

COURSE HANDOUT

PROGRAM : B. Tech., VIII-Sem., CSE
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Cloud Computing – S157
L-T-P STRUCTURE : 4-1-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Mr. T N V S PRAVEEN
COURSE COORDINATOR : Mr. T N V S PRAVEEN
PRE-REQUISITE:

COURSE OBJECTIVE:

Cloud computing is a scalable services consumption and delivery platform that provides on-demand computing service for shared pool of resources, namely servers, storage, networking, software, database, applications etc., over the Internet. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources, which can be rapidly provisioned and released with minimal management effort. This course will introduce various aspects of cloud computing, including fundamentals, management issues, security challenges and future research trends.

COURSE OUTCOMES (CO)

- CO1: Understand various delivery and deployment models.
CO2: Analyze the virtual machine provisioning and virtualized storage strategies.
CO3: Explore the Platform As A Service based Services.
CO4: Explore the Software As A Service based Services.
CO5: Identify the issues in monitoring and management in cloud environment and also identifying the components for deployment of applications on the cloud.

COURSE ARTICULATION MATRIX (Correlation between COs&POs,PSOs):

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3		1	-	-	-	-	-	-	-	-	1	-	-	1
CO2	3	1	1	-	-	-	-	-	-	-	-	1	-	2	-
CO3	2	-	1	-	-	-	-	-	-	-	-	1	-	2	-
CO4	2	-	1	-	-	-	-	-	-	-	-	1	-	2	-
CO5	2	1	2	-	1	1		-	-	-	-	1	-	2	-

Note: Enter Correlation Levels 1 or 2 or 3. If there is no correlation, put '-'

1- Slight(Low), 2 - Moderate(Medium), 3 - Substantial (High).

BOS APPROVED TEXT BOOKS:

T1 "Cloud Computing: principles and Paradigms", Raj Kumar Bunya, James Bromberg, Andrej Kosciusko, Wiley, New York, USA

BOS APPROVED REFERENCE :

R1 NIST Cloud computing definition, <http://csrc.nist.gov/groups/SNS/cloud-computing/index.html>, 2009.

R2 National Institute of Standards and Technology, <http://www.nist.gov>, 2009.

R3 Financial Services Modernization Act (GrammLeachBliley), Pub. L. No. 106-102, 113 Stat. 1338 (November 12, 1999), codified at 15 U.S.C. yy6801-09.

COURSE DELIVERY PLAN (LESSON PLAN): Section-A

UNIT-I: Foundation, Cloud computing services

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to Subject	1	10-12-18		TLM1	CO1	T1	
2.	Course Outcomes	1	11-12-18		TLM1	CO1	T1	
3.	Introduction to UNIT-I	1	12-12-18		TLM1	CO1	T1	
4.	Foundation : Importance of cloud computing	1	13-12-18		TLM1	CO1	T1	
5.	Introduction to cloud computing	1	14-12-18		TLM1	CO1	T1	
6.	Importance of migration		17-12-18		TLM1,TLM2	CO1	T1	
7.	Migration into a cloud	1	18-12-18		TLM1,TLM2	CO1	T1	
8.	Enriching Integration As a Service		19-12-18		TLM1,TLM2	CO1	T1	
9.	Cloud computing services	1	20-12-18		TLM1,TLM1	CO1	T1	
10.	Roots of cloud computing	1	21-12-18		TLM1,TLM2	CO1	T1	
11.	Challenges of Migration	1	24-12-18		TLM1,TLM2	CO1	T1	
12.	Paradigm for the cloud era	1	26-12-18		TLM1,TLM2	CO1	T1	
13.	Integration with public, homogeneous and heterogeneous	1	27-12-18		TLM1,TLM2	CO1	T1	
14.	Jitter bit in Integration and .NET service Bus,ISB	1	28-12-18		TLM1,TLM2	CO1	T1	
15.	Cloud computing for enterprise applications	1	31-12-18		TLM1,TLM2	CO1	T1	
16.	Adoption strategy and five stages of cloud	1	02-01-19		TLM1,TLM2	CO1	T1	
17.	Tutorial-1	1	03-01-19		TLM3	CO1	T1	
18.	Assignment/Quiz-1	1	04-01-19		TLM6	CO1	T1	
No. of classes required to complete UNIT-I		18			No. of classes taken:			

UNIT-II: Infrastructure as a Service(IaaS)

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
19.	Introduction to UNIT-II	1	07-01-19		TLM1	CO2	T1	
20.	Virtual Machines Provisioning	1	08-01-19		TLM1	CO2	T1	
21.	Migration services	1	09-01-19		TLM1,TLM2	CO2	T1	
22.	On the management of Virtual Machines for cloud infrastructure	1	10-01-19		TLM1,TLM2	CO2	T1	
23.	On the management of Virtual Machines for cloud infrastructure	1	11-01-19		TLM1,TLM2	CO2	T1	
24.	Enhancing cloud computing environments using cluster as a service	1	21-01-19		TLM1,TLM2	CO2	T1	
25.	Secured distributed data storage in cloud computing	1	22-01-19		TLM1,TLM2	CO2	T1	
26.	Secured distributed data storage in cloud computing	1	23-01-19		TLM1,TLM2	CO2	T1	
27.	Tutorial-2	1	24-01-19		TLM3	CO2	T1	
28.	Assignment/Quiz-2	1	25-01-19		TLM6	CO2	T1	
No. of classes required to complete UNIT-II		10			No. of classes taken:			

UNIT-III: Platform and Software as a Service(Aphasia)

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
29.	Introduction to UNIT-III	1	01-02-19		TLM1	CO3	T1	
30.	Aneka	1	04-02-19		TLM1,TLM2	CO3	T1	
31.	Integration of private and public clouds	1	05-02-19		TLM1,TLM2	CO3	T1	
32.	Comet cloud	1	06-02-19		TLM1,TLM2	CO3	T1	
33.	An autonomic cloud engine	1	07-02-19		TLM1,TLM2	CO3	T1	
34.	T-systems	1	08-02-19		TLM1,TLM2	CO3	T1	
35.	Tutorial-3	1	11-02-19		TLM3	CO3	T1	
36.	Cloud based solutions for business applications	1	12-02-19		TLM1,TLM2	CO3	T1	
37.	Work flow engines for clouds	1	13-02-19		TLM1,TLM2	CO3	T1	
38.	Understanding scientific applications	1	14-02-19		TLM1,TLM2	CO3	T1	
39.	Understanding scientific cloud environments	1	15-02-19		TLM1,TLM2	CO3	T1	
40.	The Map reduce programming Model	1	18-02-19		TLM1,TLM2	CO3	T1	

41.	Map reduce implementations	1	19-02-19		TLM1,TLM2	CO3	T1	
42.	Tutorial-4	1	20-02-19		TLM3	CO3	T1	
43.	Assignment/Quiz-3	1	21-02-19		TLM6	CO3	T1	
No. of classes required to complete UNIT-III		14			No. of classes taken:			

UNIT-IV: Monitoring and Management

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
44.	Introduction to UNIT-IV	1	22-02-19		TLM1	CO4	T1	
45.	Monitoring and management	1	25-02-19		TLM1,TLM2	CO4	T1	
46.	An architecture for federated cloud computing	1	26-02-19		TLM1,TLM2	CO4	T1	
47.	An architecture for federated cloud computing	1	27-02-19		TLM1,TLM2	CO4	T1	
48.	SLA management in cloud computing	1	28-02-19		TLM1,TLM2	CO4	T1	
49.	Tutorial-5	1	01-03-19		TLM3	CO4	T1	
50.	A service providers perspective	1	05-03-19		TLM1,TLM2	CO4	T1	
51.	A service providers perspective	1	06-03-19		TLM1,TLM2	CO4	T1	
52.	Performance prediction	1	07-03-19		TLM1,TLM2	CO4	T1	
53.	HPC on clouds	1	08-03-19		TLM1,TLM2	CO4	T1	
54.	Tutorial-6	1	11-03-19		TLM3	CO4	T1	
55.	Assignment/Quiz-4	1	12-03-19		TLM6	CO4	T1	
No. of classes required to complete UNIT-IV		12			No. of classes taken:			

UNIT-V: Applications of Cloud Computing

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
56.	Introduction to UNIT-V	1	13-03-19		TLM1	CO5	T1	
57.	Architecting applications for the Amazon Cloud	1	14-03-19		TLM1,TLM2	CO5	T1	
58.	Massively multiplayer Online Game hosting on Cloud resources	1	15-03-19		TLM1,TLM2	CO5	T1	
59.	Massively multiplayer Online Game hosting on Cloud resources	1	18-03-19		TLM1,TLM2	CO5	T1	
60.	Tutorial-7	1	19-03-19		TLM3	CO5	T1	
61.	Tutorial-8	1	20-03-19		TLM3	CO5	T1	
62.	Building Content delivery networks	1	22-03-19		TLM1,TLM2	CO5	T1	
63.	Building Content delivery networks	1	25-03-19		TLM1,TLM2	CO5	T1	
64.	Resources of Cloud	1	26-03-19		TLM1,TLM2	CO5	T1	

65.	Resource cloud mashups	1	27-03-19		TLM1,TLM2	CO5	T1	
66.	Resource cloud mashups	1	28-03-19		TLM1,TLM2	CO5	T1	
67.	Tutorial-9	1	29-03-19		TLM3	CO5	T1	
68.	Assignment/Quiz-5	1	01-04-19		TLM6	CO5	T1	
No. of classes required to complete UNIT-V		12			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
69.	Research trend in Cloud Computing	1	02-04-19		TLM1			
70.	Open Source and Commercial Clouds, Cloud Simulator	1	03-04-19		TLM1			

Teaching Learning Methods

TLM1	Chalk and Talk	TLM4	Problem Solving	TLM7	Seminars or GD
TLM2	PPT	TLM5	Programming	TLM8	Lab Demo
TLM3	Tutorial	TLM6	Assignment or Quiz	TLM9	Case Study

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment/Quiz – 1	1	A1=5
Assignment/Quiz – 2	2	A2=5
I-Mid Examination	1,2	B1=20
Assignment/Quiz – 3	3	A3=5
Assignment/Quiz – 4	4	A4=5
Assignment/Quiz – 5	5	A5=5
II-Mid Examination	3,4,5	B2=20
Evaluation of Assignment/Quiz Marks: $A=(A1+A2+A3+A4+A5)/5$	1,2,3,4,5	A=5
Evaluation of Mid Marks: $B=75\% \text{ of Max}(B1,B2)+25\% \text{ of Min}(B1,B2)$	1,2,3,4,5	B=20
Cumulative Internal Examination : A+B	1,2,3,4,5	A+B=25
Semester End Examinations	1,2,3,4,5	C=75
Total Marks: A+B+C	1,2,3,4,5	100

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the **engineering and management principles and apply these to one's own work, as a member and leader** in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyze, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

Course Instructor

Course Coordinator

Module Coordinator

HOD

COURSE HANDOUT

PROGRAM : B. Tech., VIII-Sem., CSE
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Cloud Computing – S157
L-T-P STRUCTURE : 4-1-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Mr. LELLA KRANTHI KUMAR
COURSE COORDINATOR : Mr. T N V S PRAVEEN
PRE-REQUISITE:

COURSE OBJECTIVE:

Cloud computing is a scalable services consumption and delivery platform that provides on-demand computing service for shared pool of resources, namely servers, storage, networking, software, database, applications etc., over the Internet. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources, which can be rapidly provisioned and released with minimal management effort. This course will introduce various aspects of cloud computing, including fundamentals, management issues, security challenges and future research trends.

COURSE OUTCOMES (CO)

- CO1: Understand various delivery and deployment models.
CO2: Analyze the virtual machine provisioning and virtualized storage strategies.
CO3: Explore the Platform As A Service based Services.
CO4: Explore the Software As A Service based Services.
CO5: Identify the issues in monitoring and management in cloud environment and also identifying the components for deployment of applications on the cloud.

COURSE ARTICULATION MATRIX (Correlation between COs&POs,PSOs):

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3		1	-	-	-	-	-	-	-	-	1	-	-	1
CO2	3	1	1	-	-	-	-	-	-	-	-	1	-	2	-
CO3	2	-	1	-	-	-	-	-	-	-	-	1	-	2	-
CO4	2	-	1	-	-	-	-	-	-	-	-	1	-	2	-
CO5	2	1	2	-	1	1		-	-	-	-	1	-	2	-

Note: Enter Correlation Levels 1 or 2 or 3. If there is no correlation, put '-'

1- Slight(Low), 2 - Moderate(Medium), 3 - Substantial (High).

BOS APPROVED TEXT BOOKS:

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R2 National Institute of Standards and Technology, <http://www.nist.gov>, 2009.

R3 Financial Services Modernization Act (GrammLeachBliley), Pub. L. No. 106-102, 113 Stat. 1338 (November 12, 1999), codified at 15 U.S.C. yy6801-09.

COURSE DELIVERY PLAN (LESSON PLAN): Section-B

UNIT-I: Foundation, Cloud computing services

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to Subject	1	10-12-18		TLM1	CO1	T1	
2.	Course Outcomes	1	11-12-18		TLM1	CO1	T1	
3.	Introduction to UNIT-I	1	12-12-18		TLM1	CO1	T1	
4.	Foundation : Importance of cloud computing	1	13-12-18		TLM1	CO1	T1	
5.	Introduction to cloud computing	1	14-12-18		TLM1	CO1	T1	
6.	Importance of migration		17-12-18		TLM1,TLM2	CO1	T1	
7.	Migration into a cloud	1	18-12-18		TLM1,TLM2	CO1	T1	
8.	Enriching Integration As a Service		19-12-18		TLM1,TLM2	CO1	T1	
9.	Cloud computing services	1	20-12-18		TLM1,TLM1	CO1	T1	
10.	Roots of cloud computing	1	21-12-18		TLM1,TLM2	CO1	T1	
11.	Challenges of Migration	1	24-12-18		TLM1,TLM2	CO1	T1	
12.	Paradigm for the cloud era	1	26-12-18		TLM1,TLM2	CO1	T1	
13.	Integration with public, homogeneous and heterogeneous	1	27-12-18		TLM1,TLM2	CO1	T1	
14.	Jitter bit in Integration and .NET service Bus,ISB	1	28-12-18		TLM1,TLM2	CO1	T1	
15.	Cloud computing for enterprise applications	1	31-12-18		TLM1,TLM2	CO1	T1	
16.	Adoption strategy and five stages of cloud	1	02-01-19		TLM1,TLM2	CO1	T1	
17.	Tutorial-1	1	03-01-19		TLM3	CO1	T1	
18.	Assignment/Quiz-1	1	04-01-19		TLM6	CO1	T1	
No. of classes required to complete UNIT-I		18			No. of classes taken:			

UNIT-II: Infrastructure as a Service(IaaS)

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
19.	Introduction to UNIT-II	1	07-01-19		TLM1	CO2	T1	
20.	Virtual Machines Provisioning	1	08-01-19		TLM1	CO2	T1	
21.	Migration services	1	09-01-19		TLM1,TLM2	CO2	T1	
22.	On the management of Virtual Machines for cloud infrastructure	1	10-01-19		TLM1,TLM2	CO2	T1	
23.	On the management of Virtual Machines for cloud infrastructure	1	11-01-19		TLM1,TLM2	CO2	T1	
24.	Enhancing cloud computing environments using cluster as a service	1	21-01-19		TLM1,TLM2	CO2	T1	
25.	Secured distributed data storage in cloud computing	1	22-01-19		TLM1,TLM2	CO2	T1	
26.	Secured distributed data storage in cloud computing	1	23-01-19		TLM1,TLM2	CO2	T1	
27.	Tutorial-2	1	24-01-19		TLM3	CO2	T1	
28.	Assignment/Quiz-2	1	25-01-19		TLM6	CO2	T1	
No. of classes required to complete UNIT-II		10			No. of classes taken:			

UNIT-III: Platform and Software as a Service(Aphasia)

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
29.	Introduction to UNIT-III	1	01-02-19		TLM1	CO3	T1	
30.	Aneka	1	04-02-19		TLM1,TLM2	CO3	T1	
31.	Integration of private and public clouds	1	05-02-19		TLM1,TLM2	CO3	T1	
32.	Comet cloud	1	06-02-19		TLM1,TLM2	CO3	T1	
33.	An autonomic cloud engine	1	07-02-19		TLM1,TLM2	CO3	T1	
34.	T-systems	1	08-02-19		TLM1,TLM2	CO3	T1	
35.	Tutorial-3	1	11-02-19		TLM3	CO3	T1	
36.	Cloud based solutions for business applications	1	12-02-19		TLM1,TLM2	CO3	T1	
37.	Work flow engines for clouds	1	13-02-19		TLM1,TLM2	CO3	T1	
38.	Understanding scientific applications	1	14-02-19		TLM1,TLM2	CO3	T1	
39.	Understanding scientific cloud environments	1	15-02-19		TLM1,TLM2	CO3	T1	
40.	The Map reduce programming Model	1	18-02-19		TLM1,TLM2	CO3	T1	

41.	Map reduce implementations	1	19-02-19		TLM1,TLM2	CO3	T1	
42.	Tutorial-4	1	20-02-19		TLM3	CO3	T1	
43.	Assignment/Quiz-3	1	21-02-19		TLM6	CO3	T1	
No. of classes required to complete UNIT-III		14			No. of classes taken:			

UNIT-IV: Monitoring and Management

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
44.	Introduction to UNIT-IV	1	22-02-19		TLM1	CO4	T1	
45.	Monitoring and management	1	25-02-19		TLM1,TLM2	CO4	T1	
46.	An architecture for federated cloud computing	1	26-02-19		TLM1,TLM2	CO4	T1	
47.	An architecture for federated cloud computing	1	27-02-19		TLM1,TLM2	CO4	T1	
48.	SLA management in cloud computing	1	28-02-19		TLM1,TLM2	CO4	T1	
49.	Tutorial-5	1	01-03-19		TLM3	CO4	T1	
50.	A service providers perspective	1	05-03-19		TLM1,TLM2	CO4	T1	
51.	A service providers perspective	1	06-03-19		TLM1,TLM2	CO4	T1	
52.	Performance prediction	1	07-03-19		TLM1,TLM2	CO4	T1	
53.	HPC on clouds	1	08-03-19		TLM1,TLM2	CO4	T1	
54.	Tutorial-6	1	11-03-19		TLM3	CO4	T1	
55.	Assignment/Quiz-4	1	12-03-19		TLM6	CO4	T1	
No. of classes required to complete UNIT-IV		12			No. of classes taken:			

UNIT-V: Applications of Cloud Computing

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
56.	Introduction to UNIT-V	1	13-03-19		TLM1	CO5	T1	
57.	Architecting applications for the Amazon Cloud	1	14-03-19		TLM1,TLM2	CO5	T1	
58.	Massively multiplayer Online Game hosting on Cloud resources	1	15-03-19		TLM1,TLM2	CO5	T1	
59.	Massively multiplayer Online Game hosting on Cloud resources	1	18-03-19		TLM1,TLM2	CO5	T1	
60.	Tutorial-7	1	19-03-19		TLM3	CO5	T1	
61.	Tutorial-8	1	20-03-19		TLM3	CO5	T1	
62.	Building Content delivery networks	1	22-03-19		TLM1,TLM2	CO5	T1	
63.	Building Content delivery networks	1	25-03-19		TLM1,TLM2	CO5	T1	
64.	Resources of Cloud	1	26-03-19		TLM1,TLM2	CO5	T1	

65.	Resource cloud mashups	1	27-03-19		TLM1,TLM2	CO5	T1	
66.	Resource cloud mashups	1	28-03-19		TLM1,TLM2	CO5	T1	
67.	Tutorial-9	1	29-03-19		TLM3	CO5	T1	
68.	Assignment/Quiz-5	1	01-04-19		TLM6	CO5	T1	
No. of classes required to complete UNIT-V		12			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
69.	Research trend in Cloud Computing	1	02-04-19		TLM1			
70.	Open Source and Commercial Clouds, Cloud Simulator	1	03-04-19		TLM1			

Teaching Learning Methods

TLM1	Chalk and Talk	TLM4	Problem Solving	TLM7	Seminars or GD
TLM2	PPT	TLM5	Programming	TLM8	Lab Demo
TLM3	Tutorial	TLM6	Assignment or Quiz	TLM9	Case Study

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment/Quiz – 1	1	A1=5
Assignment/Quiz – 2	2	A2=5
I-Mid Examination	1,2	B1=20
Assignment/Quiz – 3	3	A3=5
Assignment/Quiz – 4	4	A4=5
Assignment/Quiz – 5	5	A5=5
II-Mid Examination	3,4,5	B2=20
Evaluation of Assignment/Quiz Marks: $A=(A1+A2+A3+A4+A5)/5$	1,2,3,4,5	A=5
Evaluation of Mid Marks: $B=75\% \text{ of Max}(B1,B2)+25\% \text{ of Min}(B1,B2)$	1,2,3,4,5	B=20
Cumulative Internal Examination : A+B	1,2,3,4,5	A+B=25
Semester End Examinations	1,2,3,4,5	C=75
Total Marks: A+B+C	1,2,3,4,5	100

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the **engineering and management principles and apply these to one's own work, as a member and leader** in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyze, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

Course Instructor

Course Coordinator

Module Coordinator

HOD

COURSE HANDOUT

PROGRAM : **B.Tech** CSE VIII-Semester. **(A Section)**
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : MANAGING INNOVATION AND ENTREPRENEURSHIP (S296)
L-T-P STRUCTURE : 4-1-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : **K.RAVI KIRAN YASASWI**
COURSE COORDINATOR : **K.RAVI KIRAN YASASWI**
PRE-REQUISITE : To Know the Innovation and entrepreneurship in present changing environment

COURSE OBJECTIVES:

1. To understand the nature of entrepreneurship.
2. To motivate the Entrepreneurial instincts.
3. To give a clear picture about the process and involved in setting up and small scale industrial settings and bigger settings.
4. To make the potential entrepreneurs know about the possible risks and failures of the product make them learn how to overcome these problems

COURSE OUTCOMES (CO's):

At the end of the course, the student will be able to:

- CO1:** Would be in a position to convert and innovative thought into a commercial opportunity, which can boost up the economy.
CO2: Can understand the role of Entrepreneur in present changing Environment
CO3: Will be able to generate ideas for New entries, startups and handling the own enterprise.
CO4: Will be able to develop team building, planning skills and above all broad vision about the Financing and Managing.
CO5: Acquired the skills to handle the major Functional areas like Production management and Marketing management.

COURSE ARTICULATION MATRIX (Correlation between Cos&Pos,PSOs):

COURSE ARTICULATION MATRIX (Correlation between COs&POs,PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C01	1	3	2												
C02					2				3						
C03				1	2					3					
C04					1					2	3				
C05	2										3	2			

Note: Enter Correlation Levels **1** or **2** or **3**. If there is no correlation, put '-'
1- Slight(Low), **2** - Moderate(Medium), **3** - Substantial (High).

BOS APPROVED TEXT BOOKS:**T1:** Hisrich: Entrepreneurship, TMH, New Delhi, 2009.**T2:** "Managing innovation and entrepreneurship in technology based firm", by Martin M.J. 1994, John Wiley.**BOS APPROVED REFERENCE BOOKS:****R1:** Vasanth Desai Entrepreneurship, TMH, New Delhi, 2009**R2:** Rajeev Roy: Entrepreneurship, Oxford University Press, New Delhi, 2010.**R3:** V. Gangadhar, Narsimha Chary: Entrepreneurship Development, Kalyani Publishers, New Delhi, 2007**R4:** P. Narayana Reddy: Entrepreneurship, Cengage Learning, New Delhi, 2010.**COURSE DELIVERY PLAN (LESSON PLAN): Section-A****UNIT-I: Introduction: Creativity and Innovation**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome Cos	Text Book followed	HOD Sign Weekly
1.	Introduction to the topic	01	10-12-2018		TLM1	CO1	T1,R1	
2.	Creativity and Innovation concepts, Shifting	01	11-12-2018		TLM2	CO1	T1,R1	
3.	Composition of the economy	01	12-12-2018		TLM1	CO1	T1	
4.	Purposeful innovation and seven sources of innovative	01	13-12-2018		TLM1	CO1	T1	
5.	Purposeful innovation and seven sources of innovative	01	14-12-2018		TLM1	CO1	T1	
6.	Innovation Process	01	17-12-2018		TLM1	CO1	T1	
7.	Innovation Process	01	18-12-2018		TLM1	CO1	T1	
8.	Innovation Strategies	01	19-12-2018		TLM1	CO1	T1	
9.	Innovation Strategies	01	20-12-2018		TLM1	CO1	T1	
10.	Tutorial-1	01	21-12-2018		TLM3	CO1	T1	
11.	Strategies that aim at Introducing an innovation	01	24-12-2018		TLM1	CO1	T1	
12.	Strategies that aim at Introducing an innovation	01	26-12-2018		TLM1	CO1	T1	
13.	Innovation and Entrepreneurship: can they work together Planning	01	27-12-2018		TLM2	CO1	T1	
14.	Innovation and Entrepreneurship: can they work together Planning	01	28-12-2018		TLM2	CO1	T1	
15.	Incompatible with innovation and entrepreneurship	01	31-12-2018		TLM1	CO1	T1	
16.	Innovation and Entrepreneurship	01	01-01-2019		TLM1	CO1	T1	
17.	Assignment –I	01	02-01-2019		TLM6	CO1	T1	
No. of classes required to complete UNIT-I		17			No. of classes taken:			

UNIT-II : Introduction to Entrepreneurship

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
18.	Introduction to Entrepreneurship, Definition of Entrepreneurship	01	03-01-2019		TLM1	CO2	T1	
19.	Entrepreneurial Traits	01	04-01-2019		TLM1	CO2	T1	
20.	Traditional Entrepreneurship vs. Modern Entrepreneurship	01	07-01-2019		TLM2	CO2	T1	
21.	Entrepreneur vs. Intrapreneur	01	08-01-2019		TLM1	CO2	T1	
22.	The Entrepreneurial decision process	01	09-01-2019		TLM1	CO2	T1	
23.	Role of Entrepreneurship in Economic development, Ethical	01	10-01-2019		TLM2	CO2	T1	
24.	Environmental challenges and Social responsibility of Entrepreneurs	01	11-01-2019		TLM1	CO2	T1	
25.	Environmental challenges and Social responsibility of Entrepreneurs	01	17-01-2019		TLM1	CO2	T1	
26.	Opportunities for Entrepreneurs in India and abroad, Woman as Entrepreneur	01	18-01-2019		TLM1	CO2	T1	
27.	Assignment-II	01	21-01-2019		TLM3	CO2	T1	
28.	Tutorial II,	01	22-01-2019		TLM6	CO2	T1	
No. of classes required to complete UNIT II		11			No. of classes taken:			

UNIT-III : Creating and Starting the Venture

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
29.	Introduction to Creating and starting the venture,	01	23-01-2019		TLM2	CO3	T1	
30.	Introduction to Creating and starting the venture,	01	24-01-2019		TLM1	CO3	T1	
31.	Sources of new ideas	01	25-01-2019		TLM1	CO3	T1	
32.	I Mid Exam		28-01-2019					
33.	I Mid Exam		29-01-2019					
34.	I Mid Exam		30-01-2019					
35.	Generation of new entry Opportunity	01	01-02-2019		TLM1	CO3	T1	
36.	Opportunity Analysis, Creating Problem Solving	01	04-02-2019		TLM1	CO3	T1	
37.	Product Planning and development process	01	05-02-2019		TLM1	CO3	T1	
38.	SWOT analysis	01	06-02-2019		TLM2	CO3	T1	
39.	First mover advantages and disadvantages	01	07-02-2019		TLM1	CO3	T1	
40.	First mover advantages and disadvantages	01	08-02-2019		TLM1	CO3	T1	
41.	Types of business organizations	01	11-02-2019		TLM1	CO3	T1	
42.	Types of business organizations	01	12-02-2019		TLM1	CO3	T1	
43.	Features and evaluation of joint ventures	01	13-02-2019		TLM1	CO3	T1	
44.	Features and evaluation of joint ventures	01	14-02-2019		TLM1	CO3	T1	
45.	Acquisitions	01	15-02-2019		TLM2	CO3	T1	
46.	Acquisitions	01	18-02-2019		TLM1	CO3	T1	
47.	Merges	01	19-02-2019		TLM1	CO3	T1	
48.	Merges	01	20-02-2019		TLM1	CO3	T1	
49.	Franchising	01	21-02-2019		TLM1	CO3	T1	
50.	Tutorial III,	01	22-02-2019		TLM3	CO3	T1	
51.	Assignment-III	01	25-02-2019		TLM6	CO3	T1	
No. of classes required to complete UNIT-III		21			No. of classes taken:			

UNIT-IV : The Business plan, Financing and Managing

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
52.	Nature and Scope of Business Plan	01	26-02-2019		TLM1	CO4	T1	
53.	Writing Business Plan	01	27-02-2019		TLM1	CO4	T1	
54.	Evaluating Business plans	01	28-02-2019		TLM1	CO4	T1	
55.	Using and implementing business plans ,Marketing plan	01	01-03-2019		TLM2	CO4	T1	
56.	Introduction to financial plan and the organizational Launching formalities	01	05-03-2019		TLM2	CO4	T1	
57.	Survival and Success , Sources of capital	01	06-03-2019		TLM1	CO4	T1	
58.	Record keeping , Recruitment	01	07-03-2019		TLM1	CO4	T1	
59.	Motivating and Leading teams	01	08-03-2019		TLM1	CO4	T1	
60.	Financial controls, Tutorial IV	01	11-03-2019		TLM1	CO4	T1	
61.	Marketing and sales Controls	01	12-03-2019		TLM1	CO4	T1	
62.	Ecommerce in Entrepreneurship, Internet advertising	01	13-03-2019		TLM1	CO4	T1	
63.	Tutorial-IV	01	14-03-2019		TLM3	CO4	T1	
64.	Assignment-4	01	15-03-2019		TLM6	CO4	T1	
No. of classes required to complete UNIT IV		13			No. of classes taken:			

UNIT-V : Production and Marketing Management

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
65.	Thrust of production management	01	18-03-2019		TLM2	CO5	T1	
66.	Selection of production techniques	01	19-03-2019		TLM1	CO5	T1	
67.	Selection of production techniques	01	21-03-2019		TLM1	CO5	T1	
68.	Plant utilization and maintenance	01	22-03-2019		TLM1	CO5	T1	
69.	Requirements at work place	01	23-03-2018		TLM1	CO5	T1	
70.	Requirements at work place	01	25-03-2018		TLM1	CO5	T1	
71.	Materials management, Marketing Functions	01	26-03-2018		TLM1	CO5	T1	
72.	Market segmentation	01	27-03-2018		TLM1	CO5	T1	
73.	Market research and channels and channels of distribution	01	28-03-2018		TLM1	CO5	T1	
74.	Sales Promotion and Product pricing,	01	29-03-2018		TLM1	CO5	T1	
75.	Sales Promotion and Product pricing,	01	01-04-2018		TLM1	CO5	T1	
76.	Tutorial -V	01	02-04-2018		TLM3	CO5	T1	
77.	Assignment-V	01	03-04-2018		TLM6	CO5	T1	
78.	II Mid exam		04-04-2018					
79.	II Mid exam		05-04-2018					
No. of classes required to complete Unit-V		13			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
80.	Red bus and Future group business strategy	01	12-12-2018		TLM2	CO5	T1	
81.	Reliance Jio business strategy	01	06-03-2019		TLM2	CO2	T1	

Teaching Learning Methods

TLM1	Chalk and Talk	TLM4	Problem Solving	TLM7	Seminars or GD
TLM2	PPT	TLM5	Programming	TLM8	Lab Demo
TLM3	Tutorial	TLM6	Assignment or Quiz	TLM9	Case Study

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Next semesters Class Work 10-12-2018			
I Phase of Instructions-1	10-12-2018	26-01-2019	7W
I Mid Examinations	28-01-2019	30-01-2019	1/2W
II Phase of Instructions	31-01-2019	03-04-2019	9W
II Mid Examinations	04-04-2019	06-04-2019	1/2W
Preparation and Practical's	08-04-2019	13-04-2019	1W
Semester End Examinations	15-04-2019	19-04-2019	1W

EVALUATION PROCESS:

Evaluation Task	COs	Marks
I-Mid Examination (Descriptive) =A	1,2	A=20
II-Mid Examination (Descriptive) =B	3,4,5	B=20
Evaluation of Mid Marks: A+B =75% of Max(A,B)+25% of Min(A,B)	1,2,3,4,5	A+B=20
Evaluation of assignments /quiz =C	1,2,3,4,5	C=5
Cumulative Internal Examination : A+B+C	1,2,3,4,5	A+B+C=25
Semester End Examinations =D	1,2,3,4,5	D=75
Total Marks: A+B+C+D	1,2,3,4,5	100

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

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Engineering Graduates will be able to:

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To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyze, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

(K.Ravi Kiran Yasaswi)	(K.Ravi Kiran Yasaswi)	(Dr.V.V.Narsi reddy)	(Dr.A.Adishesha Reddy)
Course Instructor	Course Coordinator	Module Coordinator	HOD

COURSE HANDOUT

PROGRAM : **B.Tech** CSE VIII-Semester. (B Section)
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : MANAGING INNOVATION AND ENTREPRENEURSHIP (S296)
L-T-P STRUCTURE : 4-1-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : Mr.K.Kalyan Kumar
COURSE COORDINATOR: K.Ravi Kiran Yasaswi
PRE-REQUISITE : To Know the Innovation and entrepreneurship in present changing environment

COURSE OBJECTIVES:

1. To understand the nature of entrepreneurship.
2. To motivate the Entrepreneurial instincts.
3. To give a clear picture about the process and involved in setting up and small scale industrial settings and bigger settings.
4. To make the potential entrepreneurs know about the possible risks and failures of the product make them learn how to overcome these problems

COURSE OUTCOMES (CO's):

At the end of the course, the student will be able to:

CO1: Would be in a position to convert and innovative thought into a commercial opportunity, which can boost up the economy.

CO2: Can understand the role of Entrepreneur in present changing Environment

CO3: Will be able to generate ideas for New entries, startups and handling the own enterprise.

CO4: Will be able to develop team building, planning skills and above all broad vision about the Financing and Managing.

CO5: Acquired the skills to handle the major Functional areas like Production management and Marketing management.

COURSE ARTICULATION MATRIX (Correlation between Cos&Pos,PSOs):

COURSE ARTICULATION MATRIX (Correlation between COs&POs,PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	2												
CO2					2				3						
CO3				1	2					3					
CO4					1					2	3				
CO5	2										3	2			

Note: Enter Correlation Levels **1** or **2** or **3**. If there is no correlation, put '-'
1- Slight(Low), **2** - Moderate(Medium), **3** - Substantial (High).

BOS APPROVED TEXT BOOKS:**T1:** Hisrich: Entrepreneurship, TMH, New Delhi, 2009.**T2:** "Managing innovation and entrepreneurship in technology based firm", by Martin M.J. 1994, John Wiley.**BOS APPROVED REFERENCE BOOKS:****R1:** Vasanth Desai Entrepreneurship, TMH, New Delhi, 2009**R2:** Rajeev Roy: Entrepreneurship, Oxford University Press, New Delhi, 2010.**R3:** V. Gangadhar, Narsimha Chary: Entrepreneurship Development, Kalyani Publishers, New Delhi, 2007**R4:** P. Narayana Reddy: Entrepreneurship, Cengage Learning, New Delhi, 2010.**COURSE DELIVERY PLAN (LESSON PLAN): Section-A****UNIT-I: Introduction: Creativity and Innovation**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome Cos	Text Book followed	HOD Sign Weekly
1.	Introduction to the topic	01	10-12-2018		TLM1	CO1	T1,R1	
2.	Creativity and Innovation concepts, Shifting	01	11-12-2018		TLM2	CO1	T1,R1	
3.	Composition of the economy	01	12-12-2018		TLM1	CO1	T1	
4.	Purposeful innovation and seven sources of innovative	01	13-12-2018		TLM1	CO1	T1	
5.	Purposeful innovation and seven sources of innovative	01	14-12-2018		TLM1	CO1	T1	
6.	Innovation Process	01	17-12-2018		TLM1	CO1	T1	
7.	Innovation Process	01	18-12-2018		TLM1	CO1	T1	
8.	Innovation Strategies	01	19-12-2018		TLM1	CO1	T1	
9.	Innovation Strategies	01	20-12-2018		TLM1	CO1	T1	
10.	Tutorial-1	01	21-12-2018		TLM3	CO1	T1	
11.	Strategies that aim at Introducing an innovation	01	24-12-2018		TLM1	CO1	T1	
12.	Strategies that aim at Introducing an innovation	01	26-12-2018		TLM1	CO1	T1	
13.	Innovation and Entrepreneurship: can they work together Planning	01	27-12-2018		TLM2	CO1	T1	
14.	Innovation and Entrepreneurship: can they work together Planning	01	28-12-2018		TLM2	CO1	T1	
15.	Incompatible with innovation and entrepreneurship	01	31-12-2018		TLM1	CO1	T1	
16.	Innovation and Entrepreneurship	01	01-01-2019		TLM1	CO1	T1	
17.	Assignment –I	01	02-01-2019		TLM6	CO1	T1	
No. of classes required to complete UNIT-I		17			No. of classes taken:			

UNIT-II : Introduction to Entrepreneurship

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
18.	Introduction to Entrepreneurship, Definition of Entrepreneurship	01	03-01-2019		TLM1	CO2	T1	
19.	Entrepreneurial Traits	01	04-01-2019		TLM1	CO2	T1	
20.	Traditional Entrepreneurship vs. Modern Entrepreneurship	01	07-01-2019		TLM2	CO2	T1	
21.	Entrepreneur vs. Intrapreneur	01	08-01-2019		TLM1	CO2	T1	
22.	The Entrepreneurial decision process	01	09-01-2019		TLM1	CO2	T1	
23.	Role of Entrepreneurship in Economic development, Ethical	01	10-01-2019		TLM2	CO2	T1	
24.	Environmental challenges and Social responsibility of Entrepreneurs	01	11-01-2019		TLM1	CO2	T1	
25.	Environmental challenges and Social responsibility of Entrepreneurs	01	17-01-2019		TLM1	CO2	T1	
26.	Opportunities for Entrepreneurs in India and abroad, Woman as Entrepreneur	01	18-01-2019		TLM1	CO2	T1	
27.	Assignment-II	01	21-01-2019		TLM3	CO2	T1	
28.	Tutorial II,	01	22-01-2019		TLM6	CO2	T1	
No. of classes required to complete UNIT II		11			No. of classes taken:			

UNIT-III : Creating and Starting the Venture

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
29.	Introduction to Creating and starting the venture,	01	23-01-2019		TLM2	CO3	T1	
30.	Introduction to Creating and starting the venture,	01	24-01-2019		TLM1	CO3	T1	
31.	Sources of new ideas	01	25-01-2019		TLM1	CO3	T1	
32.	I Mid Exam		28-01-2019					
33.	I Mid Exam		29-01-2019					
34.	I Mid Exam		30-01-2019					
35.	Generation of new entry Opportunity	01	01-02-2019		TLM1	CO3	T1	
36.	Opportunity Analysis, Creating Problem Solving	01	04-02-2019		TLM1	CO3	T1	
37.	Product Planning and development process	01	05-02-2019		TLM1	CO3	T1	
38.	SWOT analysis	01	06-02-2019		TLM2	CO3	T1	
39.	First mover advantages and disadvantages	01	07-02-2019		TLM1	CO3	T1	
40.	First mover advantages and disadvantages	01	08-02-2019		TLM1	CO3	T1	
41.	Types of business organizations	01	11-02-2019		TLM1	CO3	T1	
42.	Types of business organizations	01	12-02-2019		TLM1	CO3	T1	
43.	Features and evaluation of joint ventures	01	13-02-2019		TLM1	CO3	T1	
44.	Features and evaluation of joint ventures	01	14-02-2019		TLM1	CO3	T1	
45.	Acquisitions	01	15-02-2019		TLM2	CO3	T1	
46.	Acquisitions	01	18-02-2019		TLM1	CO3	T1	
47.	Merges	01	19-02-2019		TLM1	CO3	T1	
48.	Merges	01	20-02-2019		TLM1	CO3	T1	
49.	Franchising	01	21-02-2019		TLM1	CO3	T1	
50.	Tutorial III,	01	22-02-2019		TLM3	CO3	T1	
51.	Assignment-III	01	25-02-2019		TLM6	CO3	T1	
No. of classes required to complete UNIT-III		21			No. of classes taken:			

UNIT-IV : The Business plan, Financing and Managing

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
52.	Nature and Scope of Business Plan	01	26-02-2019		TLM1	CO4	T1	
53.	Writing Business Plan	01	27-02-2019		TLM1	CO4	T1	
54.	Evaluating Business plans	01	28-02-2019		TLM1	CO4	T1	
55.	Using and implementing business plans ,Marketing plan	01	01-03-2019		TLM2	CO4	T1	
56.	Introduction to financial plan and the organizational Launching formalities	01	05-03-2019		TLM2	CO4	T1	
57.	Survival and Success , Sources of capital	01	06-03-2019		TLM1	CO4	T1	
58.	Record keeping , Recruitment	01	07-03-2019		TLM1	CO4	T1	
59.	Motivating and Leading teams	01	08-03-2019		TLM1	CO4	T1	
60.	Financial controls, Tutorial IV	01	11-03-2019		TLM1	CO4	T1	
61.	Marketing and sales Controls	01	12-03-2019		TLM1	CO4	T1	
62.	Ecommerce in Entrepreneurship, Internet advertising	01	13-03-2019		TLM1	CO4	T1	
63.	Tutorial-IV	01	14-03-2019		TLM3	CO4	T1	
64.	Assignment-4	01	15-03-2019		TLM6	CO4	T1	
No. of classes required to complete UNIT IV		13			No. of classes taken:			

UNIT-V : Production and Marketing Management

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
65.	Thrust of production management	01	18-03-2019		TLM2	CO5	T1	
66.	Selection of production techniques	01	19-03-2019		TLM1	CO5	T1	
67.	Selection of production techniques	01	21-03-2019		TLM1	CO5	T1	
68.	Plant utilization and maintenance	01	22-03-2019		TLM1	CO5	T1	
69.	Requirements at work place	01	23-03-2018		TLM1	CO5	T1	
70.	Requirements at work place	01	25-03-2018		TLM1	CO5	T1	
71.	Materials management, Marketing Functions	01	26-03-2018		TLM1	CO5	T1	
72.	Market segmentation	01	27-03-2018		TLM1	CO5	T1	
73.	Market research and channels and channels of distribution	01	28-03-2018		TLM1	CO5	T1	
74.	Sales Promotion and Product pricing,	01	29-03-2018		TLM1	CO5	T1	
75.	Sales Promotion and Product pricing,	01	01-04-2018		TLM1	CO5	T1	
76.	Tutorial –V	01	02-04-2018		TLM3	CO5	T1	
77.	Assignment-V	01	03-04-2018		TLM6	CO5	T1	
78.	II Mid exam		04-04-2018					
79.	II Mid exam		05-04-2018					
No. of classes required to complete Unit-V		13			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
80.	Red bus and Future group business strategy	01	12-12-2018		TLM2	CO5	T1	
81.	Reliance Jio business strategy	01	06-03-2019		TLM2	CO2	T1	

Teaching Learning Methods

TLM1	Chalk and Talk	TLM4	Problem Solving	TLM7	Seminars or GD
TLM2	PPT	TLM5	Programming	TLM8	Lab Demo
TLM3	Tutorial	TLM6	Assignment or Quiz	TLM9	Case Study

ACADEMIC CALENDAR:

Description	From	To	Weeks
Commencement of Next semesters Class Work 10-12-2018			
I Phase of Instructions-1	10-12-2018	26-01-2019	7W
I Mid Examinations	28-01-2019	30-01-2019	1/2W
II Phase of Instructions	31-01-2019	03-04-2019	9W
II Mid Examinations	04-04-2019	06-04-2019	1/2W
Preparation and Practical's	08-04-2019	13-04-2019	1W

EVALUATION PROCESS:

Evaluation Task	COs	Marks
I-Mid Examination (Descriptive) = A	1,2	A=20
II-Mid Examination (Descriptive) = B	3,4,5	B=20
Evaluation of Mid Marks: A+B =75% of Max(A,B)+25% of Min(A,B)	1,2,3,4,5	A+B=20
Evaluation of assignments /quiz = C	1,2,3,4,5	C=5
Cumulative Internal Examination : A+B+C	1,2,3,4,5	A+B+C=25
Semester End Examinations =D	1,2,3,4,5	D=75
Total Marks: A+B+C+D	1,2,3,4,5	100

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

- Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. Programming Paradigms:

To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering:

To inculcate an ability to Analyze, Design and implement data driven applications into the students.

3. Software Engineering:

Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

(Mr.K.Kalyan Kumar)	(K.Ravi Kiran Yasaswi)	(Dr.V.V.Narsi reddy)	(Dr.A.Adishesha Reddy)
Course Instructor	Course Coordinator	Module Coordinator	HOD

COURSE HANDOUT

Part-A

PROGRAM : B.Tech., VIII-Sem., CSE-A/S
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Operations Research – S329
L-T-P STRUCTURE : 4-1-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : T.Venkateswara Rao
COURSE COORDINATOR : B. Chaitanya
PRE-REQUISITES : Knowledge of linear programming.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of this course is to:

- CEO1:** Underline the applications of operations research techniques in Industries.
- CEO2:** Discuss the difference between deterministic and stochastic models.
- CEO3:** Familiarize the concepts of simulation and dynamic programming.
- CEO4:** Describe the concept of feasible region, optimal solution.
- CEO5:** Illustrate the applications of Transportation and Assignment models.

COURSE OUTCOMES (COs)

Upon completion of the subject, students will be able to

- CO1:** Develop mathematical models for real engineering problems.
- CO2:** Demonstrate the familiarity in identifying the key parameters influencing the production cost.
- CO3:** Exhibit knowledge in solving inventory control problems.
- CO4:** Choose optimal strategy using OR techniques.

COURSE ARTICULATION MATRIX (Correlation between Cos & POs, PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	-	2	-	-	-	1	-	-
CO2	-	-	-	2	-	-	1	-	-	-	-	-	-	2	-
CO3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
CO4	-	-	2	-	-	-	-	1	-	-	-	-	2	-	-
CO5	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-

Note: Enter Correlation Levels **1** or **2** or **3**. If there is no correlation, put ‘-’

1- Slight (Low), 2 – Moderate (Medium), 3 - Substantial (High).

BOS APPROVED TEXT BOOKS:

- T1** Kantiswarup. P.K.Gupta, Man Mohan, “Operations Research”, Sultan Chand & Sons, Educational Publications, New Delhi 2008, 14th Edition.
- T2** Hiller & Libermann, “Introduction to Operations Research” TMH 2009, 9TH EDITION

BOS APPROVED REFERENCE BOOKS:

- R1** Singiresu S Rao, “Engineering Optimization: Theory and Practice”, A WileyInterscience Publication 2009, 4th edition. 3. Taha, “Introduction to O.R .PHI”, 9th edition, 2010.

R2 A.M.Natarajan, P.Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education 2014, 2nd edition.

R3 Taha, "Introduction to O.R .PHI", 9th edition, 2010.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : INTRODUCTION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to Operations Research	1	10.12.2018		TLM1	CO1	T1/T2	
2.	Operations research models, applications.	1	11.12.2018		TLM1	CO1	T1/T2	
3.	Linear Programming Problem Formulation for Maximization	1	12.12.2018		TLM1	CO1	T1/T2	
4.	Linear Programming Problem Formulation for Minimization	1	13.12.2018		TLM1	CO1	T1/T2	
5.	Tutorial - I	1	14.12.2018		TLM3	CO1	T1	
6.	Graphical solution for Maximization	1	17.12.2018		TLM1	CO1	T1/T2	
7.	Graphical solution for Minimization	1	18.12.2018		TLM1	CO1	T1/T2	
8.	Graphical solution for Special cases	1	19.12.2018		TLM1	CO1	T1/T2	
9.	Simplex method -I	1	20.12.2018		TLM1	CO1	T1/T2	
10.	Tutorial - II	1	21.12.2018		TLM3	CO1	T1/T2	
11.	Simplex method - II	1	24.12.2018		TLM1	CO1	T1/T2	
12.	Two-phase method	1	26.12.2018		TLM1	CO1	T1/T2	
13.	Big-M method	1	27.12.2018		TLM1	CO1	T1/T2	
14.	Artificial variables techniques	1	28.12.2018		TLM1	CO1	T1/T2	
15.	Tutorial - III	1	31.12.2018		TLM3	CO1	T1/T2	
No. of classes required to complete UNIT-I		15			No. of classes taken:			

UNIT-II : TRANSPORTATION PROBLEM

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
16.	Introduction	1	02.01.2019		TLM2	CO2	T1/T2	
17.	Transportation Problem Formulation	1	03.01.2019		TLM1	CO2	T1/T2	
18.	Transportation Problem Optimal solution	1	04.01.2019		TLM1	CO2	T1/T2	
19.	unbalanced transportation problem	1	07.01.2019		TLM1	CO2	T1/T2	
20.	Tutorial - IV	1	08.01.2019		TLM3	CO2	T1	
21.	Degeneracy in transportation problem	1	09.01.2019		TLM1	CO2	T1/T2	
22.	Assignment problem (Model -I)	1	10.01.2019		TLM1	CO2	T1/T2	
23.	Assignment problem (Model -II)	1	11.01.2019		TLM1	CO2	T1/T2	
24.	Assignment problem optimal solution	1	18.01.2019		TLM1	CO2	T1/T2	
25.	Tutorial - V	1	21.01.2019		TLM3	CO2	T1/T2	
26.	Variants of Assignment Problem	1	22.01.2019		TLM1	CO2	T1/T2	
27.	unbalanced transportation problem - I	1	23.01.2019		TLM1	CO2	T1/T2	
28.	unbalanced transportation problem - II	1	24.01.2019		TLM1	CO2	T1/R2	
29.	Traveling Salesman problem	1	25.01.2019		TLM1	CO2	T1/R2	
30.	Tutorial - VI	1	31.01.2019		TLM3	CO2	T1/T2	
No. of classes required to complete UNIT-II		15			No. of classes taken:			

UNIT-III : THEORY OF GAMES & INVENTORY CONTROL

S. No.	Topics to be covered	No. of Classe Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
31.	Introduction	1	01.02.2019		TLM2	CO3	T1/T2	
32.	Minimax (maximin) Criterion	1	04.02.2019		TLM1	CO3	T1/T2	
33.	optimal strategy	1	05.02.2019		TLM1	CO3	T1/T2	

34.	Tutorial-VII	1	06.02.2019		TLM3	CO3	T1/T2	
35.	Solution of games with saddle points	1	07.02.2019		TLM1	CO3	T1/T2	
36.	Rectangular games without saddle points	1	08.02.2019		TLM1	CO3	T1/T2	
37.	2 X 2 games – dominance principle	1	11.02.2019		TLM1	CO3	T1/T2	
38.	m X 2 & 2 X n games	1	12.02.2019		TLM1	CO3	T1/T2	
39.	Tutorial-VIII	1	13.02.2019		TLM3	CO3	T1/T2	
40.	Graphical method	1	14.02.2019		TLM1	CO3	T1/T2	
41.	Inventory control: Introduction, EOQ model	1	15.02.2019		TLM2	CO3	T1/T2	
42.	Shortages not allowed	1	18.02.2019		TLM1	CO3	T1/T2	
43.	Deterministic models	1	19.02.2019		TLM1	CO3	T1/T2	
44.	Probabilistic models, Price breaks	1	20.02.2019		TLM1	CO3	T1/T2	
45.	Tutorial-IX	1	21.02.2019		TLM3	CO3	T1/T2	
No. of classes required to complete UNIT-III		15			No. of classes taken:			

UNIT-IV : THEORY OF REPLACEMENT & WAITING LINES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
46.	Introduction	1	22.02.2019		TLM2	CO4	T1/T2	
47.	Replacement of equipment that Deteriorates Gradually	1	25.03.2019		TLM1	CO4	T1/T2	
48.	Replacement of Equipment that fails suddenly	1	26.03.2019		TLM1	CO4	T1/T2	
49.	Group Replacement	1	27.03.2019		TLM1	CO4	T1/T2	
50.	Tutorial - X	1	28.03.2019		TLM3	CO4	T1/T2	
51.	Waiting Lines: Introduction	1	01.03.2019		TLM1	CO4	T1/T2	

52.	Single Channel Poisson arrivals	1	05.03.2019		TLM1	CO4	T1/T2	
53.	exponential service times	1	06.03.2019		TLM1	CO4	T1/T2	
54.	Exponential service times with infinite population	1	07.03.2019		TLM1	CO4	T1/T2	
55.	Exponential service times with finite population	1	08.03.2019		TLM1	CO4	T1/T2	
56.	Poisson arrivals	1	11.03.2019		TLM1	CO4	T1/R2	
57.	Single channel Poisson arrivals	1	12.03.2019		TLM1	CO4	T1/R2	
58.	Multichannel Poisson arrivals	1	13.03.2019		TLM1	CO4	T1/T2	
59.	Tutorial-XII	1	14.03.2019		TLM3	CO4	T1/T2	
No. of classes required to complete UNIT-IV		14			No. of classes taken:			

UNIT-V : DYNAMIC PROGRAMMING & INTRODUCTION TO OPTIMIZATION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
60.	Dynamic Programming: Introduction	1	15.03.2019		TLM2	CO4	R1/T2	
61.	Bellman's Principle of optimality	1	18.03.2019		TLM1	CO4	R1/T2	
62.	Applications of dynamic programming	1	19.03.2019		TLM1/ TLM5	CO4	R1/T2	
63.	capital budgeting problem	1	20.03.2019		TLM1	CO4	R1/T2	
64.	Shortest path problem, linear programming problem.	1	21.03.2019		TLM1	CO4	R1/T2	
65.	Introduction to Optimization:	1	22.03.2019		TLM2	CO4	R1/T2	
66.	Engineering Applications of Optimization, Problem Statement	1	25.03.2019		TLM1	CO4	R1/T2	
67.	Design Vector, Design Constraints	1	26.03.2019		TLM1	CO4	R1/T2	

68.	Objective function, Objective function Surfaces	1	27.04.2019		TLM1/ TLM5	CO4	R1/R2	
69.	Classification of optimization problems	1	28.04.2019		TLM2	CO4	R1/T2	
70.	Optimization Techniques – Introduction	1	29.04.2019		TLM1	CO4	R1/R3	
71.	Tutorial – XIII	1	01.04.2019		TLM3	CO4	R1/R2	
No. of classes required to complete UNIT-V		12			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign
72.	Advanced optimization techniques	1	02.04.2019		TLM2/ TLM5	CO4	R2/R3	
73.	Advanced optimization techniques	1	03.04.2019		TLM2/ TLM5	CO4	R2/R3	

Teaching Learning Methods

TLM1	Chalk and Talk	TLM4	Demonstration (Lab/Field Visit)
TLM2	PPT	TLM5	ICT (NPTEL/Swayam Prabha/MOOCs)
TLM3	Tutorial	TLM6	Group Discussion/Project

Part - C

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment/Quiz – 1	1	A1=5
Assignment/Quiz – 2	2	A2=5
I-Mid Examination	1,2	B1=20
Assignment/Quiz – 3	3	A3=5
Assignment/Quiz – 4	4	A4=5
Assignment/Quiz – 5	5	A5=5
II-Mid Examination	3,4,5	B2=20
Evaluation of Assignment/Quiz Marks: $A=(A1+A2+A3+A4+A5)/5$	1,2,3,4,5	A=5
Evaluation of Mid Marks: $B=75\% \text{ of Max}(B1,B2)+25\% \text{ of Min}(B1,B2)$	1,2,3,4,5	B=20
Cumulative Internal Examination : A+B	1,2,3,4,5	A+B=25
Semester End Examinations	1,2,3,4,5	C=75
Total Marks: A+B+C	1,2,3,4,5	100

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

Graduates of Computer Science & Engineering programme will be:

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to

comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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

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

PSOs:

Graduate of the Computer Science & Engineering will have the ability to

1. ProgrammingParadigms: To inculcate algorithmic thinking, formulation techniques and visualization, leading to problem solving skills using different programming paradigms.

2. Data Engineering: To inculcate an ability to Analyse, Design and implement data driven applications into the students.

3. Software Engineering: Develop an ability to implement various processes / methodologies /practices employed in design, validation, testing and maintenance of software products.

Course Instructor	Course Coordinator	Module Coordinator	HoD
Mr.T.Venkateswara rao	Mr.B.Chaitanya	Mr.J.Subba Reddy	Dr.S.Pichi Reddy

COURSE HANDOUT

Part-A

PROGRAM : B.Tech., VIII-Sem., CSE-B/S
ACADEMIC YEAR : 2018-19
COURSE NAME & CODE : Operations Research – S329
L-T-P STRUCTURE : 4-1-0
COURSE CREDITS : 3
COURSE INSTRUCTOR : V. Sankararao
COURSE COORDINATOR : B. Chaitanya
PRE-REQUISITES : Knowledge of linear programming.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

The objective of this course is to:

- CEO1:** Underline the applications of operations research techniques in Industries.
- CEO2:** Discuss the difference between deterministic and stochastic models.
- CEO3:** Familiarize the concepts of simulation and dynamic programming.
- CEO4:** Describe the concept of feasible region, optimal solution.
- CEO5:** Illustrate the applications of Transportation and Assignment models.

COURSE OUTCOMES (COs)

Upon completion of the subject, students will be able to

- CO1:** Develop mathematical models for real engineering problems.
- CO2:** Demonstrate the familiarity in identifying the key parameters influencing the production cost.
- CO3:** Exhibit knowledge in solving inventory control problems.
- CO4:** Choose optimal strategy using OR techniques.

COURSE ARTICULATION MATRIX (Correlation between Cos & POs, PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	-	2	-	-	-	1	-	-
CO2	-	-	-	2	-	-	1	-	-	-	-	-	-	2	-
CO3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
CO4	-	-	2	-	-	-	-	1	-	-	-	-	2	-	-
CO5	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-

Note: Enter Correlation Levels **1** or **2** or **3**. If there is no correlation, put ‘-’

1- Slight (Low), 2 – Moderate (Medium), 3 - Substantial (High).

BOS APPROVED TEXT BOOKS:

- T1** Kantiswarup. P.K.Gupta, Man Mohan, “Operations Research”, Sultan Chand & Sons, Educational Publications, New Delhi 2008, 14th Edition.
- T2** Hiller & Libermann, “Introduction to Operations Research” TMH 2009, 9TH EDITION

BOS APPROVED REFERENCE BOOKS:

- R1** Singiresu S Rao, “Engineering Optimization: Theory and Practice”, A WileyInterscience Publication 2009, 4th edition. 3. Taha, “Introduction to O.R .PHI”, 9th edition, 2010.

R2 A.M.Natarajan, P.Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education 2014, 2nd edition.

R3 Taha, "Introduction to O.R .PHI", 9th edition, 2010.

Part-B

COURSE DELIVERY PLAN (LESSON PLAN):

UNIT-I : INTRODUCTION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
1.	Introduction to Operations Research	1	10.12.2018		TLM1	CO1	T1/T2	
2.	Operations research models, applications.	1	11.12.2018		TLM1	CO1	T1/T2	
3.	Linear Programming Problem Formulation for Maximization	1	12.12.2018		TLM1	CO1	T1/T2	
4.	Linear Programming Problem Formulation for Minimization	1	13.12.2018		TLM1	CO1	T1/T2	
5.	Tutorial - I	1	14.12.2018		TLM3	CO1	T1	
6.	Graphical solution for Maximization	1	17.12.2018		TLM1	CO1	T1/T2	
7.	Graphical solution for Minimization	1	18.12.2018		TLM1	CO1	T1/T2	
8.	Graphical solution for Special cases	1	19.12.2018		TLM1	CO1	T1/T2	
9.	Simplex method -I	1	20.12.2018		TLM1	CO1	T1/T2	
10.	Tutorial - II	1	21.12.2018		TLM3	CO1	T1/T2	
11.	Simplex method - II	1	24.12.2018		TLM1	CO1	T1/T2	
12.	Two-phase method	1	26.12.2018		TLM1	CO1	T1/T2	
13.	Big-M method	1	27.12.2018		TLM1	CO1	T1/T2	
14.	Artificial variables techniques	1	28.12.2018		TLM1	CO1	T1/T2	
15.	Tutorial - III	1	31.12.2018		TLM3	CO1	T1/T2	
No. of classes required to complete UNIT-I		15			No. of classes taken:			

UNIT-II : TRANSPORTATION PROBLEM

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
16.	Introduction	1	02.01.2019		TLM2	CO2	T1/T2	
17.	Transportation Problem Formulation	1	03.01.2019		TLM1	CO2	T1/T2	
18.	Transportation Problem Optimal solution	1	04.01.2019		TLM1	CO2	T1/T2	
19.	unbalanced transportation problem	1	07.01.2019		TLM1	CO2	T1/T2	
20.	Tutorial - IV	1	08.01.2019		TLM3	CO2	T1	
21.	Degeneracy in transportation problem	1	09.01.2019		TLM1	CO2	T1/T2	
22.	Assignment problem (Model -I)	1	10.01.2019		TLM1	CO2	T1/T2	
23.	Assignment problem (Model -II)	1	11.01.2019		TLM1	CO2	T1/T2	
24.	Assignment problem optimal solution	1	18.01.2019		TLM1	CO2	T1/T2	
25.	Tutorial - V	1	21.01.2019		TLM3	CO2	T1/T2	
26.	Variants of Assignment Problem	1	22.01.2019		TLM1	CO2	T1/T2	
27.	unbalanced transportation problem - I	1	23.01.2019		TLM1	CO2	T1/T2	
28.	unbalanced transportation problem - II	1	24.01.2019		TLM1	CO2	T1/R2	
29.	Traveling Salesman problem	1	25.01.2019		TLM1	CO2	T1/R2	
30.	Tutorial - VI	1	31.01.2019		TLM3	CO2	T1/T2	
No. of classes required to complete UNIT-II		15			No. of classes taken:			

UNIT-III : THEORY OF GAMES & INVENTORY CONTROL

S. No.	Topics to be covered	No. of Classe Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
31.	Introduction	1	01.02.2019		TLM2	CO3	T1/T2	
32.	Minimax (maximin) Criterion	1	04.02.2019		TLM1	CO3	T1/T2	
33.	optimal strategy	1	05.02.2019		TLM1	CO3	T1/T2	

34.	Tutorial-VII	1	06.02.2019		TLM3	CO3	T1/T2	
35.	Solution of games with saddle points	1	07.02.2019		TLM1	CO3	T1/T2	
36.	Rectangular games without saddle points	1	08.02.2019		TLM1	CO3	T1/T2	
37.	2 X 2 games – dominance principle	1	11.02.2019		TLM1	CO3	T1/T2	
38.	m X 2 & 2 X n games	1	12.02.2019		TLM1	CO3	T1/T2	
39.	Tutorial-VIII	1	13.02.2019		TLM3	CO3	T1/T2	
40.	Graphical method	1	14.02.2019		TLM1	CO3	T1/T2	
41.	Inventory control: Introduction, EOQ model	1	15.02.2019		TLM2	CO3	T1/T2	
42.	Shortages not allowed	1	18.02.2019		TLM1	CO3	T1/T2	
43.	Deterministic models	1	19.02.2019		TLM1	CO3	T1/T2	
44.	Probabilistic models, Price breaks	1	20.02.2019		TLM1	CO3	T1/T2	
45.	Tutorial-IX	1	21.02.2019		TLM3	CO3	T1/T2	
No. of classes required to complete UNIT-III		15			No. of classes taken:			

UNIT-IV : THEORY OF REPLACEMENT & WAITING LINES

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
46.	Introduction	1	22.02.2019		TLM2	CO4	T1/T2	
47.	Replacement of equipment that Deteriorates Gradually	1	25.03.2019		TLM1	CO4	T1/T2	
48.	Replacement of Equipment that fails suddenly	1	26.03.2019		TLM1	CO4	T1/T2	
49.	Group Replacement	1	27.03.2019		TLM1	CO4	T1/T2	
50.	Tutorial – X	1	28.03.2019		TLM3	CO4	T1/T2	
51.	Waiting Lines: Introduction	1	01.03.2019		TLM1	CO4	T1/T2	

52.	Single Channel Poisson arrivals	1	05.03.2019		TLM1	CO4	T1/T2	
53.	exponential service times	1	06.03.2019		TLM1	CO4	T1/T2	
54.	Exponential service times with infinite population	1	07.03.2019		TLM1	CO4	T1/T2	
55.	Exponential service times with finite population	1	08.03.2019		TLM1	CO4	T1/T2	
56.	Poisson arrivals	1	11.03.2019		TLM1	CO4	T1/R2	
57.	Single channel Poisson arrivals	1	12.03.2019		TLM1	CO4	T1/R2	
58.	Multichannel Poisson arrivals	1	13.03.2019		TLM1	CO4	T1/T2	
59.	Tutorial-XII	1	14.03.2019		TLM3	CO4	T1/T2	
No. of classes required to complete UNIT-IV		14			No. of classes taken:			

UNIT-V : DYNAMIC PROGRAMMING & INTRODUCTION TO OPTIMIZATION

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign Weekly
60.	Dynamic Programming: Introduction	1	15.03.2019		TLM2	CO4	R1/T2	
61.	Bellman's Principle of optimality	1	18.03.2019		TLM1	CO4	R1/T2	
62.	Applications of dynamic programming	1	19.03.2019		TLM1/ TLM5	CO4	R1/T2	
63.	capital budgeting problem	1	20.03.2019		TLM1	CO4	R1/T2	
64.	Shortest path problem, linear programming problem.	1	21.03.2019		TLM1	CO4	R1/T2	
65.	Introduction to Optimization:	1	22.03.2019		TLM2	CO4	R1/T2	
66.	Engineering Applications of Optimization, Problem Statement	1	25.03.2019		TLM1	CO4	R1/T2	
67.	Design Vector, Design Constraints	1	26.03.2019		TLM1	CO4	R1/T2	

68.	Objective function, Objective function Surfaces	1	27.04.2019		TLM1/ TLM5	CO4	R1/R2	
69.	Classification of optimization problems	1	28.04.2019		TLM2	CO4	R1/T2	
70.	Optimization Techniques – Introduction	1	29.04.2019		TLM1	CO4	R1/R3	
71.	Tutorial – XIII	1	01.04.2019		TLM3	CO4	R1/R2	
No. of classes required to complete UNIT-V		12			No. of classes taken:			

Contents beyond the Syllabus

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	Learning Outcome COs	Text Book followed	HOD Sign
72.	Advanced optimization techniques	1	02.04.2019		TLM2/ TLM5	CO4	R2/R3	
73.	Advanced optimization techniques	1	03.04.2019		TLM2/ TLM5	CO4	R2/R3	

Teaching Learning Methods

TLM1	Chalk and Talk	TLM4	Demonstration (Lab/Field Visit)
TLM2	PPT	TLM5	ICT (NPTEL/Swayam Prabha/MOOCs)
TLM3	Tutorial	TLM6	Group Discussion/Project

Part - C

EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment/Quiz – 1	1	A1=5
Assignment/Quiz – 2	2	A2=5
I-Mid Examination	1,2	B1=20
Assignment/Quiz – 3	3	A3=5
Assignment/Quiz – 4	4	A4=5
Assignment/Quiz – 5	5	A5=5
II-Mid Examination	3,4,5	B2=20
Evaluation of Assignment/Quiz Marks: $A=(A1+A2+A3+A4+A5)/5$	1,2,3,4,5	A=5
Evaluation of Mid Marks: $B=75\% \text{ of Max}(B1,B2)+25\% \text{ of Min}(B1,B2)$	1,2,3,4,5	B=20
Cumulative Internal Examination : A+B	1,2,3,4,5	A+B=25
Semester End Examinations	1,2,3,4,5	C=75
Total Marks: A+B+C	1,2,3,4,5	100

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

Graduates of Computer Science & Engineering programme will be:

PEO I: To inculcate the adaptability skills into the students for software design, software development or any other allied fields of computing.

PEO II: To equip the graduates with the ability to analyze, design and synthesize data to create novel products.

PEO III: Ability to understand and analyze engineering issues in a broader perspective with ethical responsibility towards sustainable development.

PEO IV: To empower the student with the qualities of effective communication, team work, continues learning attitude, leadership needed for a successful computer professional.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to

comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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Mr.V.Sankararao	Mr.B.Chaitanya	Mr.J.Subba Reddy	Dr.S.Pichi Reddy