Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

Department of Computer Science & Applications

Minutes of 8th Board of Studies Virtual Meeting

The Department of Computer Science & Applications called for the 8th Board of Studies (BOS) virtual meeting, scheduled to take place on the 14th of March 2022, starting from 11:00 a.m. onwards.

1. Dr. K. Bhagavan, HOD, Department of CSA, Chairman
2. Dr. P. Suresh Varma, Professor, Adikavi Nannaya University, Member
3. Dr. M. Babu Reddy, Principal, Krishna University, Member
4. Mr. Sai Satish, Founder & CEO Indian Servers, Member
5. Mrs. S. Siva Leela, Team Leader, Hexaware, Member
6. Dr. KVSN Rama Rao, Professor KLH, Member
7. Dr.S. Lavanya, HOD, English, Member
8. Dr. V. S. Bhagavan, Professor, Mathematics, Member
9. Dr. G. Siva Nageswara Rao, Professor, CSE, Member
10. Dr. K. Kiran Kumar, Professor, CSA, Member
11. Dr. C. M. Sheela Rani, Professor, CSA, Member
12. Dr. Nitin Tyagi Professor, CSA, Member
13. Dr.M.N.V. Kiran Babu, Associate Professor, CSA, Member
14. Dr. B. Mouleswara Rao, Associate Professor, CSA, Member
15. Mr. N. Venkata RamanaAssistant Professor, CSA, Member
16. Mrs. B. Aruna, Assistant Professor, CSA, Member
17. Mr. K. Rohit Kumar, Assistant Professor, CSA, Member
18. Ms. V Nandini, Assistant Professor, CSA, Member
19. Mr. G. Venkateswarlu, Assistant Professor, CSA, Member
20. Ms. Papiya Mukharjee, Assistant Professor, CSA, Member
21. Dr. T. Thiru Venkadam, Assistant Professor, CSA, Member
22. Dr.A.Sabena Banu, Assistant Professor, CSA, Member
23. Dr.V.S. Narayana, Professor, CSA, Member
24. Mr.S.Parabrahma Chari , Assistant Professor, CSA, Member
25. Ms.M.Radha, Assistant Professor, CSE, Member
26. Dr. K. Subrahmanyam, Principal, KL College of Sciences, Special Invitee Member

Opening Remarks

Dr. K. Bhagavan, HOD, Department of CSA, opened the meeting, welcoming all the attendees.

14/03/22

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Gr -522502
desh

Agenda -1:

To review the approvals of previous meeting minutes.

Discussion

- To ensure that action items assigned in the previous meeting have been accurately documented.
- Allow participants to share any additional comments or concerns related to the previous meeting minutes.

Resolutions:

- The minutes of the previous meeting were reviewed and approved unanimously.

Agenda -2

Proposed to introduce MCA, BCA, and BSc (Computer Science) Course Structures for Y22 Admitted Students.

Discussion

- As per the feedback given by stakeholders, the chairperson Dr. K. Bhagavan presented the course structure of Y22 admitted batch MCA, BCA, and BSc (Computer Science) to BoS members and discussion went on and decisions were made and approved by members.
- As per the feedback given by stakeholders, the chairperson Dr. K. Bhagavan has presented the new program BSc (Computer Science) course structure for Y22 admitted batch students.

Resolutions

- Members shared their perspectives on industry trends and academic requirements and a resolution was passed to introduce MCA, BCA, and BSc (Computer Science) Course Structures for Y22 Admitted Students.
- The detailed syllabus is shown in **ANNEXURE-I.**

Agenda -3

Proposed to revise the L-T-P-S for selected set of courses for BCA and MCA Y21 and Y22 admitted students.

Discussions

- As per the feedback given by the academic peer Dr. R.Satya Prasad from Acharya Nagarjuna University, BoS recommended to revise the L-T-P-S structure of Operating Systems and Computer Organization and Architecture from 4-0-0-0 to 3-1-0-0 for Y22 regulation of BCA.
- As per the feedback given by the academic peer Dr. P. Suresh Varma from Adikavi Nanaya University, BoS recommended to revise the L-T-P-S structure for Research Exploration and Software Engineering is changed from 3-0-0-0 to 2-1-0-0, Computational Thinking and Data

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh
24/3/22

Structures is changed from 4-0-2-4 to 3-0-2-4 and IOT Technology and Applications changed from 3-0-0-0 to 3-1-0-0 for Y22 regulation of MCA.

- The detailed syllabus is shown in **ANNEXURE-II**

Resolutions:

- A resolution was passed to approve the revision of L-T-P-S to the Existing courses with minor changes as per the recommendations taken from stake holders.

Action Taken:

- Revised L-T-P-S Structure for the courses were accepted as per the discussions and suggestions given during the meeting and are approved.

Agenda -3

Proposed for Inclusion of Internship for BCA Y21 admitted students and Inclusion of new English courses for Y22 BCA and Y22 MCA students.

Discussions:

- As per recommendation of Student Amarnath a new course Internship introduced after IV semester with LTPS structure 0-0-4-0.
- As per the feedback given by the faculty member Mrs. Bandi Aruna, Bos recommended to add Essential Life Skills and Communication and Logical Skills in IV and V semester of BCA program and one course in II semester of MCA program.

Resolutions:

A resolution was passed to BoS for approval of adding courses Internship, Essential Life Skills and Communication and Logical Skills with L-T-P-S 0-0-4-4 to meet the industry needs.

Agenda -4

Proposed to introduce Minor Degree program in Computer Science.

Discussion

- As recommended by Alumni student Mr. Pavan Kalyan, BoS recommended to introduce the Minor Degree in Computer Science with 20 credits from Y22 Regulation onwards.

Resolutions:

A resolution was passed to BoS for approval of Minor Degree program in Computer Science.

14/03/22

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Andhra Pradesh

Agenda -5

Proposed to introduce MCA, MSc (IT) and BCA (Animation & Gaming) through OL/ODL mode from A.Y 2022-23

Discussion

- As per the feedback given by the industry person Mrs. S. Siva Leela, Team Leader, Hexaware, BoS recommended to introduce MCA, MSc (IT) and BCA (Animation & Gaming) through OL/ODL mode from A.Y 2022-23

.

Resolutions:

A resolution was passed to BoS for approval of Minor Degree program in Computer Science.

Agenda -6

- Proposed to introduce "Introduction to Cyber Laws and Introduction to Public Administration", " IPR and Patent Laws" as Open Electives for Y22 BCA students.

Discussion:

- As per the feedback given by the faculty Member Mr. Venkataramana, BoS recommended to introduce the course "IPR and Patent Laws" for the students to inculcate the thinking, new ideologies to start their startups.
- As per the feedback given by the faculty Member Dr. Pavan Kumar, from Law Department suggested to introduce the open electives for the students on Cyber Laws and Public Administration.

Resolutions:

A resolution was passed to BoS for approval of Open Electives Introduction to Cyber Law, Introduction to Public Administration and IPR and Patent Laws for Y22 batch students.

Agenda -7

Proposed to introduce the Pre-Ph. D Courses: Paper-1: Research Methodologies, Paper-2 and Paper-3 Courses.

Discussion:

- As per the feedback given by the faculty members and Head of the Department ,BoS recommended to introduce the Pre-Ph. D Courses.
- The detailed syllabus is shown in **ANNEXURE-II**

Resolutions:

A resolution was passed to BoS for approval of Pre-Ph. D Courses.

14/3/22

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

ANNEXURE – I

Koneru Lakshmaiah Education FoundationDepartment of Computer Science and Applications

Master of Computer Applications (MCA)

Sl No	Course Code	Course Title	Type	L	T	P	S	Cr	CH
1	22UC2106	COMMUNICATION AND LOGICAL SKILLS	HSS	0	0	4	0	2	4
2	22CA4100	COMPUTER NETWORKS	PC	3	1	0	0	4	4
3	22CA4101	COMPUTATIONAL THINKING AND DATA STRUCTURES	PC	3	0	2	4	5	9
4	22CA4102	RESEARCH EXPLORATION	PC	2	1	0	0	3	3
5	22CA4103	OPERATING SYSTEMS	PC	3	1	0	0	4	4
6	22CA4104	DATABASE MANAGEMENT SYSTEM	PC	3	0	2	4	5	9
7	22CA4205	DATA ANALYTICS	PC	3	0	2	4	5	9
8	22CA4206	OBJECT ORIENTED PROGRAMMING	PC	3	0	2	4	5	9
9	22CA4207	SOFTWARE ENGINEERING	PC	2	1	0	0	3	3
10	22CA4209	IOT TECHNOLOGY AND APPLICATIONS	PC	3	1	0	0	4	4
11	22CA5110	WEB TECHNOLOGIES	PC	3	0	2	4	5	9
12	22CA5111	AUTOMATION AND INTELLIGENCE	PC	3	0	0	0	3	3
13	22CA5112	INTELLECTUAL PROPERTY RIGHTS	PC	3	0	0	0	3	3
14	22CA5115	MACHINE LEARNING	PE	3	0	2	0	4	5
15	22CA5116	SOFT COMPUTING	PE	3	0	2	0	4	5
16	22CA5120	BIGDATA ANALYTICS	PE	3	0	2	0	4	5

14/3/22

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ◆Approved by AICTE ◆ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

17	22CA5123	CLOUD COMPUTING	PE	3	0	2	0	4	5
18	22CA5124	CLOUD INFORMATION SECURITY	PE	3	0	2	0	4	5
19	22CA5217	PATTERN RECOGNITION	PE	3	0	2	0	4	5
20	22CA5218	DEEP LEARNING	PE	3	0	2	4	5	9
21	22CA5221	DATA VISUALISATION	PE	3	0	2	0	4	5
22	22CA5222	COGNITIVE COMPUTING	PE	3	0	2	4	5	9
23	22CA5225	CLOUD ARCHITECTURES	PE	3	0	2	0	4	5
24	22CA5226	CLOUD WEB SERVICES	PE	3	0	2	4	5	9
25	22CA5113	INTERNSHIP/RESEARCH WORK	PR	0	0	4	0	2	4
26	22CA5214	PROJECT /DISSERTATION WORK	PR	0	0	20	0	10	20
		GRAND TOTAL		**46**	**5**	**46**	**24**	**80**	**121**

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

Koneru Lakshmaiah Education Foundation

Department of Computer Science and Applications

Bachelor of Computer Applications (BCA)

Sl No	Course Code	Course Title	Type	L	T	P	S	Cr	CH
1	22UC1101	Integrated Professional English (HSS1)	HSS	0	0	4	0	2	4
2	22UC1202	English Proficiency (HSS2)	HSS	0	0	4	0	2	4
3	22UC2103	Design Thinking & Innovation (HSS3)	HSS	0	0	4	0	2	4
4	22UC2105	Essential Life Skills (HSS4)	HSS	0	0	4	0	2	4
5	22UC0010	Universal Human Values & Professional Ethics (HSS5)	HSS	2	0	0	0	2	2
6	22FL3055	GERMAN LANGUAGE - Foreign Language (HSS6)	HSS	2	0	0	0	2	2
7	22UC2204	Corporate Readiness Skills (HSS7)	HSS	0	0	4	0	2	4
8	22CA1104	Mathematics for Computer Science (BS1)	BS	3	1	0	0	4	4
9	22UC0009	Ecology & Environment (BS2)	BS	2	0	0	0	2	2
10	22CA1101	Problem Solving through Programming	PC	3	0	2	4	5	9
11	22CA1102	Computer Organization & Architecture	PC	3	1	0	0	4	4
12	22CA1103	Essentials of Information Technology	PC	3	0	2	0	4	5
13	22CA1205	Operating System	PC	3	1	0	0	4	4
14	22CA1206	Data Structures	PC	3	0	2	0	4	5
15	22CA1207	Object Oriented Programming	PC	3	0	2	4	5	9
16	22CA1210	Database Management Systems	PC	3	0	2	4	5	9
17	22CA1209	Web and Social Media Technologies	PC	0	0	4	0	2	4
18	22CA2109	Software Engineering	PC	2	1	0	0	3	3
19	22CA2110	Mobile Application Development	PC	3	0	2	4	5	9
20	22CA2111	Computer Networks	PC	3	0	0	0	3	3

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
District, Andhra Pradesh

14/3/22

21	22CA2112	Web Development using Python	PC	3	0	2	4	5	9
22	22CA2213	Java Full Stack Development	PC	3	0	2	4	5	9
23	22CA2214	Object Oriented Analysis & Design	PC	3	0	2	4	5	9
24	22CA21C1	Cloud Architecture	PE	2	0	2	0	3	4
25	22CA22C2	Cloud Information Security	PE	2	0	2	0	3	4
26	22CA31C3	Ethical Hacking	PE	2	0	2	0	3	4
27	22CA32C4	Cloud Web Services	PE	2	0	2	0	3	4
28	22CA32C5	Design and Development of Cloud Application	PE	2	0	2	4	4	8
29	22CA21D1	Data Warehousing & Mining	PE	2	0	2	0	3	4
30	22CA22D2	Statistics for Data Science	PE	2	0	2	0	3	4
31	22CA31D3	Machine Learning	PE	2	0	2	0	3	4
32	22CA32D4	Big Data Analytics	PE	2	0	2	0	3	4
33	22CA32D5	Data Visualization	PE	2	0	2	4	4	8
34	22CA21A1	Artificial Intelligence	PE	2	0	2	0	3	4
35	22CA22A2	Data Mining in Business Intelligence	PE	2	0	2	0	3	4
36	22CA31D3	Machine Learning	PE	2	0	2	0	3	4
37	22CA32A4	Robotic Process Automation	PE	2	0	2	0	3	4
38	22CA32A5	Deep Learning	PE	2	0	2	4	4	8
39	22CA21I1	Essentials of IoT	PE	2	0	2	0	3	4
40	22CA22I2	Microprocessor and Microcontroller	PE	2	0	2	0	3	4
41	22CA31I3	Electronics and Sensor Technology	PE	2	0	2	0	3	4
42	22CA32I4	IoT Design and Development	PE	2	0	2	0	3	4
43	22CA32I5	Advance Embedded System	PE	2	0	2	4	4	8

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

14/3/22

44	22GN40D1	National Caded Cops(NCC)-1	OE	3	0	0	0	3	3
45	22GN40D4	National Service Scheme(NSS)-1	OE	3	0	0	0	3	3
46	OEBL0001 OEBA0001	Introduction to Cyber Law Introduction to Public Administration	OE	3	0	0	0	3	3
47	OEME0015	Robotics	OE	3	0	0	0	3	3
48	22GN40D2	National Caded Cops(NCC)-2	OE	3	0	0	0	3	3
49	22GN40D5	National Service Scheme(NSS)-2	OE	3	0	0	0	3	3
50	OEME0003	Operations Research	OE	3	0	0	0	3	3
51	OEBT0001	IPR and Patent Laws	OE	3	0	0	0	3	3
52	22GN40D3	National Caded Cops (NCC)-3	OE	3	0	0	0	3	3
53	22GN40D6	National Service Scheme (NSS)-3	OE	3	0	0	0	3	3
54	21MB4055	Organization Management	OE	3	0	0	0	3	3
55	21MB4056	Paradigms in Management Thought	OE	3	0	0	0	3	3
56	22CA 22E1	Term Paper	PR	2	0	0	0	2	2
57	22CA21N0	Internship-1	PR	**0**	**0**	**4**	**0**	**2**	**4**
58	22CA31N1	Internship-2	PR	**0**	**0**	**4**	**0**	**2**	**4**
59	22CA32E2	Major Project	PR	**0**	**0**	**20**	**0**	**10**	**20**
Total				**4**	**0**	**24**	**4**	**17**	**32**
GRAND TOTAL				**68**	**4**	**80**	**32**	**120**	**184**

14/3/22

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖ Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

Department of Computer Science and Applications

B.Sc. (Computer Science)

Course Structure for 2022 Regulation

Sl No	Course Code	Course Title	Type	L	T	P	S	Cr	CH
1	22UC1101	Integrated Professional English	HSS	0	0	4	0	2	4
2	22UC1202	English Proficiency	HSS	0	0	4	0	2	4
3	22UC1203	Design Thinking & Innovation	HSS	0	0	4	0	2	4
4	22UC2105	Essential Life Skills	HSS	0	0	4	0	2	4
5	22UC0010	Universal Human Values & Professional Ethics	HSS	2	0	0	0	2	2
6	22FL3055	German Language- Foreign Languages	HSS	2	0	0	0	2	2
7	22BC1101	Discrete Mathematics	BS	3	1	0	0	4	4
8	22BC2101	Linear Algebra	BS	3	1	0	0	4	4
9	22UC0009	Ecology & Environment	BS	2	0	0	0	2	2
10	22BC2200	Linear Algebra	BS	3	0	2	4	5	9
11	22CA1101	Problem Solving through Programming	PC	3	0	2	4	5	9
12	22CA1102	Computer Organization & Architecture	PC	3	1	0	0	4	4
13	22CA1103	Essentials of Information Technology	PC	3	0	2	0	4	5
14	22CA1205	Operating System	PC	3	1	0	0	4	4
15	22CA1206	Data Structures	PC	3	0	2	0	4	5
16	22CA1207	Object Oriented Programming	PC	3	0	2	4	5	9
17	22CA1210	Database Management Systems	PC	3	0	2	4	5	9
18	22BC2102	Artificial Intelligence	PC	3	0	2	0	4	5
19	22CA2111	Computer Networks	PC	3	0	0	0	3	3
20	22CA2109	Software Engineering	PC	2	1	0	0	3	3
21	22BC3101	Machine Learning	PC	3	0	0	0	3	3

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

14/3/22

22	22BC3201	Theory of Computation	PC	3	1	0	0	4	4
23	22BC3202	Microprocessor and Applications	PC	3	0	2	0	4	5
24	22CA2213	Java Full Stack Development	PC	3	0	2	4	5	9
25	22BC2201	Cloud Computing	PC	3	1	0	0	4	4
26	22BC31D1	Data Mining & Business Intelligence	PE	3	0	2	4	5	9
27	22BC31D2	Introduction to Data Science	PE	3	0	2	4	5	9
28	22BC32D3	Artificial Neural Networks	PE	3	0	2	4	5	9
29	22CA32D4	Big Data Analytics	PE	2	0	2	0	3	4
30	22CA32D5	Data Visualization	PE	2	0	2	4	4	8
31	22BC31C1	Fundamentals of Cyber Security	PE	3	0	2	4	5	9
32	22BC31C2	Cyber Forensics	PE	3	0	2	4	5	9
33	22BC31C3	Malware Analysis	PE	3	0	2	4	5	9
34	22BC32C4	E-Governance	PE	2	0	2	0	3	4
35	22BC32C5	Cloud Security	PE	2	0	2	4	4	8
36	22BC31D1	Data Mining & Business Intelligence	PE	3	0	2	4	5	9
37	22BC31A2	Human Computer Interaction	PE	3	0	2	4	5	9
38	22BC31A3	Soft Computing	PE	3	0	2	4	5	9
39	22CA32D4	Big Data Analytics	PE	2	0	2	0	3	4
40	22BC32A5	Pattern Recognition	PE	2	0	2	4	4	8
41	22CA21N0	Internship-I	PR	0	0	4	0	2	4
42	22CA31N1	Internship-II	PR	0	0	4	0	2	4
43	22CA32E2	Project Work	PR	0	0	12	0	6	12

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Prade

14/3/22

Koneru Lakshmaiah Education Foundation

(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified

Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.

Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in

Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

GRAND TOTAL		**72**	**7**	**64**	**36**	**120**	**179**

Department of Computer Science and Applications

Ph. D (Computer Science)

Course Structure for 2022 Regulation

Sl No	Course Code	Course Title	L	T	P	S	Cr	CH
Paper-1								
1	21RES104	Research Methodologies	4	0	0	0	4	4
Paper-2								
2	22CSA101	Software Development and Quality Assurance	4	0	0	0	4	4
3	22CSA102	Network Systems and Protocols	4	0	0	0	4	4
4	22CSA103	Database Management Systems	4	0	0	0	4	4
5	22CSA104	Operating Systems	4	0	0	0	4	4
6	22CSA105	Object Oriented Programming	4	0	0	0	4	4
7	22CSA106	Data Structures	4	0	0	0	4	4
8	22CSA107	Design and Analysis of Algorithms	4	0	0	0	4	4
9	22CSA108	IoT Development and Connectivity	4	0	0	0	4	4
10	22CSA109	Soft Computing Techniques and Applications	4	0	0	0	4	4
11	22CSA110	Advances in Computing	4	0	0	0	4	4
12	22CSA111	Mobile Computing using Cloud	4	0	0	0	4	4
13	22CSA112	Data Warehousing and Data Mining	4	0	0	0	4	4
14	22CSA113	Principles of Software Reliability	4	0	0	0	4	4
Paper-3								
15	22CSA201	Hadoop and Bigdata	4	0	0	0	4	4
16	22CSA202	Applied Artificial Intelligence	4	0	0	0	4	4
17	22CSA203	Data Analytics	4	0	0	0	4	4
18	22CSA204	Applied Mahine Learning	4	0	0	0	4	4
19	22CSA205	Problem Solving using Python Programming	4	0	0	0	4	4
20	22CSA206	Securing Web Systems and Networks	4	0	0	0	4	4
21	22CSA207	Distributed Databases	4	0	0	0	4	4
22	22CSA208	The Joy of Computing using R programming	4	0	0	0	4	4
23	22CSA209	Applied Deep Learning	4	0	0	0	4	4

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

14/3/22

24	22CSA210	Cloud Infrastructure with Services	4	0	0	0	4	4
25	22CSA211	Service Management in Cloud Computing	4	0	0	0	4	4
26	22CSA212	Data Management in Cloud Computing	4	0	0	0	4	4
27	22CSA213	Securing Cloud Computing Environments	4	0	0	0	4	4
		GRAND TOTAL	**108**	**0**	**0**	**0**	**108**	**108**

Head of the Department 14/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ◆Approved by AICTE ◆ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

ANNEXURE – II

22CA1102: Computer Organization & Architecture

L-T-P-S: 3-1-0-0 **Credits:4** **Prerequisite: Nil**

Mapping of Course outcomes (CO) with program outcomes (PO):

CO No	Course Outcomes	PO	BTL
CO 1	Explain different logic gates and K-maps of variable length	PO1,PO2	2
CO 2	Discuss the functionality of combinational and sequential circuits	PO1,PO2	3
CO 3	Demonstrate the working of registers in computer organization and design	PO1,PO2	3
CO 4	Organize the working of micro programmed control and CPU with memory organization	PO1,PO2	3

Syllabus:

Boolean Algebra - Boolean Algebra, Properties of Boolean Algebra and De Morgan's Theorem , Operations of Boolean Algebra. Logic Gates, Truth Table and Logic Design.Karnaugh Map (K-Map) and Simplification of Boolean functions.Karnaugh Map- 2, 3 and 4 Variable K Maps. Minimization Techniques – Min-terms and Max-terms, Sum of Product (SOP), Product of Sum (POS).**Combinational Circuits** - Half Adder, Full Adder, Half Subtractor, Full Subtractor, Multiplexer andDe-multiplexer. Conversion Sequential Circuits – Flip Flops, Types of Flip Flop – SR Flip Flop, J K Flip Flop, D flip flop, T Flip flop,Master-Slave JK Flip Flop , Conversion . **Register Transfer & Micro -Operations:** Register Transfer Language, Register Transfer, Bus & memory Transfers, Arithmetic Micro-operations, Logic Micro Operations, Shift Micro-operation, Arithmetic Logic Shift Unit.**Basic Computer Organization and Design**: introduction codes, Computer Registers, Computer instructions, Timing and Control, Instruction Cycle, Memory-Reference Instruction, Input-Output and interrupt, Design of Basic Computer, Design of accumulator Logic**, MICRO Programmed Control:** Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.**Central Processing Unit:** General registers Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced instruction Set Computer (RISC). **Memory Organization:** Memory Hierarchy, Main Memory, Associative Memory, Cache Memory, Virtual Memory

Text Books:

1. Computer System Architecture by Morris Mano, PHI
2. Computer Organization and Architecture by William Stallings

Reference Books:

1.Stephen Brown and ZvonkoVrane "Fundamentals of Digital Logic with Verilog Design" SecondEdition, McGraw-Hill.
2. M. Morris Mano, "Digital Logic and Computer Design", Pearson

Head of the Department 14/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CA1205: Operating System

L-T-P-S: 3-1-0-0 **Credits:4** **Prerequisite: Nil**

Mapping of Course outcomes (CO) with program outcomes (PO):

CO No	Course Outcomes	PO	BTL
CO 1	Explain overview of Operating System and basic Operating systems	PO1	2
CO 2	Discover Process state and scheduling with different algorithms	PO1,PO2, PO3,PO4	4
CO 3	Apply Process Synchronization and Dead lock prevention and avoidance.	PO1,PO2,PO3	3
CO 4	Organize various paging concepts and it's algorithms	PO1, PO2, PO3	3

Syllabus:

Overview of Operating Systems: What is an OS, Brief history, **Background and Basics Computer System review:** Architecture, Instruction cycle, Process Control Block, **Basic Oss:** Batch, Multi-programmed batch, Timesharing, Computer System Structures, Operating System Structures.**Processes:** Definition, Process States, 5 state model, **Process structure:** PCB and components, Operations on Processes, **Threads CPU Scheduling:** I/O burst cycle, Context Switching, **Scheduling:** Short Term, Long Term and Scheduling Criteria, **Algorithms:** First Come First Serve, Shortest Job First, Priority Scheduling, Round Robin. **ProcessSynchronization:** Critical Section, Problem, Mutual Exclusion, Races, Semaphores, Deadlocks and Starvation, Classic Synchronization Problems, Readers/Writers, Dining Philosophers. **Deadlocks:** System Model, Necessary Conditions for a deadlock, Mutual Exclusion, Hold and Wait, No Preemption, Circular wait, Resource Allocation Graphs, Handling Deadlocks, Prevention, Avoidance, Bankers Algorithm.**Memory Management:** Address Binding,Compile time, Load time, Execution time, Logical versus Physical Address Space,**Swapping:**Contiguous Allocation, Single Partition, Multiple Partition-First Fit-Best Fit-Worst Fit, Internal and External Fragmentation, **Paging and Virtual Memory:**Basics, Demand Paging, Page Replacement, Page_Replacement_Algorithms: FIFO, Belady's, anomal, Optimal, LRU, MFT, Thrashing.

Text Book:

1."Operating Systems Concepts", Fifth Edition; Silberschatz and Galvin

Reference Book:

1. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.
2. Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
3. H. M. Deitel, Operating systems, 2nd Edition ,Pearson Education

14/3/22
Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ◆Approved by AICTE ◆ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CA4102 : RESEARCH EXPLORATION

L-T-P-S : 2-1-0-0 **Credits: 3** **Prerequisites: NIL**

CO.No	Course Outcome	PO	BTL
CO1	Understand objectives and the steps involved in research process, articulate appropriate research questions and perform literature review in a scholarly style.	PO3	3
CO2	Represent the data in tabular or graphical form	PO3,PO2	3
CO3	Perform Statistical Modeling and Analysis and optimize the data, based on various techniques	PO4,	3
CO4	Use techniques for empathetic research and prepare an appropriate research report	PO3,PO6	3

Syllabus :

Definition and objectives of Research-Types of research, Various Steps in Research process, Mathematical tools for analysis, developing a research question- Choice of a problem, Literature review, Surveying, Synthesizing, critical analysis, reading materials, reviewing, rethinking, critical evaluation, interpretation, Research Purposes, Ethics in research – APA Ethics code. Tabular and graphical description of data: Tables and graphs of frequency data of one variable, Tables and graphs that show the relationship between two variables, Relation between frequency distributions and other graphs, preparing data for analysis. Statistical Modeling and Analysis, Multivariate methods, Concepts of Correlation and Regression, Fundamentals of Time Series Analysis and Error Analysis. Soft Computing: Computer and its role in research, Use of statistical software SPSS, GRETL in research. Introduction to evolutionary algorithms and their classification, Fundamentals of Genetic algorithms, Simulated Annealing, Neural Network based optimization, Optimization of fuzzy systems. Structure and Components of Research Report, Types of Report, Layout of Research Report, Mechanism of writing a research report, referencing in academic writing, Design Thinking for Contextualized Problem-Solving and Empathetic Research.

Text Books :

1. C.R. Kothari, Research Methodology Methods and Techniques,2nd Edition, Vishwa Prakashan,2019

2. Donald R.Cooper, Pamela S. Schhindler, Business Research Methods, 12th Edition, Tata MCGRAW-Hill Co.Ltd.,2018.

Reference Books :

1. Donald H. McBurney, Research Methods, 9th edition, Thomson Learning, ISBN: 81- 315-0047-0, 2017

2. Fuzzy Logic with Engg Applications, Timothy J.Ross, Wiley Publications, 2nd Edition., 2017

3. R. Panner Selvam, Research Methodology, PHI Learning Pvt. Ltd., 2014 4. Mark Saunders , Research Methods for Business Students, Pearson Education, 2015

Head of the Department 4/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CA4207: Software Engineering

L-T-P-S: 2-1-0-0 **Credits: 3** **Prerequisites: NIL**

CO.No	Course Outcome	PO	BTL
CO1	Understand Fundamentals Object Oriented Software Engineering	PO1	2
CO2	Design UML diagrams for Echo Systems	PO4	3
CO3	Design and apply software architectures	PO3	3
CO4	Analyze software testing and software process models	PO3	3

Syllabus

Software and Software Engineering, Nature of software, software application domains, unique nature of web applications, software engineering, software process, software engineering practice, SDLC, software myths. Process Models: Generic process model, prescriptive process models, specialized process models, unified process, personal and team process models, product and process. Reverse Engineering, Agile Development, Agile manifesto and principles, Extreme programming, Scrum, Feature Driven Development (FDD), Lean Software Development (LSD), Requirements Engineering, Requirements classification, Requirements modeling approaches, SRS and User Stories, Analysis to Design, Coupling and Cohesion, Refactoring Design Concepts, Design Principles, Software architecture, architectural styles, Use cases, Classes, Relationships, common Mechanisms and their diagrams. Interfaces, Modeling techniques for Class & Object Diagrams. Behavioral Modeling : Interaction diagrams. Activity Diagrams. Software testing & reliability, A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Testing methods, The Human and The Computer, Golden Rules, user interface analysis and design, interface analysis, interface design steps. Software Process Improvement, Software Quality Assurance: Six Sigma & the CMMI.

Text Book:

1. Object Oriented Software Engineering: Practical Software Development using UML and Java. Timothy C Lethbridge & Robert, Langaneire, Mc Graw Hill

Reference Books:

1. The Unified Modeling Language User Guide. Grady Booch, James Rumbaugh and Ivar Jacobson. Addison-Wesley.

2. Software Engineering; A Practitioner's Approach. Roger SPressman.

3. Object-Oriented Software Engineering: Using UML, Patterns and Java, Bernd Bruegge and Allen H. Dutoit, 2nd Edition, Pearson Education

14/3/22
Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CA4101: COMPUTATIONAL THINKING AND DATA STRUCTURES

L-T-P-S : 3-0-2-4 **Credits: 5** **Prerequisites: NIL**

CO.No	Course Outcome	PO	BTL
CO1	Understand the Fundamentals of C Programming.	PO1	2
CO2	Apply concepts of Arrays, Functions and Strings	PO1	3
CO3	Analyze the concepts of pointers ,Derived Data Types and IO	PO2,PO4	4
CO4	Evaluate Data structures - Stacks ,arrays , Linked Lists, Trees, Graphs, Searching and Sorting methods	PO1,PO2,PO4 ,PO6	4
CO5	Create applications using control structures and linear and non-liner data structure	PO4	6

Syllabus :

CO-I Introduction to Computers, Algorithm, flowchart, program development steps, Structure of C, program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional, operator, bit-wise operators, assignment operators, expressions, type conversions, conditional, expressions, precedence and order of evaluation. Control structures such as if, go to, labels, and switch statements. Loops- while, do-while and for statements, break, continue. Derived types-Arrays: Arrays - declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1- D arrays, 2-D arrays – 2-D and character arrays – Multidimensional arrays. Functions: basics, parameter passing, storage classes- scope rules, user defined functions, standard library functions, recursive functions, header files, C pre-processor. CO-III Pointers: Concepts, initialization of pointer variables, pointers and Function arguments, passing by address – dangling memory, Character pointer s and functions, pointer s to pointer s, pointer s and multidimensional arrays, dynamic memory management functions, command line arguments. User Defined types: structures declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typed of, bit fields, Input and output – concept of a file, text files and binary files, Formatted I/o, file I/o operations. Data Structures: Introduction to Data Structures – Stacks: Definition, Stack implementation one application; Queues: Definition, Queue implementation and types of Queues. Linked Lists: Single Linked List- Definition, implementation; Double Linked List- Definition, implementation. Trees: Binary Trees- representation, traversals. Graphs: Introduction, representation, traversals. Searching: Linear Searching and Binary Searching. Sorting: Bubble Sort, Quick Sort and Merge Sort.

Text Books :

1 .Let Us C, Yashwant Kanetkar, BPB Publications, 5th Edition.

2. Computer science, A structured programming approach using C, B.A. Forouzan and R.F.Gilberg, Third edition, Thomson.

Reference Books :

1. Fundamentals of Data Structures in C, Horowitz, Sahni, Anderson-Freed, 2nd ed,2008.

2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson.

14/3/22

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CA4209: IoT Technology and Applications

L-T-P-S : 3-1-0-0 **Credits : 4** **Prerequisites: NIL**

CO.No	Course Outcome	PO	BTL
CO1	Understand the IoT technology's and vision of IoT from a global context. Understand the application of IoT.	PO2	2
CO2	Apply the Market perspective of IoT	PO4	3
CO3	Analyze state of the art architecture in IoT	PO1	4
CO4	Evaluate Opinions on IoT Application and Value for Industry	PO3	4

Syllabus

Internet of Things Evolution (IoT), Enabling Technologies, M2M Communication, IoT World Forum (IoTWF) Standardized Architecture, Simplified IoT Architecture, Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects.IoT Protocols-IoT Access Technologies, Physical and MAC layers, Topology and Security of IEEE 802.15.4, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks,6LoWPAN, Application Transport Methods: SCADA, Application Layer Protocols: CoAP and MQTT.IoT Design and Development-Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks IoT Platform overview: Overview of IoT supported Hardware platforms such as: Raspberry pi, Arduino Board details, IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT Electronic Equipment's, Industry 4.0 concepts.IoT Data Analytics Introduction, Structured Versus Unstructured Data, Data in Motion versus Data at Rest, IoT Data Analytics Challenges, Data Acquiring, Organizing in IoT/M2M, Supporting Services-Computing Using a Cloud Platform for IoT/M2M Applications/Services, Everything as a service and Cloud Service Models.

Text Book:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014

References Books:

1. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013
2. Cuno Pfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493-9357-1

Head of the Department 4/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ◆Approved by AICTE ◆ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

OEBL0001:Introduction to Cyber Law

L-T-P-S: 3-0-0-0 **Credits:3** **Prerequisite: Nil**

Syllabus:

Introduction to cyber space and meaning of Cyber Law, Invention of Computers and its Impact in Society, overview of Computer and Web Technology, Need for cyber-Jurisprudence at International and Indian Level, Salient features of IT Act, 2000, 2008, Digital Signatures. Constitutional & Human Rights Issues in Cyberspace, Freedom of Speech and Expression in Cyberspace, Right to Privacy, Right to Data Protection, Right to Access Cyberspace, Access to Internet, cryptography, cyber data risk management, Legal, ethical and professional practice. Cyber Crimes & Legal Framework, Cyber Crimes against Individuals, Institution and State Hacking, Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography, Identity Theft & Fraud, Cyber terrorism, Cyber Defamation, offences under Cyber Torts, Cyber Defamation, Different Types of Civil Wrongs. E Commerce, Salient Features, Online approaches like B2B, B2C & C2C, Online contracts Click Wrap Contracts, Applicability of Indian Contract Act, 1872. Ecommerce and Taxation, Intellectual Property Issues in Cyber Space, Interface with Copyright Law, Patent Law, Trademarks & Domain Names, Dispute Resolution in Cyberspace, Jurisdictional problems, cyber security guidelines, cyber forensics aspects

Text Books :•1. Chris Reed & John Angel, Computer Law, OUP, New York, (2007).
2.Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012). •
3.Verma S, K, Mittal Raman, Legal Dimensions of Cyber Space, Indian Law Institute, New Delhi, (2004)
4. Jonthan Rosenoer, Cyber Law, Springer, New York, (1997).
5. Sudhir Naib, The Information Technology Act, 2005: A Handbook, OUP, New York, (2011)
6. S. R. Bhansali, Information Technology Act, 2000, University Book House Pvt. Ltd., Jaipur (2003).
7.Vasu Deva, Cyber Crimes and Law Enforcement, Commonwealth Publishers, New Delhi, (2003).

Reference Books:

1. Computer Law Chris Reed & John Angel Oxford University Publication, New York.
2. Cyber Laws Justice Yatindra Singh Universal Law Publishing Co, New Delhi 2021
3. Legal Dimensions of Cyber Space Verma S, K, Mittal Raman, ILI, New Delhi 2004
4. Cyber Crimes & E-Commerce, Dr. K.I.Pavan Kumar Rubicon Publications 2021

14/3/22
Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ◆Approved by AICTE ◆ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

OEBA0001:Introduction to Public Administration

L-T-P-S: 3-0-0-0 **Credits:3** **Prerequisite: Nil**

SYLLABUS:

Meaning, Nature, Scope and importance of Public Administration, Public Administration & Private Administration, Evolution of Public Administration and Politics & Administration Dichotomy – Woodrow Wilson, Relation with other Social Sciences: Political Science, Economics, Sociology, Psychology

Organization: Meaning and forms of Organization Basis of Organization- Hierarchy, Span of Control, Unity of Command, Co-ordination, Supervision, Communication, Centralization & Decentralization.

New Public Administration: Minnow Brook I & II, New Public Management, Public Policy, E-Governance and Good Governance

Public Administration in the Context of Liberalization, Globalization and Privatization, Administrative Reforms Commissions and Second ARC, Public Private Partnership

TEXTBOOKS:

1. Public Administration: Awasthi & Maheshwari, Laximinarayan Agrawal, Agra, 1997.
2. Modern Public Administration: Felix Nigro & Lyod Nigro, Harper and Row Publication, New York.

REFERENCE BOOKS:

1. Dr. K.K. Puri, Elements of Public Administration, Bharat Prakashan, Jalandhar.
2. Goel S.L. Advance Public Administration, Sterling, New Delhi

14/3/22
Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ◆Approved by AICTE ◆ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22UC2105: Essential Life Skills

L-T-P-S: 0-0-4-0 **Credits:2** **Prerequisite: Nil**

Syllabus :COMPETENCY 1:, Tenses, Active and Passive voice, Direct and Indirect speech, Spotting errors, Sentence completion, and Sentence rearrangement. COMPETENCY 2: Introduction to soft skills - Components of Soft Skills, Character Vs personality, Assertiveness, Building Confidence, Attitude, SWOT, Goal Setting. COMETENCY 3: Writing Skills – Critical reading, Paragraph writing, Product and Process description, speaking from the script, and Report writing. COMPETENCY 4: Time Management, Presentation Skills, Public Speaking, Group Discussion, Leadership, Problem Solving-Decision Making, Etiquette, Body Language.

Text Books :

1.Objective English for Competitive Examination by Hari Mohan Prasad and Uma Sinha. McGraw Hill Education, 2017.
2.English Language Communication Skills, Cengage, 2014.
3.Effective Technical Communication by M Ashraf Rizvi, Tata McGraw Hill, 2010. Soft Skills by Dr. Alex, S. Chand Publications.
4.Business Communication connecting in a Digital World by Raymond V. Lesikar & Marie. E. Flately.

Reference Books :

1.Soft Skills by Dr. Alex S CHAND Publications. 2. Objective English by Showarick Thrope, Pearson

Head of the Department 1/3/22.
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ◆Approved by AICTE ◆ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22UC2106: Communication and Logical Skills

L-T-P-S: 0-0-4-0 **Credits:2** **Prerequisite: Nil**

Syllabus : Critical reading, Tenses, Spotting errors, Sentence completion, Sentence rearrangement, and Paragraph writing SWOT, Goal Setting, Listening skills, Leadership, Presentation Skills, Public speaking, Jam, Time Management, Email Etiquette. Numbers- Divisibility Rules, Units Digit, Remainders, LCM & HCF, Simplification, Problems On Ages, Ratio & Proportion, Partnership, Averages & Alligations, Percentages, Profit & Loss, Simple & Compound Interest, Data Interpretation Number & Letter Series and Analogy, Coding-Decoding, Odd Man Out, Blood Relations, Direction Sense, Syllogisms, Clocks, Calendars, Logical Venn Diagrams, Data Sufficiency.

Text Books :

1. Objective English for Competitive Examination by Hari Mohan Prasad and Uma Sinha. McGraw Hill Education, 2017.
2. English Language Communication Skills, Cengage, 2014.
3. Quantitative Aptitude for CAT by Arun Sharma, McGraw Hill Education
4. Analytical & Logical Reasoning, Peeyush Bhardwaj, Arihant Publications.

Reference Books :

1. Quantitative Aptitude by R.S. Agarwal, SCHAND Publications.
2. A Modern Approach to Verbal Reasoning by R.S. Agarwal, SCHAND Publications.
3. Developing Soft Skills by Robert M. Sherfield, Rhonda J., Patrica J. Moodi; Cornerstone Publications.

14/3/22
Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

Reference for Program Structures and Syllabus Revision- BCA

Course Code	Course Name	Course Category	L	T	P	S	CR	Pre-Requisite	New Course/ Revised Course/ Retained Course	Changes Proposed by	Focused on Employability/Entrepreneurship/Skill Development	Justification
22UC1101	Integrated Professional English	HSS	0	0	4	0	2	NA	Retained Course	NA	Employability	Covering communication skills
22CA1104	Mathematics for Computer Science	BS	3	1	0	0	4	NA	Retained Course	NA	Skill Development and Entrepreneurship	Enhance the skilling and knowledge of coding
22CA1101	Problem Solving Through Programming	PC	3	0	2	4	5	NA	Retained Course	NA	Employability	Enhance Programming skills for coding competition
22CA1102	Computer Organization & Architecture	PC	3	1	0	0	4	NA	Retained Course	NA	Employability	Provide basic understanding of operating Computer
21UC0009	Ecology & Environment (BS2)	BS	2	0	0	0	2	NA	Retained Course	NA		Provide the entire knowledge on Environment
22CA1103	Essentials of Information Technology	PC	3	0	2	0	4	NA	Retained Course	NA	Employability	Enhance the knowledge of architecture of computer
20UC1202	English Proficiency	HSS	0	0	4	0	2	NA	Retained Course	NA	Employability	Use communication skills for interviews

14/3/22

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

22CA1205	Operating System	PC	3	1	0	0	4	NA	Retained Course	NA	Employability	Enhance knowledge on Internal working of devices
22CA1206	Data Structures	PC	3	0	2	0	4	NA	Retained Course	NA	Employability	Enhance Programming skills and participate in coding competitions
22CA1207	Object Oriented Programming	PC	3	0	2	4	5	NA	Retained Course	NA	Employability	Enhance Programming skills and participate in coding competitions
22CA2210	Mobile Application Development	PC	3	0	2	4	5	NA	Retained Course	NA	Employability	Able to design the Apps using Android and Java.
22CA1209	Web and Social Media Technologies	PC	0	0	4	0	2	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance the skilling and knowledge of coding
22CA2109	Software Engineering	PC	2	1	0	0	3	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance Knowledge in SDLC and Software project Management.
22CA1210	Database Management Systems	PC	3	0	2	4	5	NA	Retained Course	NA	Skill Development	Enhance Knowledge in retrieval of data from Database using Queries.
22CA2111	Computer Networks	PC	3	0	0	0	3	NA	Retained Course	NA	Entrepreneurship	Enhance networking knowledge for Entrepreneurship

Head of the Department 13/12/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

22CA2112	Web Development using Python	PC	3	0	2	4	5	NA	Retained Course	NA	Entrepreneurship	Enhance scripting knowledge in python for development of Web Applications
21UC2103	Design Thinking & Innovation	HSS	1	0	0	4	2	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance the knowledge of thinking in respect of startup
22CA21N0	Internship -1	PROJ	0	0	4	0	2	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance the skilling and knowledge of coding
22UC2105	Essential Life Skills	HSS	0	0	4	0	2	NA	**Newly Introduced Course**	NA	Entrepreneurship	Enhance the skilling for Entrepreneurship
21UC0010	Universal Human Values & Professional Ethics	HSS	2	0	0	0	2	NA	Retained Course	NA	Entrepreneurship	Ethics is mandatory in any field and provide quality life.
22CA2213	Java Full Stack Development	PC	3	0	2	4	5	NA	Retained Course	NA	Employability	Enhance the knowledge of Web Development using client and server side scripting.
22CA2214	Object Oriented Analysis & Design	PC	3	0	2	4	5	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance the knowledge on Designing the solutions for the problems.
22CA 22E1	Term Paper	PROJ	0	0	4	0	2	NA	Retained Course	NA	Employability and Entrepreneurship	Able to build the projects by analyzing the problems in

14/3/22

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

												existing system.
	Foreign Language	HSS	2	0	0	0	2	NA	Retained Course	NA	Employability	Enhance knowledge in foreign Languages.
21UC2204	Corporate Readiness Skills	HSS	0	0	4	0	2	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance the knowledge on corporate readiness.
22CA31N1	Internship -2	PROJ	0	0	4	0	2	NA	Retained Course	NA	Employability and Entrepreneurship	Able to build the projects by analyzing the problems in existing system.
22CA32E2	Major Project	PROJ	0	0	12	0	6	NA	Retained Course	NA	Employability	Able to build the projects by analyzing the problems in existing system.
22CA21C1	Cloud Architecture	PE	2	0	2	0	3	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance the knowledge of cloud computing for employability and Entrepreneurship
22CA22C2	Cloud Information Security	PE	2	0	2	0	3	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance the knowledge cloud information security for employability
22CA31C3	Ethical Hacking	PE	2	0	2	0	3	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance the knowledge of ethical hacking for employability and Entrepreneurship

Head of the Department 13/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

22CA32C4	Cloud Web Services	PE	2	0	2	0	3	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance the knowledge of cloud web services for employability and Entrepreneurship
22CA32C5	Design and Development of Cloud Application	PE	2	0	2	4	4	NA	Retained Course	NA	Skill Development and Entrepreneurship	Enhance the knowledge of cloud computing for employability and Entrepreneurship
22CA21D1	Data Warehousing & Mining	PE	2	0	2	0	3	NA	Retained Course	NA	Entrepreneurship	Enhance the knowledge on Mining the data.
22CA22D2	Statistics for Data Science	PE	2	0	2	0	3	NA	Retained Course	NA	Employability	Enhance knowledge on Data analysis using the tools and algorithms
22CA32D4	Big Data Analytics	PE	2	0	2	0	3	NA	Retained Course	NA	Skill Development and Employability	Enhance Knowledge in Bigdata analysis using Hadoop, MapReduce
22CA32D5	Data Visualization	PE	2	0	2	4	4	NA	Retained Course	NA	Employability	Enhance Knowledge on Data using the plots and graphs
22CA31D3	Machine Learning	PE	2	0	2	0	3	NA	Retained Course	NA	Skill Development and Employability	Enhance the Knowledge on Machine Learning Algorithms
22CA21A1	Artificial Intelligence	PE	2	0	2	0	3	NA	Retained Course	NA	Employability	Knowledge on concepts of Artificial Intelligence

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

14/3/22

22CA22A2	Business Intelligence	PE	2	0	2	0		NA	Retained Course	NA	Employability	Enhance concepts on E-Commerce and business online
22CA32A4	Robotic Process Automation	PE	2	0	2	0	3	NA	Retained Course	NA	Employability	Knowledge on the automation of robots
22CA32A5	Deep Learning	PE	2	0	2	4	4	NA	Retained Course	NA	Skill Development and Entrepreneurship	Enhance the Knowledge on Deep Learning Algorithms
22CA22I1	Essentials of IoT	PE	2	0	2	0	3	NA	Retained Course	NA	Employability	Enhance Knowledge on the sensors and the actuators used in IoT
22CA22I2	Microprocessor and Microcontroller	PE	2	0	2	0	3	NA	Retained Course	NA	NA	NA
22CA31I3	Electronics and Sensor Technology	PE	2	0	2	0	3	NA	Retained Course	NA	Skill Development and Employability	Enhance Knowledge on the sensors and the actuators used in IoT
22CA32I4	IoT Design and Development	PE	2	0	2	0	3	NA	Retained Course	NA	Employability	Enhance Knowledge on the Design and development of Circuits in IoT for the given applications
22CA32I5	Advance Embedded System	PE	2	0	2	4	4	NA	Retained Course	NA	Skill Development	Enhance Knowledge on the basic concepts.

Percentage of Syllabus Revision = 11.42% (4 out of 35)

Percentage of Courses focusing on Employability= 91.42% (32 out of 35)

Percentage of Courses focusing on Entrepreneurship= 42.85% (15 out of 35)

Percentage of Courses focusing on Skill Development = 48.57% (17 out of 35)

Head of the Department 4/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

Reference for Program Structures and Syllabus Revision- MCA

Course Code	Course Name	Course Category	L	T	P	S	CR	Pre-Requisite	New Course/ Revised Course/ Retained Course	Changes Proposed by	Focused on Employability/Entrepreneurship/Skill Development	Justification
22CA4208	COMPUTER NETWORKS	PC	3	1	0	0	3	NA	Retained Course	NA	Employability	Enhance networking knowledge for employability and Entrepreneurship
22CA4101	COMPUTATIONAL THINKING AND DATA STRUCTURES	PC	3	0	2	4	5	NA	Retained Course	NA	Skill Development and Entrepreneurship	Enhance data structure knowledge for employability
22CA4102	RESEARCH EXPLORATION	PC	2	1	0	0	3	NA	Retained Course	NA	Employability	Enhance Knowledge to design the projects on existing problems
22CA4103	OPERATING SYSTEMS	PC	3	1	0	0	4	NA	Retained Course	NA	Employability	Provide basic understanding of operating through for employability
22CA4104	DATABASE MANAGEMENT SYSTEM	BS	3	0	2	4	5	NA	Retained Course	NA	Employability	Enhance database knowledge for employability and Entrepreneurship
22CA4205	DATA ANALYTICS	PC	3	0	2	4		NA	Retained Course	NA	Employability	Enhance knowledge for statistics in term of computer and Entrepreneurship

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

22CA4206	OBJECT ORIENTED PROGRAMMING	PC	3	0	2	4	5	NA	Retained Course	NA	Employability	Enhance the awareness of object-oriented programming
22CA4207	SOFTWARE ENGINEERING	PC	2	1	0	0	3	NA	Retained Course	NA	Skill Development and Entrepreneurship	Enhance Knowledge on Software Project Management
22UC2106	Communication and Logical Skills	HSS	0	0	4	0	2	NA	**Newly Introduced Course**	NA	Employability	Covering communication skills for employability
22CA4209	IOT TECHNOLOGY AND APPLICATIONS	PC	3	1	0	0	4	NA	Retained Course	NA	Employability	Enhance Knowledge on Various IoT protocols and its applications
22CA5110	WEB TECHNOLOGIES	PC	3	0	2	4	5	NA	Retained Course	NA	Employability	Enhance the knowledge of web development for employability
22CA5111	AUTOMATION AND INTELLIGENCE	PC	3	0	0	0	3	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance Knowledge on Automation
22CA5116	SOFT COMPUTING	PE	3	0	2	0	4	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance knowledge on Neural Networks and genetic Algorithms
22CA5115	MACHINE LEARNING	PE	3	0	2	0	4	NA	Retained Course	NA	Skill Development and Entrepreneurship	Enhance Knowledge on different Machine algorithms.
22CA5123	CLOUD COMPUTING	PE	3	0	2	0	4	NA	Retained Course	NA	Skill Development	Enhance knowledge on

Head of the Department 4/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

												cloud services, cloud types.
22CA5120	BIGDATA ANALYTICS	PE	3	0	2	0	4	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance knowledge on Bigdata algorithms
22CA5124	CLOUD INFORMATION SECURITY	PE	3	0	2	0	4	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance the knowledge of Information storage and its security
22CA5113	INTERNSHIP/RESEARCH WORK	PROJ	0	0	4	0	2	NA	Retained Course	NA	Entrepreneurship	Enhance Knowledge to design the projects on existing problems
22CA5212	INTELLECTUAL PROPERTY RIGHTS	PC	3	0	0	0	3	NA	Retained Course	NA	Skill Development and Entrepreneurship	Enhance knowledge on IPR to file the patents.
22CA5217	PATTERN RECOGNITION	PE	3	0	2	0	4	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance Knowledge on pattern recognition algorithms.
22CA5221	DATA VISUALISATION	PE	3	0	2	0	4	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance knowledge on various graphs and plots to visualize the data
22CA5225	CLOUD ARCHITECTURES	PE	3	0	2	0	4	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance Knowledge on Cloud Architectures.
22CA5218	DEEP LEARNING	PE	3	0	2	4	5	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance different Deep Learning Algorithms
22CA5222	COGNITIVE COMPUTING	PE	3	0	2	4	5	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance the knowledge of Information

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh
4/3/22

												storage and its security
22CA5226	CLOUD WEB SERVICES	PE	3	0	2	4	5	NA	Retained Course	NA	Employability and Entrepreneurship	Enhance the knowledge of services to develop and storage data in cloud
22CA5214	PROJECT /DISSERTATION WORK	PROJ	0	0	20	0	10	NA	Retained Course	NA	Employability	Enhance Knowledge to design the projects on existing problems

Percentage of Syllabus Revision = 0.52% (1 out of 19)

Percentage of Courses focusing on Employability= 52.63% (10 out of 19)

Percentage of Courses focusing on Entrepreneurship= 78.94% (15 out of 19)

Percentage of Courses focusing on Skill Development = 52.63% (10 out of 19)

Head of the Department 14/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

Reference for Program Structures and Syllabus Revision- B.Sc. (Computer Science)

Course Code	Course Name	Course Category	L	T	P	S	CR	Pre-Requisite	New Course/ Revised Course/ Retained Course	Changes Proposed by	Focused on Employability/Entrepreneurship/Skill Development	Justification
20UC1101	Integrated Professional English	HSS	0	0	4	0	2	NA	New Course	NA	Employability	Covering communication skills for employability
22BC1101	Discrete Mathematics	BS	3	1	0	0	4	NA	New Course	NA	Skill Development	Enhance the skilling and knowledge of coding
22BC1102	Introduction to Problem Solving	PC	3	0	2	4	5	NA	New Course	NA	Employability and skilling	Enhance Programming skills for employability
22BC1103	IT Fundamentals	PC	3	0	2	0	4	NA	New Course	NA	Employability and skilling	Provide basic understanding of operating through for employability
22BC1104	Computer Architecture	PC	3	1	0	0	4	NA	New Course	NA	Employability and skilling	Provide the entire knowledge of software engineering for employability
20UC1202	English Proficiency	HSS	0	0	4	0	2	NA	New Course	NA	Employability	Enhance the knowledge of architecture of computer for employability
22BC1201	Probability and Statistics	BS	3	1	0	0	4	NA	New Course	NA	Employability	Enhance the awareness of environment.
22BC1202	Object Oriented Principles	PC	3	0	2	4	5	NA	New Course	NA	Skill Development and Entrepreneurship	Enhance the skilling and knowledge of coding

Head of the Department 14/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

22BC1203	Data Structures and Algorithms	PC	3	0	2	4	5	NA	New Course	NA	Skill Development and Entrepreneurship	Covering communication skills for employability
22BC1204	Operating System Concepts	PC	3	1	0	0	4	NA	New Course	NA	Skill Development and Entrepreneurship y	Enchance Programming skills for employability
22BC2101	Linear Algebra	BS	3	1	0	0	4	NA	New Course	NA	Employability	Enhance data structure knowledge for employability
22BC2102	Computer Networking Systems	PC	3	0	2	0	4	NA	New Course	NA	Employability and Entrepreneurship	Enhance networking knowledge for employability and Entrepreneurship
22BC2103	Elements of Software Engineering	PC	3	1	0	0	4	NA	New Course	NA	Employability and Entrepreneurship	Enhance knowledge for statistics in term of computer and Entrepreneurship
22BC2104	Database Support Systems	PC	3	0	2	4	5	NA	New Course	NA	Skill Development and Entrepreneurship	Enhance knowledge for human values and professional ethics
21UC1203	Design Thinking & Innovation	HSS	1	0	0	4	2	NA	New Course	NA	Skill Development and Entrepreneurship	Enhance the skilling and knowledge of coding
22BC21I1	Internship-I	PROJ	0	0	4	0	2	NA	New Course	NA	Entrepreneurship	Enhance the knowledge of thinking in respect of start-up

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

21UC0009	Ecology & Environment	BS	2	0	0	0	2	NA	New Course	NA	Employability and Entrepreneurship	Enhance database knowledge for employability and Entrepreneurship
22UC2105	Essential Life Skills	HSS	0	0	4	0	2	NA	New Course	NA	Employability and Entrepreneurship	Enhance scripting knowledge for employability and Entrepreneurship
21UC0010	Universal Human Values & Professional Ethics	HSS	2	0	0	0	2	NA	New Course	NA	Entrepreneurship	Enhance the knowledge of thinking in respect of startup
22BC2201	Microprocessor and Applications	PC	3	0	2	4	5	NA	New Course	NA	Skill Development and Entrepreneurship	Enhance the skilling and knowledge of coding
22BC2202	Cloud Computing	PC	3	0	2	4	5	NA	New Course	NA	Employability and Entrepreneurship	Enhance the knowledge of software development
22BC2203	Theory of Computation	PC	3	1	0	0	4	NA	New Course	NA	Employability and Entrepreneurship	Enhance the knowledge of LINUX operating system for employability and Entrepreneurship
	Foreign Language	HSS	2	0	0	0	2	NA	New Course	NA	Employability and Entrepreneurship	Enhance the knowledge of Information storage for employability and Entrepreneurship

Head of the Department 4/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

22BC31D1	Data Mining & Business Intelligence	DSE	3	0	2	0	4	NA	New Course	NA	Employability, Skill Development and Entrepreneurship	Gain the knowledge of Principals of virtualization for employability and Entrepreneurship
22BC31D2	Big Data Analytics	DSE	3	0	2	4	5	NA	New Course	NA	Employability, Skill Development and Entrepreneurship	Enhance the knowledge of network security for employability and Entrepreneurship
22BC31D3	Introduction to Data Science	DSE	3	0	2	0	4	NA	New Course	NA	Employability, Skill Development and Entrepreneurship	Enhance the knowledge of web development for employability and Entrepreneurship
22BC3101	Artificial Intelligence	PC	3	0	0	0	3	NA	New Course	NA	Employability	Covering communication skills for employability
22BC31I2	Internship-II	PROJ	0	0	4	0	2	NA	New Course	NA	Employability, Skill Development and Entrepreneurship	Enhance the for employability and Entrepreneurship
22BC32D4	Data Visualization	DSE	3	0	2	4	5	NA	New Course	NA	Employability, Skill Development and Entrepreneurship	Enhance the knowledge Entrepreneurship
22BC32D5	Artificial Neural Networks	DSE	3	0	2	4	5	NA	New Course	NA	Employability, Skill Development and	Enhance the knowledge employability and

Head of the Department 4/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

											Entrepreneurship	Entrepreneurship
22BC3201	Machine Learning	PE	3	0	2	0	4	NA	New Course	NA	mployability and Entrepreneurship	Enhance the for employability and Entrepreneurship
22BC32P1	Project Work	PROJ	0	0	12	0	6	NA	New Course	NA	Employability, Skil Development and Entrepreneurship	Enhance the skilling and knowledge of Project

Percentage of Syllabus Revision = 100% (32 out of 32)

Percentage of Courses focusing on Employability= 65.62% (21 out of 32)

Percentage of Courses focusing on Entrepreneurship= 59.37% (19 out of 32)

Percentage of Courses focusing on Skill Development = 43.75% (14 out of 32)

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

Reference for Program Structures and Syllabus Revision- Ph. D (Computer Science): All the following subjects are mapped to employability.

Course Code	Course Name	Course Category	L	T	P	S	CR	Pre-Requisite	New Course/Revised Course/ Retained Course
22CSA101	Software Development and Quality Assurance	PC	4	0	0	0	4	NA	New Course
22CSA102	Network Systems and Protocols	PC	4	0	0	0	4	NA	New Course
22CSA103	Database Management Systems	PC	4	0	0	0	4	NA	New Course
22CSA104	Operating Systems	PC	4	0	0	0	4	NA	New Course
22CSA105	Object Oriented Programming	PC	4	0	0	0	4	NA	New Course
22CSA106	Data Structures	PC	4	0	0	0	4	NA	New Course
22CSA107	Design and Analysis of Algorithms	PC	4	0	0	0	4	NA	New Course
22CSA108	IoT Development and Connectivity	PC	4	0	0	0	4	NA	New Course
22CSA109	Soft Computing Techniques and Applications	PC	4	0	0	0	4	NA	New Course
22CSA110	Advances in Computing	PC	4	0	0	0	4	NA	New Course
22CSA111	Mobile Computing using Cloud	PC	4	0	0	0	4	NA	New Course

Head of the Department 4/12/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)

22CSA112	Data Warehousing and Data Mining	PC	4	0	0	0	4	NA	New Course
22CSA113	Principles of Software Reliability	PC	4	0	0	0	4	NA	New Course
22CSA201	Hadoop and Bigdata	PC	4	0	0	0	4	NA	New Course
22CSA202	Applied Artificial Intelligence	PC	4	0	0	0	4	NA	New Course
22CSA203	Data Analytics	PC	4	0	0	0	4	NA	New Course
22CSA204	Applied Mahine Learning	PC	4	0	0	0	4	NA	New Course
22CSA205	Problem Solving using Python Programming	PC	4	0	0	0	4	NA	New Course
22CSA206	Securing Web Systems and Networks	PC	4	0	0	0	4	NA	New Course
22CSA207	Distributed Databases	PC	4	0	0	0	4	NA	New Course
22CSA208	The Joy of Computing using R programming	PC	4	0	0	0	4	NA	New Course
22CSA209	Applied Deep Learning	PC	4	0	0	0	4	NA	New Course
22CSA210	Cloud Infrastructure with Services	PC	4	0	0	0	4	NA	New Course
22CSA211	Service Management in Cloud Computing	PC	4	0	0	0	4	NA	New Course
22CSA212	Data Management in Cloud Computing	PC	4	0	0	0	4	NA	New Course

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

22CSA213	Securing Cloud Computing Environments	**PC**	**4**	**0**	**0**	**0**	**4**	**NA**	**New Course**

Percentage of Syllabus Revision = 100% (26 out of 26)

Percentage of Courses focusing on Employability= 100% (26 out of 26)

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA101: SOFTWARE TESTING AND QUALITY ASSURANCE

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:

Introduction, Basics of Software Testing, Testing Principles, Goals, Testing Life Cycle, Phases of Testing, Defects, Defect Life Cycle, Defect Report, Test Plan (IEEE format), Importance of testing in software production cycle. Introduction, Need of black box testing, Black box testing Concept, Requirement Analysis, Test case design criteria, Testing Methods, requirement-based testing, Positive & negative testing, Boundary value analysis, Equivalence Partitioning class, state based, or graph based, cause effect graph based, error guessing, documentation testing & domain testing, design of test cases. Black- Box testing. Introduction, Need of white box testing, Testing types, Test adequacy criteria, static testing by humans, Structure - logic coverage criteria, Basis path testing, Graph metrics, Loop Testing, Data flow testing, Mutation Testing, Design of test cases. Testing of Object-oriented systems, Challenges in White box testing. Test organization, Structure of testing, Measurement tools, testing metrics: Type of metric – Project, Progress, Productivity, Metric plan, Goal Question metric model, Measurement in small & large system. Other Software Testing: GUI testing, Validation testing, Regression testing, Scenario testing, Specification based testing, Adhoc testing, Sanity testing, Smoke testing, Random Testing. Software quality, Quality attribute, Quality Assurance, Quality control & assurance, Methods of quality management, Cost of quality, Quality management, Quality factor, Quality management & project management.

Textbooks:

1.Software Testing, Second Edition By: Ron Patton, Pearson Education ISBN-13: 978-0-672-32798-8
2.Software Testing Principles and Tools By M.G. Limaye TMG Hill Publication, ISBN 13:978-0-07-013990-9

References:

1.Metric and Model in Software Quality Engineering, By Stephen H Kan, Pearson Education ISBN 81-297-0175-8
2. Effective methods for software testing by William Perry, Willey Publication, ISBN 81-265-0893-0
3.Foundation of software testing by Dorothy Graham, Erik Van Veenendaal. CENGAGE learning, ISBN 978-81-315-0218-1

14/3/22
Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA102: NETWORK SYSTEMS AND PROTOCOLS

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:

Introduction :- Networks, Network Types, Network Models :-The Protocol Layering , TCP/IP Protocol Suite, The OSI Model, Physical Layer :- Transmission Media - Guided Media, Un-Guided Media Data-Link Layer: Introduction to Data-Link Layer - Introduction, Link-Layer Addressing. Error Detection and Correction - Introduction, Cyclic Redundancy Check. Data Link Control (DLC) - DLC Services. Media Access Control (MAC) - Random Access, Controlled Access. Network Layer: Introduction to Network Layer - Network-Layer Services, Packet Switching, Network-Layer Performance, IPv4 Addresses, Forwarding of IP Packets. Next Generation IP- IPv6 Addressing, The IPv6 Protocol. Network-Layer Protocols - Internet Protocol (IP), Unicast Routing - Introduction, Routing Algorithms- Distance vector and Link State Routing, Unicast Routing Protocols. Transport Layer: Introduction to Transport Layer-Introduction, Transport-Layer Protocols. Transport Layer Protocols-Introduction, User Datagram Protocol(UDP), Transmission Control Protocol(TCP) Application Layer: Standard Client-Server Protocols-World Wide Web and HTTP, FTP, Electronic Mail, Telnet, Secure Shell (SSH), Domain Name System (DNS)

Text Books:

1. Data Communications and Networking, Behrouz A. Forouzan, Fifth Edition, McGrawHill

Reference Books:

1. Computer Networking A Top-Down Approach, James F. Kurose, Keith W. Ross, Sixth Edition, Pearson Education
2. Computer Networks - A Systems Approach, Larry L. Peterson, Bruce S. Davie, Fifth Edition, Morgan Kaufmann

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

220CSA103: DATABASE MANAGEMENT SYSTEMS

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:

Introduction to Databases: Characteristics of the Database Approach, Advantages of using the DBMS Approach, A Brief History of Database Applications, Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System environment, Centralized and Client-Server Architecture for DBMSs. Conceptual Data Modeling: High-Level Conceptual Data Models for Database Design, A Sample Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types, Refining the ER Design, ER Diagrams, Naming Conventions and Design Issues, Relationship Types of Degree Higher Than Two. Relational Database Design Using ER-toRelational Mapping. Relational Model: The Relational Model Concepts, Relational Model Constraints and Relational Database Schemas. Basic SQL: SQL Data Definition and Data Types, Specifying Constraints in SQL, Basic retrieval Queries in SQL ,INSERT, DELETE AND UPDATE Statements in SQL More SQL: More complex SQL retrieval queries Advanced Queries, Specifying constraints as Assertions and Actions as Triggers, Views in SQL Relational Algebra: Unary Relational Operations: Select and Project, Relational Algebra Operations from SetTheory, Binary Relational Operations: Join and Division, Examples of Queries in Relational Algebra. Keys, General definitions of Second and Third Normal Forms , Boyce-Codd Normal Form, Multi valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal FormTransaction Processing: Introduction, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability & Serializability, Transaction Support in SQL. Introduction to Concurrency Control: Two-Phase Locking Techniques for concurrency control: Types of Locks and System Lock Tables, Guaranteeing Serializability by Two-Phase Locking. Introduction to Recovery Protocols: Recovery Concepts, No- UNDO/REDO Recovery Based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging.

Textbooks:

1. Fundamentals of Database Systems, Ramez Elmasri,ShamkantB. Navathe, Seventh edition, Pearson.

Reference Books:

1. Data base System Concepts, Abraham Silberschatz, Henry F Korth, S. Sudarshan, FifthEdition, McGraw Hill.

Head of the Department 04/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA104: OPERATING SYSTEMS

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisites – Nil**

Syllabus:

Overview: Introduction: What Operating Systems Do, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System OperationsOperating System Structures: Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls. Process Management: Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication. Threads: Overview, Multi-core Programming, Multithreading Models. Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms (First-Come, First-Served Scheduling, Shortest-Job-First Scheduling, Priority Scheduling, Round-Robin Scheduling.) Process Synchronization: Background, The Critical-Section Problem, Peterson_s Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors. Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. Memory Management: Main Memory: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table Virtual Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Basic Page Replacement, FIFO Page Replacement, Optimal Page Replacement, LRU Page Replacement, LRU-Approximation Page Replacement, Allocation of Frames, Thrashing. Storage Management: File–System Interface: File Concept, Access Methods, Directory and Disk Structure. File–System Implementation: File-System Structure, File- System Implementation, Directory Implementation, Allocation Methods. Mass-Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, FCFS Scheduling, SSTF Scheduling, SCAN Scheduling, C-SCAN Scheduling, LOOK Scheduling, Selection of a Disk-Scheduling Algorithm.

Text book:

1. Operating System Concepts, Abraham Silberchatz, Peter Baer Galvin, Greg Gagne, Ninth Edition, 2016, Wiley India.

Reference Books:

1. Operating Systems - Internal and Design Principles, William Stallings, Ninth Edition, 2018, Pearson.
2. Operating Systems - Harvey M.Deitel, Paul J Deitel and David R.Choffnes , Third Edition, 2019, Pearson.
3. Operating Systems - A Concept based Approach- D.M. Dhamdhere, Second Edition, 2010, McGraw Hill.

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ◆Approved by AICTE ◆ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA105 - OBJECT ORIENTED PROGRAMMING

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:

Introduction. Object Oriented Programming Class Fundamentals, Object & Object reference, Object Life time & Garbage Collection, Creating and Operating Objects , Constructor & initialization code block, Access Control, Modifiers, methods Nested , Inner Class &Anonymous Classes ,Abstract Class & Interfaces Defining Methods, Argument Passing Mechanism , Method Overloading, Recursion, Dealing with Static Members, Finalize() Method, Native Method. Use of "this "reference, Use of Modifiers with Classes & Methods, Design of Accessors and Mutator Methods Cloning Objects, shallow and deep cloning, Generic Class Types. Extending Classes and Inheritance Use and Benefits of Inheritance in OOP, Types of Inheritance in Java, Inheriting Data members and Methods, Role of Constructors in inheritance, Overriding Super Class Methods ,Use of "super" , Polymorphism in inheritance ,Type Compatibility and Conversion Implementing interfaces. Package Organizing Classes and Interfaces in Packages , Package as Access Protection , Defining Package ,CLASSPATH Setting for Packages , Making JAR Files for Library Packages Import and Static Import Naming Convention For Packages. Exception Handling:Exceptions & Errors ,Types of Exception ,Control Flow In Exceptions, JVM reaction to Exceptions ,Use of try, catch, finally, throw, throws in Exception Handling ,In-built and User Defined Exceptions, Checked and Un-Checked Exceptions. Array & String : Defining an Array, Initializing & Accessing Array, Multi –Dimensional Array, Operation on String, Mutable & Immutable String, Using Collection Bases Loop for String, Tokenizing a String, Creating Strings using StringBuffer . Thread : Understanding Threads , Needs of Multi-Threaded Programming ,Thread Life-Cycle, Thread Priorities ,Synchronizing Threads, Inter Communication of Threads ,Critical Factor in Thread –DeadLock,) The Collection Framework : Collections of Objects , Collection Types, Sets , Sequence, Map, Understanding Hashing, Use of ArrayList & Vector. Event Handling Event-Driven Programming in Java, Event- Handling Process, Event- Handling Mechanism, The Delegation Model of Event Handling, Event Classes, Event Sources, Event Listeners, Adapter Classes as Helper Classes in Event Handling. Database Programming using JDBC Introduction to JDBC,JDBC Drivers & Architecture, CURD operation Using JDBC, Connecting to non-conventional Databases. Java Server Technologies Servlet Web Application Basics, Architecture and challenges of Web Application, Introduction to servlet, Servlet life cycle, Developing and Deploying Servlets, Exploring Deployment , Descriptor (web.xml), Handling Request and Response.

Textbooks:

1. "Java: Object-Oriented Programming in Java" by Kamthane
2. "Java Programming: From the Beginning" by K. N. King
3. Beginning Java 8 Fundamentals: Language Syntax, Arrays, Data Types, Objects, and Regular Expressions, by Kishori Sharan:

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA106: DATA STRUCTURES

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisites :Nil**

Syllabus:

Introduction: Algorithm Specification, Time complexity & space complexity and their notations. Recursion: What is Recursion, Why Recursion, Format of a Recursive function, Recursion and memory, Recursion Vs. Iteration, Examples Sorting and Searching: Searching- Linear and Binary search algorithms, Sorting- Bubble, Insertion, Selection, Merge, Quick sort algorithms. Linked lists: Single linked list, double linked list, circular linked list, and operations on linked lists. Stacks: Definition, operations: array implementation, linked list implementation and applications. Queues: Definition, operations: array implementation, linked list implementation and applications, Circular Queue. Trees: Introduction- Terminology, representation of trees, binary trees abstract data type, Properties of binary trees, binary tree representation, binary tree traversals In order, preorder, post order, Binary search trees Definition, searching BST, insert into BST, delete from a BST, Height of a BST. AVL Trees – Priority Queue (Heaps) – Binary Heap ,B-Tree – B+ Tree Graphs: The Graph ADT Introduction, definition, graph representation, elementary graph operations BFS, DFS, Minimum Spanning Tree – only: Prim_s and Kruskal_s MST. Topological Sort – Dijkstra's algorithm,Hashing – Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

Text Books :

1. Data Structures and Algorithm Analysis in C, Mark Allen Weiss, Second Edition, 2002, Pearson.
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Third Edition, 2010, PHI.
3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, CareerMonk Publications.

Reference Books:

1. Fundamental of Data Structures in C, Horowitz, Sahani, Anderson-Freed, Second Edition, 2008, Universities Press.
2. Classic Data Structures, Debasis Samantha, Second Edition, 2009, PHI.

Head of the Department 14/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA107: DESIGN AND ANALYSIS OF ALGORITHMS

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisites: Nil**

Syllabus:

Introduction: Notion of Algorithm, Fundamentals of Algorithmic Problem Solving. Fundamentals of the Analysis of Algorithm Efficiency: Analysis framework and Asymptotic Notations and Basic Efficiency Classes, Amortized Analysis. Randomized Algorithms. Sets & Disjoint set union: introduction, union and find operations. Basic Traversal & Search Techniques: Techniques for Graphs, connected components and Spanning Trees, Bi-connected components and DFS.Introduction to Brute Force Technique, Exhaustive Search, Divide and Conquer: Introduction,General Method, Defective chessboard, Merge sort, Quick sort, Binary Search, Finding Maximum and Minimum, Strassen_s Matrix MultiplicationThe Greedy Method: The general Method, container loading, Huffman Trees and codes, Minimum Coin Change problem, Knapsack problem, Job sequencing with deadlines, Minimum Cost Spanning Trees, Single Source Shortest paths. Dynamic Programming: The general method, multistage graphs, All pairs-shortest paths, singlesource shortest paths: general weights, optimal Binary search trees, 0/1 knapsack, reliability Design, The traveling salesperson problem, matrix chain multiplication.Back Tracking: Introduction, n-Queens problem, Sum of subsets, Grapg coloring problem,Hamiltonian cycle. Branch and Bound: Introduction, Assignment problem, FIFO Branch-and-Bound, LC Branch-and-Bound, 0/1 Knapsack problem, Traveling salesperson problem. Introduction to Complexity classes: NP-Hard and NP-Complete problems: Basic concepts, Cook's Theorem. String Matching: Introduction, String Matching-Meaning and Application, Native String Matching Algorithm, Rabin-Karp Algorithm, Knuth-Morris-Pratt Automata, Tries, Suffix Tree.

Textbooks:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, " Fundamentals of Computer Algorithms", 2nd Edition, Universities Press.
2. Harsh Bhasin, " Algorithms Design & Analysis", Oxford University Press.

Reference Books:

1. Horowitz E. Sahani S: "Fundamentals of Computer Algorithms", 2nd Edition, Galgotia Piblications, 2008.
2. S. Sridhar, "Design and Analysis of Algorithms", Oxford University Press.

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA108: IOT DEVELOPMENT AND CONNECTIVITY

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisites –Nil**

Syllabus:

Definition and Characteristics of Internet of Things (IoT) - Challenges and Issues - Physical Design of IoT - Logical Design of IoT - IoT Functional Blocks. Control Units – Communication modules – Bluetooth – Zigbee – WiFi – GPS - IoT Protocols (IPv6, 6LoWPAN, RPL, CoAP) – MQTT - Wired Communication - Power Sources. Four pillars of IoT paradigm: RFID, Wireless Sensor Networks, Supervisory Control and Data Acquisition (SCADA) - M2M - IoT Enabling Technologies: BigData Analytics, Cloud Computing, Embedded Systems. Working principles of sensors – IoT deployment for Raspberry Pi /Arduino/Equivalent platform – Reading from Sensors, Communication: Connecting microcontroller with mobile devices - Communication through Bluetooth - WiFi and USB - Contiki OS - Cooja Simulator.Scalability: Network Configuration Protocol, Open vSwitch Database Management Protocol - Routing and Protocols: Collection Tree, LOADng. Scope of Web of Things (WoT) – IoT Data Management: Set up cloud environment, Cloud access from sensors, Data Analytics Platforms for IOT- Resource Identification: Richardson Maturity Model - REST API. Business models for IoT - Green energy buildings and infrastructure - Smart farming - Smart retailing and Smart fleet management

Text Books

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Thing Wiley Publications, 2012.
2. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,‖IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, 1stEdition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978-9386873743)

Reference Books

1. ArshdeepBahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014
2. Srinivasa K G, Internet of Things, CENGAGE Leaning India, 2017

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA109- SOFT COMPUTING TECHNIQUES AND APPLICATIONS

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus: Introduction to Neuro-Fuzzy and soft computing: computing constituents and conventions, characteristics. Fuzzy set theory: basic definitions and terminology, set-theoretic operations, Mf formulation and parameteization. Fuzzy rules and reasoning: extension principles and fuzzy relations, fuzzy if-then rules, fuzzy reasoning. Fuzzy inference systems: mamdani fuzzy models, sugeno fuzzy models, Tsukamoto fuzzy models, other considerations. Regression and optimization: least-squares methods for system identification. Introduction,basics of matrix manipulation and calculus, least-square estimator, geometric interpretation of LSE, recursive least squares estimator, recursive LSE for time varying systems, statistical properties and maximum likelihood estimator, LSE for nonlinear models. Derivative-based optimization: introduction, descent methods, the method of steepest descent, newtons methods, step-size determination, conjugate gradient methods, analysis of quadratic case, non linear least square problems, incorporation of stochastic mechanisms. Derivative-free optimization: introduction, genetic algorithms, simulated annealing, random search, downhill simple search. Neural Networks: Adaptive networks, supervised learning neural networks, unsupervised learning and other neural networks. neuro-fuzzy modeling: ANFIS, Coative Neuro-Fuzzy Modeling: Towards Generalized ANFIS. Advanced Neuro-Fuzzy modeling: classification and regression trees, data clustering algorithms, rule based structure identification. Neuro Fuzzy control: ANFIS: introduction, architecture, hybrid learning algorithm, learning methods that cross fertilize ANFIS and RBFN, ANFIS as a universal approximation. Simulation examples: example 1.Modeling a two-input sinc function, Example 2. Modeling a three input non-linear function, example 3. On-line identification in control systems, example 4. Predicting chaotic time series. coactive neuro-fuzzy modeling: Towards Generalized ANFIS: introduction, framework, neuron functions for adaptive networks, neuro-fuzzy spectrum, analysis of adaptive learning capability. NEURO-FUZZY CONTROL-I Introduction, framework, control systems and neuro-fuzzy control, expert control, inverse learning, specialized learning, back-propagation through time and real-time recurrent learning. NEURO-FUZZY CONTROL-II : Introduction, Reinforcement learning control, Gradient-free optimization, Gain Schediling, Feedback Linearization and Sliding Control. GENETIC ALGORITHMS: A Genetic Introduction to Genetic Algorithms: What are Genetic Algorithms, Robustness of Traditional Optimization and search methods, goals of Optimization, How genetic algorithms different from traditional methods, A Simple Genetic Algorithm, Genetic Algorithms at work. Genetic Algorithms Revisited: Mathematical Foundations Computer implementation of a genetic algorithm. Advanced Operations and Techniques in Genetic Search: Introduction to Genetics based Machine Learning, Applications of Genetics based Machine Learning.

Textbooks:

1. Neuro-Fuzzy And Soft Computing BY "J-S.R.Jang, Ct. Sun, E.Mizutani" Prentic-Hall Of India Private Limited Publications.
2. Genetic Algorithms BY "David E. Goldberg" Pearson Education.

REFERENCES:

1. Neural Networks and Learning Machines By "Simon Haykin"3rd Edition, Phi Publication.
2. Fuzzy Sets and Fuzzy Logic By "George J. Klir|Bo|Yuan" In Phi Publications

Head of the Department 4/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA110: ADVANCES IN COMPUTING

L-T-P-S: 4-0-0-0 **Credits: 3** **Prerequisites –Nil**

Syllabus:

Introduction to Advances in Computing - Overview of modern computing paradigms - Historical developments and key breakthroughs - Current trends and challenges in computing High-Performance Computing Parallel computing architectures: Distributed systems and clusters, GPU computing and acceleration - Performance optimization techniques Quantum Computing: Basics of quantum mechanics, Quantum algorithms and programming, Quantum cryptography and secure communication, Quantum computing applications Cloud Computing and Big Data: Cloud service models (SaaS, PaaS, IaaS), MapReduce and Hadoop,Data storage and processing in the cloud,Big data analytics and real-world applications,Cyber-Physical Systems:Embedded systems and sensor networks,Cybersecurity for IoT, Smart cities and applications. Soft Computing and Artificial Intelligence: Introduction of Soft Computing, Soft Computing vs. Hard Computing, Various Types of Soft Computing Techniques, Applications of Soft Computing, AI Search Algorithm, Predicate Calculus, Rules of Interference, Semantic Networks, Frames, Objects, Hybrid Models.

Text Books:

1.Quantum Computing: A Gentle Introduction" by Eleanor G. Rieffel and Wolfgang H. Polak: The MIT Press, 1st Edition (2011)
2. Soft Computing: Techniques and Applications by Debasis Ghosh and Ashish Ghosh
3. "Introduction to Parallel Computing" by Ananth Grama, Anshul Gupta, George Karypis, and Vipin Kumar.

Reference Books:

1. "Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers" by Barry Wilkinson and Michael Allen

2. "Quantum Computation and Quantum Information" by Michael A. Nielsen and Isaac L. Chuang, Cambridge University Press,Edition: 10th Edition (2020)

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA111 MOBILE COMPUTING USING CLOUD

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS. Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations. Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment. Introduction To Cloud Computing: Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning. Cloud Enabling Technologies Service Oriented Architecture: REST and Systems of Systems – Web Services – Publish, Subscribe Model – Basics of Virtualization – Types of Virtualizations – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices –Virtualization Support and Disaster Recovery. Cloud Architecture, Services and Storage: Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds – laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3. Cloud Technologies And Advancements Hadoop: MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

Text books:

1. J. Schiller, Mobile Communications, Addison Wesley.
2. A. Mehrotra, GSM System Engineering.
3. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
4. 4.Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
5. Rittinghouse, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Security, CRC Press, 2017.

Reference books:

1. lan Foster, et al.,"The Open Grid Services Architecture", Version 1.5 (GFD.80). Open Grid Forum, 2006.
2. RajkumarBuyya. High Performance Cluster Computing: Architectures and Systems. PrenticeHall India, 1999.

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA112 DATA WAREHOUSING AND DATA MINING

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:

Data Warehousing and Online Analytical Processing: Data Warehouse: Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation. Introduction: Fundamentals of data mining: Kinds of data, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Discretization. Mining Frequent Patterns, Associations, and Correlations: Basic Concepts, Frequent Item Set Mining Methods. Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule Based Classification. Cluster Analysis: Basic Concepts and Methods, Cluster Analysis, Partitioning Methods: k-means and k-mediods, Hierarchical Method: Agglomerative Hierarchical clustering (BIRCH), Density-Based Methods: DBSCAN, Grid-based Methods. Outlier Detection: Outliers and Outlier Analysis, Outlier Detection Methods. Data Mining Trends: Mining Complex Data Types, Other Methodologies of Data Mining.

Text Books:

1. Data Mining – Concepts and Techniques – 3/e, Jiawei Han , Micheline Kamber & Jian Pei- Elsevier.

Reference Books:

1. Introduction to Data Mining with Case Studies – 2nd Edition, G.K.Gupta, PHI
2. Introduction to Data Mining: Pang-Ning Tan, Michael Steinbach, Vipin Kumar,Pearson.
3. Data Mining Techniques – ARUN K PUJARI, University Press.
4. Data Warehousing in the Real World, SAM ANAHORY & DENNIS MURRAY, Pearson Edn. Asia.

Head of the Department 3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ◆Approved by AICTE ◆ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA113 PRINCIPLES OF SOFTWARE RELIABILITY

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisites –Nil**

Syllabus:

Basic Ideas of Software Reliability, Hardware reliability vs. Software reliability, Reliability metrics, Failure and Faults – Prevention, Removal, Tolerance, Forecast, Dependability Concept – Failure Behaviour, Characteristics, Maintenance Policy, Reliability and Availability Modeling, Reliability Evaluation Testing methods, Limits, Starvation, Coverage, Filtering, Microscopic Model of Software Risk. Computation of software reliability, Functional and Operational Profile, Operational Profiles – Difficulties, Customer Type, User Type, System Mode, Test Selection - Selecting Operations, Regression Test. Classes of software reliability Models, Time Dependent Software Reliability Models: Time between failure reliability Models, Fault Counting Reliability Models. Time Independent Software Reliability Models: Fault injection model of Software Reliability, Input Domain Reliability Model, Orthogonal defect classification, Software availability Models. Software Reliability Modeling: A general procedure for reliability modelling Short and Long Term Prediction, Model Accuracy, Analysing Predictive Accuracy – Outcomes, PLR, U and Y Plot, Errors and Inaccuracy, Recalibration – Detecting Bias, Different Techniques, Power of Recalibration, Limitations in Present Techniques, Improvements.

Text Books:

1. System Software Reliability - Hoang Pham, Springer, 2006.
2. An Introduction to Reliability and Maintainability Engineering- Charles E. Ebeling, Tata McGraw-Hill Edition, 2000.

Reference Books:

1. Software Reliability Engineering, Michael R. Lyu, McGraw-Hill Inc.,US; Har/Cdr edition
2. Software Reliability Engineering: More Reliable Software, Faster and Cheaper, John D. Musa, McGraw Hill Education (India) Private Limited, 2004 edition.

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA201: HADOOP AND BIGDATA

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisites – Nil**

Syllabus: Understanding Big Data: Definition of Big Data, Types of Big Data, How Big Data is Generated, Different source of Big Data Generation, Rate at which Big Data is being generated, Different V's, How a single person is contributing towards Big Data, Significance for Big Data, Reason for Big Data, Understanding RDBMS and why it is failing to store Big Data, Future of Big Data, Maintenance/storage of Big data, Big Data use cases for major IT Industries. **Introduction to Hadoop:** What is Hadoop, Apache Community, History of Hadoop, How is Hadoop Important, Apache Hadoop Ecosystem, Hadoop Architecture, Difference between Hadoop 1.x, 2.x and 3.x Architecture, Master-Slave Architecture, Advantages of Hadoop. HDFS and its features, Map Reduce and its features, Map Reduce V1 vs. Map Reduce V2, Hadoop YARN-job scheduling in YARN, storage options in HADOOP – File Formats & Compression Formats, Encryption, and User Authentication. **Introduction to Spark:** What is Spark, history of Spark, Theoretical concepts in Spark – Resilient distributed datasets, Directed acyclic graphs, Spark Context, Spark Data Frames, Actions and Transformations, Spark deployment options, Spark APIs. Core Components in Spark – Spark Core, Spark SQL, Spark Streaming, GraphX, MLib. The Architecture of Spark. **Big Data Analytics with Hadoop plus Spark:** Limitations of Hadoop, Overcoming limitations of Hadoop, Spark solutions, spark practical on big data analytics, Hadoop Practical on Big data analytics, Hadoop vs. Spark, Why Hadoop plus Spark – Hadoop features, Spark features. Installing Hadoop plus Spark Clusters

Text Books:

1. Big Data Analytics , Venkat Ankam , Packt Publishing,2018.
2. Big Data Analytics with Hadoop 3.0 , Sridhar Alla, Packt Publishing

Reference Books:

1. Practical Big Data Analytics , Nataraj Dasgupta , Packt Publishing,2018
2. Hadoop: The Definitive Guide , Tom White , O'REILLY ,2015

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA202:APPLIED ARTIFICIAL INTELLENGENCE

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisites – Nil**

Syllabus :

Overview and Historical Perspective, Turing test, Physical Symbol Systems and the scope of Symbolic AI, Agents. State Space Search: Depth First Search, Breadth First Search, DFID. Heuristic Search: Best First Search, Hill Climbing, Beam Search, Tabu Search. Randomized Search: Simulated Annealing, Genetic Algorithms, Ant Colony optimization. Finding Optimal Paths: Branch and Bound, A*, IDA*, Divide and Conquer approaches, Beam Stack Search. Problem Decomposition: Goal Trees, AO*, Rule Based Systems, Rete Net. Game Playing: Planning and Constraint Satisfaction: Domains, Forward and Backward Search, Goal Stack Planning, Plan Space Planning, Graph plan, Constraint Propagation. Logic and Inferences: Propositional Logic, First Order Logic, Soundness and Completeness, Forward and backward chaining.Knowledge and reasoning: knowledge based agents, Logic, propositional logics and horn clauses, first order logic, Inference in first order logic, Propositional versus first order inference, unification and lifting, forward & backward chaining, resolution. Handling Uncertainty: Quantifying uncertainty, basic probability notation, Baye's theorem, Probabilistic reasoning, representation of conditional distributions, probabilistic reasoning overtime, hidden markov model, Kalman filters Knowledge and reasoning: knowledge-based agents, Logic, propositional logics and horn clauses, first order logic, Inference in first order logic, Propositional versus first order inference, unification and lifting, forward & backward chaining, resolution. Heuristic Search Techniques: Greedy BFS, A*, memory bounded, heuristic functions. Local &Adversarial search: Optimization problems, hill climbing search, simulated annealing, local beam search, genetic algorithms. Online search agents and unknown environments. Optimal decisions in games, alpha-beta pruning, cutting of search, forward pruning, stochastic games, partially observable games. Handling Uncertainty: Quantifying uncertainty, basic probability notation, Baye's theorem, Probabilistic reasoning, representation of conditional distributions, probabilistic reasoning overtime, hidden markov model, Kalman filters , well defined problems and solutions with examples. Applications of AI:- ANN, Fuzzy Systems, NLP, Introduction to Expert systems. Uninformed search strategies-BFS, DFS, Iterative deepening, bidirectional search.

Text Books :

1. Deepak Khemani.A First Course in Artificial Intelligence, McGraw (India), 2013. Hill Education
2. Artificial Intelligence a Modern Approach by Peter Norvig and Andrew Rusell,Third Edition, Prentice Hall.

Reference Books :

1. Stefan Edelkamp and Stefan Schroedl. Heuristic Search: Theory and Applications, Morgan Kaufmann, 2011.

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA203: DATA ANALYTICS

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisites – Nil**

Syllabus:

Programming Essentials in Python Cisco Networking Academy netacad.com Python Essentials , Introduction to Python and computer programming • , Data types, variables, basic input-output operations, basic operators • , Boolean values, conditional execution, loops, lists and list processing, logical and bitwise operations •, Functions, tuples, dictionaries, and data processing • M¨ogliche Zertifizierung: PCEP Python, packages, string and list methods, and exceptions • , The object-oriented approach: classes, methods, objects, and the standard objective features; exception handling, and working with files • M¨ogliche Zertifizierung: PCAStatistical Thinking in the Age of Big Data. Exploratory Data Analysis, The Data Science Process, Machine Learning Algorithms, Linear Regression, k-Nearest Neighbors (k-NN), k-means, Logistic Regression, Python Language Basics, IPython, and Jupyter Notebooks: The Python Interpreter, IPython Basics, Python Language Basics, Built-in Data Structures, Functions, and Files, NumPy Basics: Arrays and Vectorized Computation, Introduction to pandas Data Structures, Essential Functionality, Summarizing and Computing Descriptive Statistics Data Loading, Storage, and File Formats: Reading and Writing Data in Text Format, Binary Data Formats, Interacting with Web APIs, Interacting with Databases Data Cleaning and Preparation: Handling Missing Data, Data Transformation, String Manipulation, Data Wrangling: Join, Combine, and Reshape, Hierarchical Indexing, Combining and Merging Datasets, Reshaping and Pivoting,Plotting and Visualization: A Brief matplotlib API Primer, Plotting with pandas and seaborn Other Python Visualization Tools.Data Aggregation and Group Operations: GroupBy Mechanics, Data Aggregation, Apply: General split-apply-combine, Pivot Tables and Cross-Tabulation, Time Series: Date and Time Data Types and Tools, Time Series Basics, Date Ranges, Frequencies, and Shifting, Time Zone Handling, Periods and Period Arithmetic, Resampling and Frequency Conversion, Moving Window Functions.

Text Books:

1. Doing Data Science: Straight Talk From The Frontline, 1st Edition, Cathy O'Neil and Rachel Schutt, O'Reilly, 2013.
2. McKinney, W. (2012). Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. " O'Reilly Media, Inc.".

Reference Books:

1. Anderson Sweeney Williams (2011). Statistics for Business and Economics. "Cengage Learning".

Head of the Department 9/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA204: APPLIED MACHINE LEARNING

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisites –Nil**

Syllabus:

Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias. Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning. Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks. einforcement Learning – Introduction, the learning task, Q– learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.Evaluation Hypotheses –Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm. Computational learning theory –Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms. Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Textbooks:

1. Machine Learning – Tom M. Mitchell, - MGH

Reference Books:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA205 PROBLEM SOLVING USING PYTHON PROGRAMMING

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:

Introduction to Computers, Characteristics of Computers, Uses of Computers,Types and Generations of Computers ,Units of a computer, CPU, ALU, Memory Hierarchy, Registers, I/O devices, Concept of problem solving , Problem definition, Program design, Debugging, Types of errors in programming, Documentation, Algorithms, Flowchart, Flowchart using Raptor Tool , Pseudocode, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming , Structure of a Python Program, Elements of Python , Python Interpreter, Using Python as calculator,Python shell, Indentation, Atoms, Identifiers and keywords , Literals, Strings, Types of Operators, Input and Output Statements,Conditional Statements Control statements : while and for statements, nested loops, Difference between break, continue and pass, Lists, Tuples, Dictionary, Date and time Defining Function, User-Defined Functions, Passing Arguments and Lambda Functions, Creating class and objects, Constructors, Getter and setter methods, static methods, Inheritance, Exception Handling, Modules, import statement, Packages, File handling, Event Driven Programming, GUI Programming , Database Programming,Data Analytics with Python Client server programming with Python, Internet Data Handling and web Programming,The Process of Computational Problem Solving, Python, Programming Language, Python Data Types: Expressions, Variables and Assignments, Strings, List, Objects and Classes, Python Standard, Library, Imperative Programming: Python programs, Execution Control, Structures, User-Defined Functions, Python Variables and Assignments, Parameter Passing. Strings, Formatted Output, Files, Errors and Exception,Handling, Execution and Control Structures: if Statement, for Loop, Two Dimensional Lists, while Loop, More Loop Patterns, Additional, Iteration Control Statements, Containers and Randomness:Dictionaries, Other Built-in Container Types, Character Encoding and Strings, Module random, Set Data Type.Numerical Computing in Python: NumPy, Vectorized Algorithms, Graphical User Interfaces: Basics of tkinter GUI Development, Event- Based tkinter Widgets, Designing GUIs, OOP for GUI, The Web and Search: The World Wide Web, Python WWW API, String Pattern Matching,Database Programming in Python

Textbooks:

1. Ljubomir Perkovic, "Introduction to Computing Using Python: An Application Development Focus", Wiley, 2012.
2. R. Nageswara RaoCore Python Programming Paperback, 2018
3. Yashavant Kanetkar Let Us Python, 2019

Reference Books:

1. S.Kuppuswamy, S.Malliga, C.S.Kanimozhi Selvi, K.Kousalya. Problem Solving and Programming. 2019, Tata McGraw Hill.

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh
13/22

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA206: SECURING WEB SYSTEMS AND NETWORKS

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:

Web Basics: HTML, CSS, JS, URLs, DOM, Frames, HTTP, Navigation, X-Domain communication, web security, Security elements, Implementation of safety assessment, understanding the dangers of an insecure communication channel, Network Attacks & HTTPS, HTTPS deployment, HTTPS impact on your application, Insights into the latest evolutions for HTTPS deployments, Limitations of HTTPS, Cookie Flaws and Server Misconfiguration. Security of Browser same origin policy, sandbox browser, malicious URL intercept, Rapid development of browser security, cross-site scripting attack, Advanced XSS attack, XSS defence, Cross-Site Request Forgery, Advanced CSRF defence, Clickjacking, HTML5 Securities, other security problems. Injection Attacks, SQL injection attacks, Database attacking techniques properly defending against SQL injection and other injection, File Upload Vulnerability, designing secure file upload features, Authentication and session management, Attacks on User Interfaces, Access control, Encryption algorithms and random numbers, Web framework security, Application-layer Denial-of-Service Attacks, PHP security, TCP Reset Attack. Security of Internet Business, Business logic security, How the account is stolen, Internet garbage phishing, User privacy protection ,Security development lifecycle, Security operations, Process of vulnerability patch, security monitoring, Practical ways to secure the authentication process, prevent authorization bypasses and harden session management mechanisms (10) security planning, business continuity planning, Handling incidents Risk Analysis, Dealing with disaster: privacy on the web, Privacy impacts of emerging technologies, Handling incidents, Risk Analysis, Dealing with disaster: privacy on the web, Privacy impacts of emerging technologies, Browser Design & Flaws.

Text Books:

1. Andrew Hoffman, Web Application Security: Exploitation and Countermeasures for Modern Web Applications (1 ed.), O'Reilly Media, 2020. ISBN 978- 1492053118.

Reference Books:

1. Malcolm McDonald, Web Security for Developers (1 ed.), No Starch Press, 2020. ISBN 9781593279957.

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA208: THE JOY OF COMPUTING USING R PROGRAMMING

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:
Introduction, Reserved Words, Variables & Constants, Operators, Operator Precedence, Decision: if…else, if else () Function. for loop, while Loop, break & next, repeat Loop. Functions, Function Return Value, Environment & Scope, Recursive Function, R Infix Operator, switch, Vectors, Matrix, List, Data Frame, Factor. Descriptive statistics in R: Introduction, Data, Minimum and maximum, Range, Mean, Median, Mode, First and third quartile, other quartiles, Interquartile range, Standard deviation, and variance. Histogram, Bar plot, Coefficient of variation, Boxplot, Contingency table – Mosaic Plot. Probability Distributions – Binomial, Bernoulli, Geometric, Poisson, Exponential, Normal, Uniform distributions. Correlation & Regression - Introduction, Correlation & Regression plot - Scatterplot, Line plot, Classification using logistic regression. Hypothesis testing – Introduction, Hypothesis tests - Proportions, Diff between props, Mean, Diff between means, Diff between pairs, Goodness of fit test- Chi- square test.

Text Books:

1. Vincent Zoonekynd, Statistics With R
2. Salvatore S. Mangiafico, Summary and Analysis of Extension Program Evaluation in R.
3. Hadley Wikham & Garrett Grolemund, R for Data Science, O'Reilly Publications

Reference Books:

1. Garrett Grolemund, Hands-On Programming with R, O'Reilly publications
2. Nina Zumel, Jahn Mount, Practical Data Science with R, dreamtech press
3. Winston Chang, R Graphics Cookbook, O'Reilly Publications

Head of the Department 18/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ◆Approved by AICTE ◆ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA209 – APPLIED DEEP LEARNING

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:

Feed forward networks and training, Machine learning vs and Deep learning, Activation functions, initialization, regularization, batch normalization, model selection, ensemble techniques, Convolutional neural networks, Fundamentals, architectures, pooling, visualization Deep learning for spatial localization, Transposed convolution, efficient pooling, object detection, semantic segmentation. Recurrent neural networks Recurrent neural networks (RNN), long-short term memory (LSTM), language models, machine translation, image captioning, video processing, visual question answering, video processing, and learning from descriptions Deep generative models, Boltzmann Machine and Auto-encoders, variational auto- encoders, generative adversarial networks, autoregressive models, generative image models. Deep reinforcement learning, Temporal difference learning, Policy gradient methods, Q-learning, Deep Q-Learning.

Textbook:

1.Goodfellow, Y. Bengio, A. Courville, Deep Learning, MIT Press, 2016. http://www. deeplearningbook.org.

Reference Book:

1) François Chollet , Deep learning with Python, 2017 Manning publications

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA210: CLOUD INFRASTRUCTURE WITH SERVICES

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:

Introduction to cloud computing: Definition, roots of clouds, characteristics, Cloud Architecture-public, private, hybrid, community, Advantages & Disadvantages of cloud computing. Virtualization: benefits&drawbacks of virtualization, Virtualization types-operating system virtualization, platform virtualization, storage virtualization, network virtualization, application virtualization, virtualization technologies. Cloud Computing Architecture: Cloud computing stack: Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services; Service Models (XaaS): Infrastructure as a Service (IaaS), Platform as a Service(PaaS), Software as a Service(SaaS); Deployment Models: Public cloud, Private cloud, Hybrid cloud, Community cloud. Accessing the cloud: Hardware and infrastructure requirements; Access Mechanisms: web Applications, web APIs. web Browsers. Cloud Storage and cloud Standards: Overview; Storage as a Service; Cloud Storage issues; Challenges; Standards. Security Issues: Securing the Cloud. Securing Data, Establishing identity and presence. Developing Applications: Major Players in Cloud Business; Overview of Service Oriented Architecture; Tools for developing cloud services and applications.

Text books:

1. Arshadeep Bagha,vijay Madisetti, Cloud computing-A Hands-on Approach, University press ,2014

2. Books l. Arrthony T. Velte, Toby J. Velte, and Robert Elsenpeter, Cloud Computing: A Practical Approach, McGraw Hill, 2010.

Reference Books:

1. Rajkumar Buyya, JamesBroberg. Andrzej Goscinski (Editors), Cloud Computing: Principles and Paradigms, Wiley,2011.

2. Cloud Computing Bible, Barrie Sosinsky, Wiley-india, 2010.

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ◆Approved by AICTE ◆ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA211 SERVICE MANAGEMENT IN CLOUD COMPUTING

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:

Introduction to Cloud Computing and Service Management, Overview of Cloud Computing: Concepts, characteristics, and deployment models. Introduction to Service Management in Cloud Computing. Cloud Service Models Understanding and comparing IaaS, PaaS, SaaS, and FaaS.Service Catalog Management: Service definition, publication, and updates. Service Management in Cloud Computing: Service Level Agreements (SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously, Managing Data, Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing.IT Service Management (ITSM) in the Cloud: ITIL (Information Technology Infrastructure Library) in the Cloud. Best practices for IT Service Management in a Cloud environment. Cloud Service Provisioning and Orchestration: Automated provisioning and deprovisioning of cloud resources. Service Orchestration and workflow automation. Cloud Service Security and Compliance: Security challenges and solutions in the cloud.Compliance and regulatory considerations for cloud services. Emerging Trends in Cloud Service Management: Cloud-native technologies and methodologies. Edge computing and its impact on service management.

Text Books:

1. "Cloud Computing: Concepts, Technology & Architecture" by Thomas Erl, et al.
2. "Managing Cloud Services" by Markus Linder.
3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
4. "ITIL Foundation: ITIL 4 Edition" by AXELOS Global Best Practice.

Reference Books:

1. "Cloud Computing: Automating the Virtualized Data Center" by Venkata Josyula and Malcom Orr.
2. "Cloud Security and Governance: Who's on Your Cloud?" by Raj Samani and Jim Reavis.
3. "Cloud Native Transformation: Practical Patterns for Innovation" by Pini Reznik and Jamie Dobson.

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA212- DATA MANAGEMENT IN CLOUD COMPUTING

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:

Overview of cloud computing models (IaaS, PaaS, SaaS) Cloud service providers and offerings Advantages and challenges of cloud computing Types of cloud storage (object, block, file) Cloud storage providers (e.g., AWS S3, Azure Blob Storage) Data consistency and durability in cloud storage, Data retrieval mechanisms (e.g., RESTful APIs) Query languages and tools (e.g., SQL, NoSQL), Indexing and searching in cloud databases . Data Security and Privacy in the Cloud-Cloud security models and responsibilities, Encryption and key management, Compliance and data privacy regulations, Scalability and Performance Optimization, Horizontal and vertical scaling Load balancing and auto-scaling Caching and optimization techniques, Data Backup and Disaster Recovery Backup strategies and best practices, High availability and fault tolerance, Disaster recovery planning in the cloud. Data Analytics and Machine Learning Big data frameworks (e.g., Hadoop, Spark) Cloud-based analytics and machine learning platforms, Data preprocessing and modelling, Serverless Computing and Data Processing Serverless architecture (e.g., AWS Lambda, Azure Functions) Event-driven data processing Stream processing and real-time analytics. Cloud Data Governance and Compliance -Data governance frameworks, Regulatory compliance, Data lifecycle management

Textbooks:

1. "Cloud Computing: Principles and Paradigms" by Rajkumar Buyya, James Broberg, and Andrzej M. Goscinski.

Reference Books:

1. "Amazon Web Services in Action" by Andreas Wittig and Michael Wittig.
2. "Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems" by Martin Kleppmann.

Head of the Department
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

22CSA213- SECURING CLOUD COMPUTING ENVIRONMENTS

L-T-P-S: 4-0-0-0 **Credits:4** **Prerequisite: Nil**

Syllabus:

Introduction to Cloud Security: Overview of cloud computing models (IaaS, PaaS, SaaS), Cloud security responsibilities (shared responsibility model), Key security challenges in the cloud.Cloud Security Models: Public, private, hybrid, and multicloud models,Security considerations for different deployment models,Identity and Access Management (IAM) in the cloud. Threats and Vulnerabilities- Common cloud security threats (e.g., data breaches, DDoS), Vulnerability assessment and risk analysis, Security auditing and compliance Data Security in the Cloud:Encryption and key management, Data masking and tokenization, Data loss prevention (DLP) strategies. Network and Application Security-Virtual private clouds (VPCs) and network security groups, Web application firewall (WAF) and API security,Security in serverless computing. Identity and Access Management: Role-based access control (RBAC), Multi-factor authentication (MFA), Single sign-on (SSO) and identity federation. Cloud Security Monitoring and Incident Response-Security information and event management (SIEM),Cloud-specific monitoring tools,Incident response planning and execution.Compliance and Legal Considerations:Cloud compliance frameworks (e.g., GDPR, HIPAA) International data transfer regulations,Legal aspects of cloud contracts and service-level agreements (SLAs), Cloud Security Best Practices- Security by design principles, DevSecOps and continuous security, Third-party risk assessment and vendor security.

Textbooks:

1. "The Art of Scalability: Scalable Web Architecture, Processes, and Organizations for the Modern Enterprise" by Martin L. Abbott and Michael T. Fisher.

2. "Data Governance: How to Design, Deploy, and Sustain an Effective Data Governance Program" by John Ladley

Reference Books:

1. "Mastering Cloud Computing: Foundations and Applications Programming" by Rajkumar Buyya, Christian Vecchiola, and S. Thamarai Selvi.
2. "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance" by Tim Mather, Subra Kumaraswamy, and Shahed Latif.

Head of the Department 14/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

Department of Computer Science & Applications

Minutes of the DAC meeting held on 11-03-2022

Agenda Items

1. To discuss any proposals for modifications to the existing curriculums of the department.
2. To formulate the eligibility criteria for admissions into BCA, MCA, and Ph. D with Specializations.
3. To Analyze the feedback towards curriculum improvement.

This meeting is chaired by Dr. K. Bhagavan, HOD, Department of Computer Applications.

Members Attended

S.No.	Name of the Member	Designation
1.	Dr. K. Bhagavan	HOD
2.	Dr.V.S.Bhagavan	Professor
3.	Dr.K.Kiran Kumar	Professor
4.	Dr.C.M.Sheela Rani	Professor
5.	Dr.Nitin Tyagi	Professor
6.	Dr.M.N.V. Kiran Babu	Associate Professor
7.	Dr.B.Mouleswara Rao	Associate Professor
8.	Mr.N.Venkata Ramana	Assistant Professor
9.	Mrs.B.Aruna	Assistant Professor
10.	Mr.K. Rohit Kumar	Assistant Professor
11.	Ms.V Nandini	Assistant Professor
12.	Mr.G.Venkateswarlu	Assistant Professor
13.	Ms.Papiya Mukharjee	Assistant Professor
14.	Dr. T. Thiru Venkadam	Assistant Professor
15.	Dr.A.Sabena Banu	Assistant Professor
16.	Dr.V.S.Narayana	Professor
17.	Mr.S.Parabrahma Chari	Assistant Professor
18.	Ms.M.Radha	Assistant Professor

Head of the Department 11/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh

Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ◆Approved by AICTE ◆ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

Recommendations of Department Academic Committee Meeting held on 11/03/2022 at 9.30 a.m

Minutes of Meeting:

The Department Academic Committee has suggested the following changes.

a) DAC suggested to introduce one new css courses in 4th semester of Y22 BCA program which helps to students in interviews.

b) DAC suggested to include Term Paper in 4th semester of BCA program for Y21 batch to gain exposure to perform project in the coming final year.

c) DAC suggested to change the L-T-P-S of Operating Systems and PE2 from 3-0-0-0 to 4-0-0-0 for Y21 batch students.

d) DAC suggested to introduce Internship-2 after completion of the 2nd year for Y21 batch students.

e) DAC suggested to introduce coursera courses based on their specialization for Y21 BCA students.

f) DAC suggested to introduce informal methods like viewing videos, self-study, reading articles, participating in forums and chat rooms, performance support, coaching sessions and game.

g) DAC suggested to combine DTI-1 and DTI-2 into only DTI and schedule this in third semester of the curriculum for Y21 Batch.

h) DAC suggested to start professional electives from 3rd semester based on their specialiations for BCA Y21 regulation.

i) DAC suggested to introduce one CSS course in 2nd semester of MCA course from Y22 regulation.

j) DAC suggeted to identify industry oriented course as a workin lieu course, then students gain knowledge from real world.

k) DAC suggested the department to offer Minor Degree program in Computer Science from Y22 Regulation onwards.

l) DAC suggested to introduce MCA,M.Sc(IT) and BCA(Animation & Gaming) under OL/ODL mode from A.Y 2022-23.

Head of the Department 13/3/22
Computer Science and Applications
Koneru Lakshmaiah Education Foundation
(K.L. Deemed to be University)
Green Fields, Vaddeswaram-522502
Guntur District, Andhra Pradesh