SHREYANKITA KAR | P | 45 | Forty-Five | NA | NA | NA |
| 27 | 1601105073 | SOURAV MISHRA | P | 27 | Twenty-Seven | NA | NA | NA |
| 28 | 1601105075 | SRITAM SHREE | P | 41 | Forty-One | NA | NA | NA |
| 29 | 1601105076 | STUTI SWAGAT MITRA | P | 30 | Thirty | NA | NA | NA |
| 30 | 1601105077 | SUBHASIS ROUT | P | 40 | Forty | NA | NA | NA |
| 31 | 1601105078 | SUCHISNIGDHA BISWAL | P | 46 | Forty-Six | NA | NA | NA |
| 32 | 1601105079 | SUHAGINI SOREN | P | 45 | Forty-Five | NA | NA | NA |
| 33 | 1601105080 | SUKANT PRIYADARSAN | P | 27 | Twenty-Seven | NA | NA | NA |
| 34 | 1601105081 | SWAGAT KUMAR JENA | P | 32 | Thirty-Two | NA | NA | NA |
| 35 | 1601105082 | SWARAJ KUMAR BARAL | P | 44 | Forty-Four | NA | NA | NA |
| 36 | 1601105083 | SWARNAPRIYA SABAT | P | 39 | Thirty-Nine | NA | NA | NA |
| 37 | 1601105084 | TANMAYA KUMAR MEHER | P | 39 | Thirty-Nine | NA | NA | NA |

| Sr.No. | Roll No | Name | Internal Attendance | Internal Marks | Internal in Word | Practical Attendance | Practical Marks | Practical In Word |
|---|---|---|---|---|---|---|---|---|
| 41 | 1601105088 | SIBA PRASAD PANDA | P | 37 | Thirty-Seven | NA | NA | NA |
| 42 | 1601105237 | SWAYAN PRAVA MALLA | P | 44 | Forty-Four | NA | NA | NA |
| 43 | 1601105490 | PRITY ARPITA PANDA | P | 33 | Thirty-Three | NA | NA | NA |
| 44 | 1601105537 | HITESH PATTNAIK | P | 32 | Thirty-Two | NA | NA | NA |
| 45 | 1721105002 | SWAYAMSIDDHA SWAIN | P | 32 | Thirty-Two | NA | NA | NA |
| 46 | 1721105005 | ANINDETA RATH | P | 33 | Thirty-Three | NA | NA | NA |
| 47 | 1721105038 | BRIKISHOR SHARMA | P | 36 | Thirty-Six | NA | NA | NA |
| 48 | 1721105064 | RAJASHREE BEHERA | P | 45 | Forty-Five | NA | NA | NA |
| 49 | 1721105066 | ANITA MAHALIK | P | 43 | Forty-Three | NA | NA | NA |
| 50 | 1721105067 | AMULYA BAGE | P | 36 | Thirty-Six | NA | NA | NA |
| 51 | 1721105070 | SATYANARAYAN SAHOO | P | 34 | Thirty-Four | NA | NA | NA |
| 52 | 1721105071 | SUDHAKANTA MOHANTY | P | 37 | Thirty-Seven | NA | NA | NA |
| 53 | 1721105072 | PRATIVA NAIK | P | 34 | Thirty-Four | NA | NA | NA |
| 54 | 1721105077 | BABITA PUJHARI | P | 39 | Thirty-Nine | NA | NA | NA |
| 55 | 1721105085 | SUSHMITA SWAIN | P | 43 | Forty-Three | NA | NA | NA |
| 56 | 1721105102 | HANNY RANI PRASAD | P | 48 | Forty-Eight | NA | NA | NA |
| 57 | 1721105109 | SOURAV BOSE | P | 28 | Twenty-Eight | NA | NA | NA |
| 58 | 1721105110 | MONALISA SAHOO | P | 38 | Thirty-Eight | NA | NA | NA |
| 59 | 1721105115 | SUCHITRA LENKA | P | 42 | Forty-Two | NA | NA | NA |
| 60 | 1721105121 | SUMAN BAGE | P | 41 | Forty-One | NA | NA | NA |
| 61 | 1721105125 | SANGHATI JAGADEV | P | 39 | Thirty-Nine | NA | NA | NA |
| 62 | 1721105128 | DIPALI RANASINGH | P | 44 | Forty-Four | NA | NA | NA |
| 63 | 1721105129 | SUNIL KUMAR BEHERA | P | 28 | Twenty-Eight | NA | NA | NA |
| 64 | 1721105151 | PRATIMA PADHEE | P | 46 | Forty-Six | NA | NA | NA |

## 17.Semester Marks (A sample copy)



| Sl.No. | Subject Code | Subject | Credit | Last History | Final Grade |
|---|---|---|---|---|---|
| | | 3rd Semester | | | |
| 1 | PEK3E001 | ENGINEERING ECONOMICS | 3 | 2017-18 A | A |
| 2 | PET3J001 | SEMICONDUCTOR DEVICES | 4 | 2017-18 A | A |
| 3 | PET3I102 | NETWORK THEORY | 4 | 2017-18 B | B |
| 4 | PET3I101 | ANALOG ELECTRONIC CIRCUITS | 4 | 2017-18 E | E |
| 5 | PET3I104 | DIGITAL ELECTRONICS | 4 | 2017-18 E | E |
| 6 | PET3I103 | SIGNAL & SYSTEMS | 4 | 2017-18 O | O |
| | | Total Credits : 23 | | SGPA : | 8.52 |
| | | 4th Semester | | | |
| 1 | PET4I102 | ELECTRICAL MACHINES & POWER DEVICES | 4 | 2017-18 A | A |
| 2 | PET4I103 | ELECTRICAL AND ELECTRONICS MEASUREMENT | 4 | 2017-18 A | A |
| 3 | POB4E003 | ORGANIZATIONAL BEHAVIOR | 3 | 2017-18 A | A |
| 4 | PMA4E001 | APPLIED MATHEMATICS-III | 3 | 2017-18 B | B |
| 5 | PET4I101 | ELECTROMAGNETICS ENGINEERING | 4 | 2017-18 E | E |
| 6 | PET4I104 | MICROPROCESSOR & MICROCONTROLLER | 4 | 2017-18 E | E |
| 7 | PET4I201 | SKILL PROJECT AND HANDS ON | 3 | 2017-18 O | O |
| | | Total Credits : 25 | | SGPA : | 8.44 |
| | | 5th Semester | | | |
| 1 | PETSH002 | DIGITAL VLSI DESIGN | 4 | 2018-19 A | A |
| 2 | PETSI101 | CONTROL SYSTEMS | 4 | 2018-19 E | E |
| 3 | PETSI103 | ANALOG COMMUNICATION | 4 | 2018-19 E | E |
| 4 | PETSJ001 | FIBER OPTICS & OPTOELECTRONICS DEVICES | 4 | 2018-19 E | E |
| 5 | PETSI102 | DIGITAL SIGNAL PROCESSING | 4 | 2018-19 O | O |
| 6 | PETSI201 | ADVANCE LAB - I (VLSI & EMBEDDED SYSTEM LAB) | 4 | 2018-19 O | O |
| | | Total Credits : 24 | | SGPA : | 9.17 |
| | | 6th Semester | | | |
| 1 | PET6I102 | HIGH FREQUENCY ENGINEERING | 4 | 2018-19 A | A |
| 2 | PET6J002 | COMPUTER NETWORK AND DATA COMMUNICATION | 4 | 2018-19 A | A |
| | | Grand Total Credits: 178 | | CGPA : | 8.80 |

| Sl.No. | Subject Code | Subject | Credit | Last History | Final Grade |
|---|---|---|---|---|---|
| 3 | PCG6C001 | GREEN TECHNOLOGIES | 4 | 2018-19 E | E |
| 4 | PET6I101 | DIGITAL COMMUNICATION | 4 | 2018-19 E | E |
| 5 | PET6J009 | CRYPTOGRAPHY & NETWORK SECURITY | 4 | 2018-19 E | E |
| 6 | PEN6E101 | BUSINESS COMMUNICATION & SKILL FOR INTERVIEW | 3 | 2018-19 O | O |
| 7 | PET6H301 | INDUSTRIAL LECTURE # | 1 | 2018-19 O | O |
| | | Total Credits : | 24 | | SGPA : 8.83 |
| | | 7th Semester | | | |
| 1 | PET7J003 | Digital Image Processing | 3 | 2019-20 A | A |
| 2 | PET7J007 | Wireless Sensor Networks | 3 | 2019-20 B | B |
| 3 | PCP7H007 | Internet of Things (IOT) | 3 | 2019-20 E | E |
| 4 | PCP7H012 | Marketing Management | 3 | 2019-20 E | E |
| 5 | PET7N201 | Seminar | 2 | 2019-20 E | E |
| 6 | PET7N202 | Minor Project | 4 | 2019-20 E | E |
| | | Total Credits : | 18 | | SGPA : 8.5 |
| | | 8th Semester | | | |
| 1 | PCP8H001 | Entrepreneurship Development | 3 | 2019-20 O | O |
| 2 | PET8J002 | BIOMEDICAL SIGNAL PROCESSING | 3 | 2019-20 O | O |
| 3 | PET8N201 | SEMINAR | 2 | 2019-20 A | A |
| 4 | PET8N202 | MAJOR PROJECT | 7 | 2019-20 E | E |
| | | Total Credits : | 15 | | SGPA : 9.27 |
| | | Grand Total Credits: | 178 | | CGPA : 8.80 |

- DISCLAIMER -

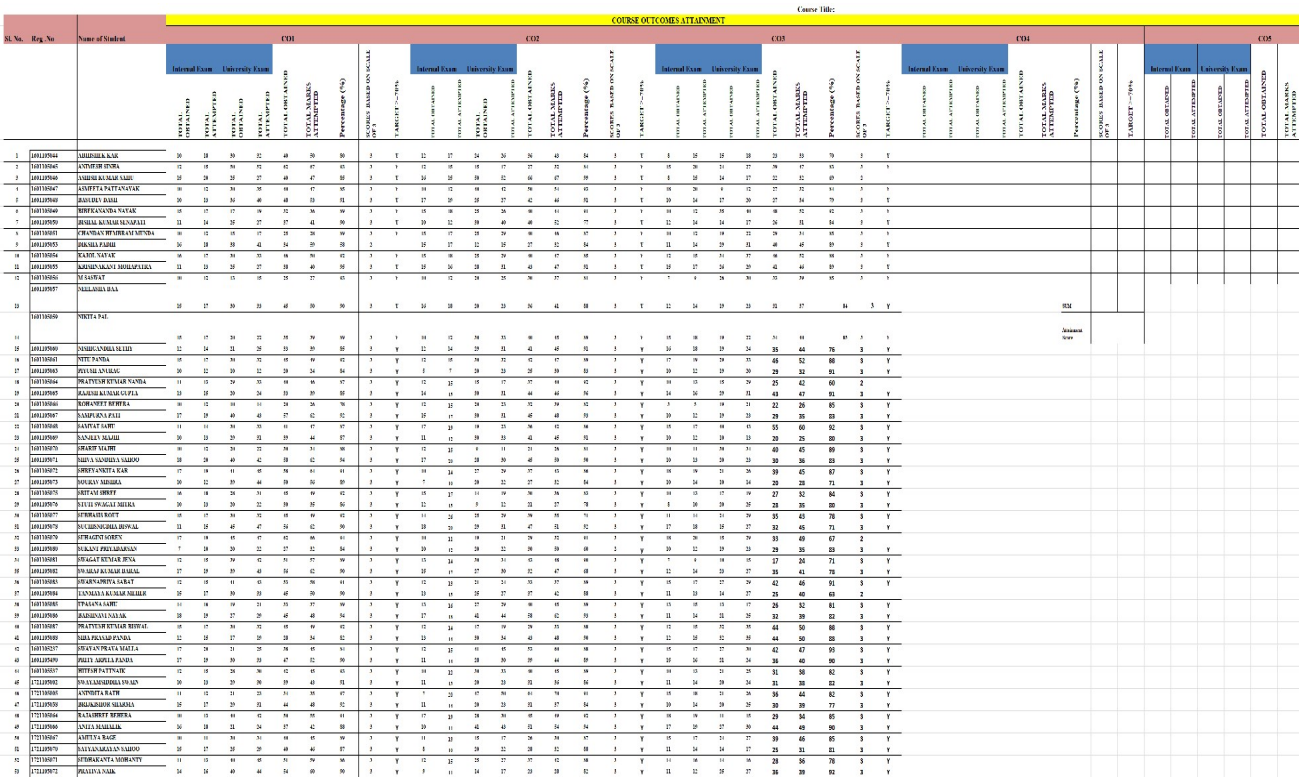
i) The result is provisional and subject to change after post publication and or scrutiny by Biju Patnaik University of Technology, Odisha.

ii) In case of any typological error or discrepancy, the student is required to report at their respective college for necessary intimation / compliance to the University.

iii) 'F' - Fail (Grade) in (Int - Internal, Ext - External, Pr -Practical), 'MA' - Misc. Anomalies (Anomalies in Wrong Entry in UMS / Absentee Statement), Answer Booklets Reported, 'MPR'- Malpractice Reported, 'M' denotes Malpractice (Grade Point 0), NE- Not Evaluated for Wrong Remarks or Comments in Answer Booklet, 'NCC'- Non-Credit Course Completion, 'NCI'- Non-Credit Course Uncompleted, RW - Result Withheld for Non-Submission / Receipt of Registered Internal / Sessional / Practical / Theory Marks, 'S' - Absent (Grade Point 0), 'SJ'- Subjudice, 'TR' - Transfer Case, WR- Wrong Registration.

iv) The university shall not be held responsible for any inadvertent error that may have crept into the results being displayed.

## 18.CO Attainment



## 19.Concluding Remarks of the course by the instructor

- Lecture was delivered in offline and examination was conducted in offline mode.
- Students attended the class in offline mode.
- Mapping of the course outcomes and certain program outcomes match well.
- The course is to be redesigned further to match with certain program outcomes.
- Overall, the course module was completed successfully. The syllabus is too heavy to complete it within the time limit of 40 hours. Hence, it is decided to reduce the course content keeping in mind that the course outcomes map well with the program outcomes.
- A portion of the syllabus was given to the students for self-study and assignments.

Course Title:CNDC

| Sl. No. | Reg .No | Name of Student | COURSE OUTCOMES ATTAINMENT | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CO1 | | | | | | | | | CO2 | | | | | | | | | |
| | | | Internal Exam | | University Exam | | TOTAL OBTAINED | TOTAL MARKS ATTEMPTED | Percentage (%) | SCORES BASED ON SCALE OF 3 | TARGET >=70% | Internal Exam | | University Exam | | TOTAL OBTAINED | TOTAL MARKS ATTEMPTED | Percentage (%) | SCORES BASED ON SCALE OF 3 | TARGET >=70% | Interna |
| | | | TOTAL OBTAINED | TOTAL ATTEMPTED | TOTAL OBTAINED | TOTAL ATTEMPTED | | | | | | TOTAL OBTAINED | TOTAL ATTEMPTED | TOTAL OBTAINED | TOTAL ATTEMPTED | | | | | | TOTAL OBTAINED |
| 1 | 1501105516 | ABHISEK BASTIA | 13 | 18 | 30 | 32 | 45 | 50 | 80 | 3 | Y | 15 | 17 | 24 | 26 | 36 | 43 | 84 | 3 | Y | 12 |
| 2 | 1501105517 | AJIT SAHOO | 12 | 15 | 30 | 52 | 42 | 67 | 93 | 3 | Y | 15 | 15 | 15 | 17 | 27 | 32 | 84 | 3 | Y | 17 |
| 3 | 1501105519 | ANKITA MOHAPATRA | 17 | 18 | 32 | 35 | 49 | 53 | 87 | 3 | Y | 17 | 20 | 12 | 30 | 34 | 47 | 73 | 3 | Y | 14 |
| 4 | 1501105520 | ASISH BEHRA | 16 | 18 | 28 | 32 | 44 | 50 | 88 | 3 | Y | 12 | 17 | 25 | 30 | 37 | 47 | 78 | 3 | Y | 15 |
| 5 | 1501105521 | AVEET KUMAR AGARWAL | 16 | 17 | 28 | 35 | 51 | 52 | 98 | 3 | Y | 16 | 18 | 25 | 34 | 34 | 52 | 66 | 2 | | 15 |
| 6 | 1501105523 | CHANDAN KUMAR SINGH | 15 | 16 | 26 | 35 | 50 | 51 | 98 | 3 | Y | 14 | 16 | 20 | 25 | 37 | 41 | 91 | 3 | Y | 12 |
| 7 | 1501105524 | DEBAJANI NAYAK | 14 | 16 | 25 | 30 | 35 | 46 | 76 | 3 | Y | 16 | 18 | 26 | 28 | 37 | 43 | 86 | 3 | Y | 18 |
| 8 | 1501105525 | DIBYAJYOTI NANDA | 15 | 18 | 30 | 35 | 45 | 53 | 84 | 3 | Y | 13 | 15 | 20 | 25 | 33 | 40 | 83 | 3 | Y | 16 |
| 9 | 1501105526 | DILIP KUMAR MANGARAJ | 15 | 18 | 29 | 32 | 45 | 50 | 90 | 3 | Y | 17 | 19 | 18 | 25 | 30 | 41 | 73 | 3 | Y | 18 |
| 10 | 1501105527 | JAGDISH KUMAR NAIK | 16 | 18 | 21 | 35 | 47 | 53 | 88 | 3 | Y | 15 | 16 | 19 | 25 | 34 | 41 | 83 | 3 | Y | 10 |
| 11 | 1501105528 | JANMAJAYA PRADHAN | 12 | 16 | 26 | 30 | 33 | 46 | 72 | 3 | Y | 15 | 17 | 20 | 28 | 28 | 45 | 63 | 2 | | 19 |
| 12 | 1501105529 | KUNDAN SIRODHARYA PARDIA | 10 | 18 | 17 | 30 | 35 | 48 | 73 | 3 | Y | 7 | 15 | 17 | 25 | 29 | 40 | 73 | 3 | Y | 8 |
| 13 | 1501105530 | MANMAY ROUT | 15 | 17 | 25 | 28 | 37 | 45 | 82 | 3 | Y | 13 | 18 | 20 | 25 | 28 | 43 | 66 | 2 | | 15 |
| 14 | 1501105531 | NIKITA MUNDU | 18 | 20 | 26 | 32 | 40 | 49 | 82 | 3 | Y | 13 | 18 | 23 | 25 | 31 | 43 | 72 | 3 | Y | 16 |
| 15 | 1501105532 | NIKUNJ PATEL | 12 | 14 | 21 | 25 | 33 | 39 | 85 | 3 | Y | 14 | 14 | 29 | 31 | 41 | 45 | 91 | 3 | Y | 16 |
| 16 | 1501105534 | PINAK KUMAR RATH | 15 | 17 | 30 | 32 | 45 | 49 | 92 | 3 | Y | 12 | 15 | 30 | 32 | 42 | 47 | 89 | 3 | Y | 18 |
| 17 | 1501105536 | PRASANTI SANTOSH ROY | 16 | 17 | 23 | 30 | 20 | 24 | 84 | 3 | Y | 15 | 18 | 25 | 29 | 25 | 30 | 83 | 3 | Y | 15 |
| 18 | 1501105537 | RAJAT KUMAR DALAI | 17 | 19 | 30 | 33 | 40 | 46 | 87 | 3 | Y | 15 | 15 | 15 | 17 | 37 | 40 | 92 | 3 | Y | 15 |
| 19 | 1501105538 | ROJALIN MALIK | 13 | 15 | 20 | 24 | 33 | 39 | 85 | 3 | Y | 18 | 20 | 30 | 31 | 44 | 46 | 96 | 3 | Y | 14 |
| 20 | 1501105539 | SAJAN BEHERA | 12 | 15 | 20 | 30 | 20 | 26 | 78 | 3 | Y | 15 | 15 | 21 | 23 | 32 | 39 | 82 | 3 | Y | 14 |
| 21 | 1501105540 | SAKSHI GATYAN | 17 | 19 | 40 | 43 | 57 | 62 | 92 | 3 | Y | 15 | 17 | 30 | 31 | 45 | 48 | 93 | 3 | Y | 15 |
| 22 | 1501105541 | SANDEEP KUMAR PATRA | 10 | 14 | 30 | 33 | 41 | 47 | 87 | 3 | Y | 10 | 19 | 19 | 23 | 36 | 42 | 86 | 3 | Y | 14 |
| 23 | 1501105542 | SHAHAMIN RASHID | 18 | 19 | 29 | 31 | 39 | 44 | 87 | 3 | Y | 11 | 12 | 30 | 33 | 41 | 45 | 91 | 3 | Y | 20 |
| 24 | 1501105543 | SHYAM PRASAD BEHERA | 14 | 15 | 20 | 22 | 30 | 34 | 88 | 3 | Y | 13 | 15 | 20 | 30 | 21 | 26 | 81 | 3 | Y | 15 |
| 25 | 1501105544 | SOBHAGINI PANDEY | 18 | 20 | 30 | 42 | 58 | 62 | 94 | 3 | Y | 17 | 20 | 28 | 30 | 45 | 50 | 90 | 3 | Y | 15 |
| 26 | 1501105545 | SOM BISMAYA | 17 | 19 | 28 | 45 | 58 | 64 | 91 | 3 | Y | 10 | 14 | 27 | 29 | 37 | 43 | 86 | 3 | Y | 17 |
| 27 | 1501105546 | SOUMITRI PANDA | 13 | 15 | 30 | 44 | 50 | 56 | 89 | 3 | Y | 14 | 16 | 20 | 22 | 27 | 32 | 84 | 3 | Y | 18 |
| 28 | 1501105547 | SOUMYA RANJAN DALUA | 16 | 18 | 29 | 31 | 45 | 49 | 92 | 3 | Y | 15 | 17 | 15 | 19 | 30 | 36 | 83 | 3 | Y | 11 |
| 29 | 1501105548 | SUBHASHREE PRIYADARSHINEE | 18 | 20 | 20 | 22 | 30 | 35 | 86 | 3 | Y | 15 | 15 | 31 | 40 | 21 | 27 | 78 | 3 | Y | 17 |
| 30 | 1501105550 | SUKANYA MAHALIK | 15 | 17 | 25 | 32 | 45 | 49 | 92 | 3 | Y | 14 | 26 | 20 | 29 | 39 | 55 | 71 | 3 | Y | 17 |
| 31 | 1501105551 | SWAGAT ROUT | 12 | 15 | 28 | 47 | 56 | 62 | 90 | 3 | Y | 18 | 20 | 29 | 31 | 47 | 51 | 92 | 3 | Y | 17 |
| 32 | 1501105552 | SWAPNIL ROY | 11 | 19 | 35 | 47 | 62 | 66 | 94 | 3 | Y | 10 | 11 | 19 | 21 | 29 | 32 | 91 | 3 | Y | 18 |
| 33 | 1501105553 | SWETAPADMA PANDA | 13 | 15 | 20 | 22 | 27 | 32 | 84 | 3 | Y | 13 | 16 | 20 | 22 | 30 | 50 | 60 | 2 | | 10 |
| 34 | 1501105554 | TUSHAR RANJAN PANDA | 18 | 20 | 27 | 42 | 51 | 57 | 89 | 3 | Y | 13 | 14 | 24 | 34 | 43 | 48 | 90 | 3 | Y | 15 |
| 35 | 1501105555 | U.S.VISHAAL | 13 | 19 | 21 | 43 | 56 | 62 | 90 | 3 | Y | 15 | 17 | 14 | 30 | 32 | 47 | 68 | 3 | Y | 12 |
| 36 | 1501105556 | YASH RANJAN MOHAPATRA | 13 | 16 | 30 | 34 | 40 | 45 | 89 | 3 | Y | 14 | 15 | 15 | 17 | 26 | 30 | 87 | 3 | Y | 15 |
| 37 | 1501105557 | SANDEEP SAHU | 15 | 17 | 19 | 43 | 40 | 46 | 87 | 3 | Y | 14 | 17 | 31 | 37 | 28 | 32 | 88 | 3 | Y | 15 |

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 38 | 1501105558 | SIDDHESWAR NAHAK | 13 | 15 | 30 | 45 | 51 | 59 | 86 | 3 | Y | 15 | 15 | 25 | 27 | 37 | 42 | 88 | 3 | Y | 14 |
| 39 | 1501105559 | SOURAV SUBUDHI | 14 | 16 | 28 | 44 | 54 | 60 | 90 | 3 | Y | 15 | 19 | 12 | 17 | 23 | 28 | 82 | 3 | Y | 15 |
| 40 | 1621105191 | ANMOL AICH | 13 | 14 | 30 | 33 | 41 | 47 | 87 | 3 | Y | 14 | 17 | 15 | 28 | 41 | 45 | 91 | 3 | Y | 14 |
| 41 | 1621105193 | BIKEN SAHOO | 15 | 18 | 31 | 42 | 56 | 60 | 93 | 3 | Y | 15 | 18 | 21 | 24 | 38 | 42 | 90 | 3 | Y | 11 |
| 42 | 1621105198 | JYOTIRMAYEE SAMAL | 10 | 19 | 21 | 45 | 58 | 64 | 91 | 3 | Y | 11 | 13 | 20 | 30 | 38 | 43 | 88 | 3 | Y | 17 |
| 43 | 1621105202 | PRAGYAN TANAYA TAPASWINI | 11 | 19 | 21 | 33 | 47 | 52 | 90 | 3 | Y | 11 | 14 | 19 | 30 | 39 | 44 | 89 | 3 | Y | 14 |
| 44 | 1621105203 | PRATYUSHA RATH | 14 | 15 | 10 | 30 | 42 | 45 | 93 | 3 | Y | 12 | 12 | 14 | 33 | 40 | 45 | 89 | 3 | Y | 11 |
| 45 | 1621105204 | PRIYADARSHINI PATRA | 12 | 13 | 19 | 30 | 39 | 43 | 91 | 3 | Y | 14 | 16 | 20 | 23 | 31 | 36 | 86 | 3 | Y | 15 |
| 46 | 1621105205 | PRIYANKA DALAI | 11 | 12 | 15 | 23 | 34 | 35 | 97 | 3 | Y | 12 | 20 | 18 | 50 | 64 | 70 | 91 | 3 | Y | 13 |
| 47 | 1621105206 | PRIYANKA MOHAPATRA | 15 | 17 | 19 | 31 | 44 | 48 | 92 | 3 | Y | 12 | 14 | 20 | 23 | 31 | 37 | 84 | 3 | Y | 14 |
| 48 | 1621105207 | RAJAT SEKHAR NANDA | 10 | 13 | 20 | 42 | 50 | 55 | 91 | 3 | Y | 17 | 19 | 28 | 30 | 45 | 49 | 92 | 3 | Y | 13 |
| 49 | 1621105208 | RASMITA BEHERA | 16 | 18 | 21 | 24 | 37 | 42 | 88 | 3 | Y | 10 | 11 | 20 | 43 | 51 | 54 | 94 | 3 | Y | 11 |
| 50 | 1621105210 | SEKH ZABID BOX | 12 | 15 | 31 | 43 | 53 | 58 | 91 | 3 | Y | 14 | 13 | 11 | 24 | 33 | 37 | 89 | 3 | Y | 15 |
| 51 | 1621105211 | SK SAFI ULLA | 15 | 17 | 30 | 33 | 45 | 50 | 90 | 3 | Y | 13 | 15 | 25 | 27 | 37 | 42 | 88 | 3 | Y | 15 |
| 52 | 1621105213 | SONALI SAHOO | 14 | 16 | 19 | 21 | 33 | 37 | 89 | 3 | Y | 13 | 16 | 27 | 29 | 40 | 45 | 89 | 3 | Y | 14 |
| 53 | 1621105214 | SONALIKA SAMAL | 15 | 19 | 20 | 29 | 45 | 48 | 94 | 3 | Y | 17 | 18 | 15 | 44 | 58 | 62 | 93 | 3 | Y | 11 |
| 54 | 1621105215 | SOUMYARANJAN PATTANAIK | 15 | 17 | 19 | 32 | 45 | 49 | 92 | 3 | Y | 12 | 14 | 17 | 19 | 29 | 33 | 88 | 3 | Y | 13 |
| 55 | 1621105216 | SUBHASMITA BEHERA | 15 | 18 | 17 | 19 | 28 | 34 | 82 | 3 | Y | 13 | 14 | 15 | 34 | 43 | 48 | 90 | 3 | Y | 16 |
| 56 | 1621105217 | SUBHRA BEHURIA | 13 | 20 | 17 | 25 | 38 | 45 | 84 | 3 | Y | 12 | 15 | 21 | 45 | 53 | 60 | 88 | 3 | Y | 14 |
| 57 | 1621105218 | SUSMITA DAS | 15 | 16 | 20 | 24 | 30 | 37 | 81 | 3 | Y | 15 | 20 | 23 | 17 | 23 | 26 | 88 | 3 | Y | 12 |
| 58 | 1621105220 | UDAYA BHASKAR BEHERA | 14 | 18 | 28 | 41 | 50 | 55 | 91 | 3 | Y | 13 | 15 | 20 | 27 | 37 | 42 | 88 | 3 | Y | 14 |
| 59 | 1621105222 | SURYAKANTA SAHANI | 15 | 17 | 20 | 44 | 56 | 61 | 92 | 3 | Y | 17 | 19 | 15 | 25 | 38 | 44 | 86 | 3 | Y | 11 |
| 60 | 1601105221 | BIJAYANTI LAKRA | 14 | 16 | 28 | 41 | 52 | 57 | 91 | 3 | Y | 10 | 12 | 20 | 22 | 30 | 34 | 88 | 3 | Y | 16 |
| | | | | | | | | | SUM | 180 | | | | | | | | SUM | 200 | | |
| | | | | | | | | | ATT.SCORI | 2.4 | | | | | | | | ATT.SCORI | 2.6 | | |

| CO3 | | | | | | | |
|---|---|---|---|---|---|---|---|
| l Exam | University Exam | | | | | | |
| TOTAL ATTEMPTED | TOTAL OBTAINED | TOTAL ATTEMPTED | TOTAL OBTAINED | TOTAL MARKS ATTEMPTED | Percentage (%) | SCORES BASED ON SCALE OF 3 | TARGET >=70% |
| | | | | | | | |
| 15 | 15 | 18 | 23 | 33 | 70 | 3 | Y |
| 20 | 24 | 27 | 39 | 47 | 83 | 3 | Y |
| 18 | 25 | 30 | 36 | 45 | 80 | 3 | |
| 15 | 12 | 25 | 24 | 40 | 60 | 2 | |
| 18 | 16 | 28 | 37 | 43 | 86 | 3 | Y |
| 18 | 22 | 28 | 35 | 46 | 76 | 3 | Y |
| 20 | 19 | 22 | 30 | 41 | 73 | 3 | Y |
| 17 | 18 | 26 | 37 | 43 | 86 | 3 | Y |
| 20 | 26 | 30 | 38 | 41 | 92 | 3 | Y |
| 16 | 15 | 30 | 38 | 41 | 92 | 3 | Y |
| 20 | 25 | 31 | 29 | 43 | 67 | 2 | |
| 17 | 13 | 20 | 25 | 37 | 67 | 2 | |
| 15 | 17 | 20 | 27 | 35 | 77 | 3 | Y |
| 20 | 22 | 25 | 33 | 40 | 82 | 3 | Y |
| 18 | 19 | 24 | 35 | 44 | 76 | 3 | Y |
| 19 | 25 | 33 | 46 | 52 | 88 | 3 | Y |
| 15 | 20 | 30 | 29 | 32 | 91 | 3 | Y |
| 18 | 15 | 29 | 25 | 42 | 60 | 2 | |
| 16 | 29 | 31 | 43 | 47 | 91 | 3 | Y |
| 16 | 19 | 21 | 22 | 26 | 85 | 3 | Y |
| 18 | 19 | 23 | 29 | 35 | 83 | 3 | Y |
| 17 | 27 | 43 | 55 | 60 | 92 | 3 | Y |
| 20 | 20 | 30 | 20 | 25 | 80 | 3 | Y |
| 18 | 30 | 34 | 40 | 45 | 89 | 3 | Y |
| 17 | 20 | 23 | 30 | 36 | 83 | 3 | Y |
| 19 | 21 | 26 | 39 | 45 | 87 | 3 | Y |
| 20 | 10 | 14 | 20 | 28 | 71 | 3 | Y |
| 13 | 17 | 19 | 27 | 32 | 84 | 3 | Y |
| 20 | 20 | 25 | 28 | 35 | 80 | 3 | Y |
| 20 | 24 | 29 | 35 | 43 | 78 | 3 | Y |
| 18 | 10 | 27 | 32 | 45 | 71 | 3 | Y |
| 20 | 15 | 29 | 33 | 49 | 67 | 2 | |
| 12 | 19 | 23 | 29 | 35 | 83 | 3 | Y |
| 17 | 10 | 15 | 17 | 24 | 71 | 3 | Y |
| 14 | 23 | 27 | 35 | 41 | 78 | 3 | Y |
| 17 | 24 | 27 | 39 | 46 | 85 | 3 | Y |
| 17 | 20 | 24 | 25 | 31 | 81 | 3 | Y |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 16 | 14 | 16 | 28 | 36 | 78 | 3 | Y |
| 20 | 10 | 27 | 36 | 39 | 92 | 3 | Y |
| 16 | 12 | 15 | 26 | 31 | 84 | 3 | Y |
| 15 | 15 | 31 | 38 | 46 | 83 | 3 | Y |
| 22 | 17 | 25 | 41 | 47 | 87 | 3 | Y |
| 16 | 19 | 24 | 36 | 40 | 90 | 3 | Y |
| 13 | 21 | 25 | 31 | 38 | 82 | 3 | Y |
| 17 | 20 | 24 | 31 | 38 | 82 | 3 | Y |
| 18 | 12 | 26 | 36 | 44 | 82 | 3 | Y |
| 14 | 20 | 25 | 30 | 39 | 77 | 3 | Y |
| 19 | 11 | 15 | 29 | 34 | 85 | 3 | Y |
| 19 | 18 | 30 | 44 | 49 | 90 | 3 | Y |
| 17 | 27 | 29 | 42 | 46 | 91 | 3 | Y |
| 15 | 14 | 27 | 25 | 40 | 63 | 2 | |
| 15 | 13 | 17 | 26 | 32 | 81 | 3 | Y |
| 14 | 21 | 25 | 32 | 39 | 82 | 3 | Y |
| 15 | 21 | 35 | 44 | 50 | 88 | 3 | Y |
| 20 | 32 | 35 | 44 | 50 | 88 | 3 | Y |
| 17 | 20 | 30 | 42 | 47 | 93 | 3 | Y |
| 15 | 24 | 28 | 34 | 40 | 85 | 3 | Y |
| 17 | 11 | 19 | 30 | 36 | 83 | 3 | Y |
| 12 | 23 | 30 | 37 | 42 | 88 | 3 | Y |
| 19 | 11 | 15 | 28 | 34 | 82 | 3 | Y |
| | | | | | SUM | 196 | |
| | | | | | ATT.CSORE | 2.6 | |