JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

Kakinada-533003, Andhra Pradesh (India)

Comparison of Program Structure R19 with R20

Program Code	Program Name	Total No. of Courses		No of Subjects			Total Courses	Percentage %
		R19	R20	Added in (R20)	Deleted (R19)	Content revised more than 20%		
021A08	B.Tech (CHE)	85	83	11	05	02	83	25%

Coordinator

REGISTRAR
J.N.T. University Kakinada
Kakinada-533003

CHAIRMAN, BOS

Dept. of Petroleum Engineering &
Petrochemical Engineering, UCEK (A)
J.N.T. University Kakinada
Kakinada - 533 003 A.P. India

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Coordinator **HOD**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

Kakinada-533003, Andhra Pradesh (India)

Comparison of Course Structure R19 with R20

Program Code: 021A08 **Program Name:B.Tech–CHEMICAL ENGG. Year: I** **Semester: I**

R19						R20						Remarks		
Course code	**Course name**	**L**	**T**	**P**	**C**	**Course code**	**Course name**	**L**	**T**	**P**	**C**	**New Course? (R20)**	**Deleted Course? (R19)**	**Content Revision %**
BS	Mathematics–I	3	0	0	3	BS	Mathematics - I	3	0	0	3			10
BS	EngineeringPhysics	3	0	0	3	BS	Engineering Physics	3	0	0	3			10
PCC	IntroductiontoChemical Engineering	3	0	0	3	ES	Engineering Mechanics	3	0	0	3		YES	
ES	ProgrammingforProblemSolving	3	0	0	3	ES	Engineering Drawing	1	0	4	3			10
ES	EngineeringDrawing	1	0	3	2.5	ES	Programming for problem solving using - C	3	0	0	3			15
BS	EngineeringPhysicsLab	0	0	3	1.5	ES	Engineering Workshop and IT Workshop	0	0	3	1.5			10
BS	PhysicsVirtualLab	0	0	2	0	BS	Engineering Physics Laboratory	0	0	3	1.5			10
ES	ProgrammingforProblemSolving - Laboratory	0	0	3	1.5	ES	Programming for problem solving using - C Laboratory	0	0	3	1.5			10
HS	EnglishCommunicationSkills - Laboratory –I	0	0	2	1	BS	Physics Virtual Laboratory	0	0	2	0			10
PR	EngineeringExplorationProject	0	0	2	1	MC	Constitution of India	3	0	0	0			
*MC	ConstitutionofIndia	3	0	0	0									
	TOTAL				19.5		Total				**19.5**			

					Credits								

rogram Code: 021A08 **Program Name:B.Tech – CHEMICAL ENGG** **Year : I** **Semester: II**

R19						R20						Remarks		
Course code	**Course name**	**L**	**T**	**P**	**C**	**Course code**	**Course name**	**L**	**T**	**P**	**C**	**New Course ? (R20)**	**Deleted Course ? (R19)**	**Content Revision %**
HS	CommunicativeEnglish	3	0	0	3	BS	Mathematics – II	3	0	0	3			15
BS	Mathematics–II	3	0	0	3	BS	Physical Chemistry	3	0	0	3			10
BS	Mathematics–III	3	0	0	3	HS	Communicative English	3	0	0	3			10
BS	Chemistry – I (Physical Chemistry)	3	0	0	3	ES	Elements of Mechanical Engineering	3	0	0	3			10
ES	EngineeringMechanics	3	0	0	3	ES	Basic Electrical and Electronics Engineering	3	0	0	3			
ES	EngineeringWorkshop&IT Workshop	0	0	3	1.5	HS	English Communication Skills Lab	0	0	3	1.5			
BS	Chemistry - ILaboratory (Physical Chemistry)	0	0	3	1.5	BS	Physical Chemistry Laboratory	0	0	3	1.5			
HS	EnglishCommunicationSkillsLaboratory –II	0	0	3	1.5	ES	Basic Engineering (Mechanical & Electrical) Laboratory	0	0	3	1.5			10
*MC	EnvironmentalScience	3	0	0	0	HS	Professional Ethics and Human Values	2	0	0	0			
*MC	PhysicalFitnessActivities	0	0	2	0	BS	Physical Fitness Activities	0	0	2	0			
HS	CommunicativeEnglish	3	0	0	3								YES	

	MOOCS (NPTEL/SWAYAM) for Honors/Minor													
TOTAL				19.5	Total Credits					**19.5**				

Program Code: 021A08 **Program Name:B.Tech – CHEMICAL ENGG.** **Year : II** **Semester: I**

R19						R20						Remarks		
Course code	**Course name**	**L**	**T**	**P**	**C**	**Course code**	**Course name**	**L**	**T**	**P**	**C**	**New Course? (R20)**	**Deleted Course? (R19)**	**Content Revision %**
BS	Mathematics-IV	3	0	0	3	BS	Mathematics – III	3	0	0	3			15
ES	Basic Electrical & Electronics Engineering	3	0	0	3	PCC	Organic Chemistry for Chemical Engineers	3	0	0	3	YES		
ES	Materials Science & Engineering	3	0	0	3	PCC	Fluid Mechanics for Chemical Engineers	3	0	0	3			
PCC	Chemistry – II (Organic Chemistry)	3	0	0	3	PCC	Mechanical Unit Operations	3	0	0	3			
PCC	Chemical Process Principles	3	0	0	3	PCC	Material and Energy Balances	3	0	0	3			
PCC	Mechanical Unit Operations	3	0	0	3	PCC	Organic Chemistry for Chemical Engineers – Laboratory	0	0	3	0	YES		
ES	Basic Engineering (Mech. + Elec.) Laboratory	0	0	3	1.5	PCC	Mechanical Unit Operations – Laboratory	0	0	3	0			
PCC	Organic Chemistry – Laboratory	0	0	3	1.5	PCC	Fluid Mechanics for Chemical Engineers – Laboratory	0	0	3	0			
PCC	Mechanical Unit Operations – Laboratory	0	0	3	1.5	SC	Python programming	1	0	2	1			
*MC	Essence of Indian Traditional Knowledge	3	0	0	0	MC	Environmental Science	2	0	0	2		YES	
TOTAL					22.5	Total Credits					**21.5**			

Program Code:021A08 **Program Name:B.Tech – CHEMICAL ENGG.** **Year : II** **Semester: II**

R19						R20						Remarks		
Course code	**Course name**	**L**	**T**	**P**	**C**	**Course code**	**Course name**	**L**	**T**	**P**	**C**	**New Course? (R20)**	**Deleted Course? (R19)**	**Content Revision %**
ES	Elements of Mechanical Engineering	2	0	0	2	HS	Management Science	3	0	0	3			10
HSSMS	Managerial Economics & Financial Accounting	3	0	0	3	BS	Mathematics -IV	3	0	0	3			
PCC	Momentum Transfer	3	0	0	3	PCC	Mass Transfer Operations – I	3	0	0	3			
PCC	Chemical Engineering Thermodynamics-I	3	0	0	3	PCC	Chemical Engineering Thermodynamics – I	3	0	0	3			
PCC	Process Instrumentation	2	0	0	2	PCC	Heat Transfer Operations	3	0	0	3			
PCC	Process Heat Transfer	3	0	0	3	PCC	Mass Transfer Operations – I Laboratory	0	0	3	1.5			
PCC	Momentum Transfer – Laboratory	0	0	3	1.5	PCC	Mathematical methods for Chemical Engineers – Laboratory	0	0	3	1.5			
PCC	Process Heat Transfer – Laboratory	0	0	3	1.5	PCC	Heat Transfer Operations - Laboratory	0	0	3	1.5			20
HSSMS	Socially Relevant Project	0	0	1	0.5	SC	Industry Exploration Project	1	0	2	2	YES		
*MC	Physical Fitness Activities	0	0	2	0									
TOTAL					19.5	Total Credits					**21.5**			

Program Code: 021A08 **Program Name:B.Tech – CHEMICAL ENGG.** **Year : III** **Semester: I**

R19						R20						Remarks		
Course code	**Course name**	**L**	**T**	**P**	**C**	**Course code**	**Course name**	**L**	**T**	**P**	**C**	**New Course ? (R20)**	**Deleted Course ? (R19)**	**Content Revision %**
PCC	Chemical Engineering Thermodynamics-II	3	0	0	3	PCC	Chemical Engineering Thermodynamics-II	3	0	0	3			15
PCC	Chemical Reaction Engineering – I	3	0	0	3	PCC	Instrumentation, Process Dynamics and Control	3	0	0	3			15
PCC	Mass Transfer Operations – I	3	0	0	3	PCC	Mass Transfer Operations – II	3	0	0	3			10
PCC	Process Dynamics & Control	3	0	0	3	OEC	Open Elective Course/Job oriented elective (for other branches) i. Introduction to Chemical Engineering ii. Fundamentals of Petroleum Refining iii. Renewable Energy Sources	2	0	2	3	YES		
PEC	PROFESSIONAL ELECTIVE – I i. Petroleum Refinery Engineering ii. Air Pollution and Control	3	0	0	3	PEC	Professional Elective courses i. General Chemical Technology ii. Industrial Pollution and Control iii. Petroleum Refinery Engineering	3	0	0	3	YES		
PCC	Petroleum Analysis – Laboratory	0	0	3	1.5	PCC	Instrumentation, Process Dynamics and Control – Laboratory	0	0	3	1.5			
PCC	Mass Transfer Operations – Laboratory	0	0	3	1.5	PCC	Mass Transfer Operations – II - Laboratory	0	0	3	1.5			
PCC	Instrumentation, Process Dynamics	0	0	3	1.5	SC	Soft Computing Techniques	1	0	2	2			

	& Control – Laboratory														
PCC	Socially Relevant Project	0	0	1	0.5	PCC	Essence of Indian Traditional Knowledge	2	0	0	0				
*MC	Physical Fitness Activities	0	0	2	0		***Summer Internship after second year to be evaluated during V semester***	0	0	0	1.5				
TOTAL					20	**TOTAL**					21.5				

Program Code: 021A08 **Program Name:B.Tech – CHEMICAL ENGG.** **Year : III** **Semester: II**

R19						R20						Remarks		
Course code	**Course name**	**L**	**T**	**P**	**C**	**Course code**	**Course name**	**L**	**T**	**P**	**C**	**New Course? (R20)**	**Deleted Course? (R19)**	**Content Revision %**
PCC	Mass Transfer Operations- II	3	0	0	3	PCC	Chemical Reaction Engineering	3	1	0	3			10
PCC	Chemical Reaction Engineering – II	3	0	0	3	PCC	Transport Phenomena	3	0	0	3			12
OEC	OPEN ELECTIVE – I (for other Branches) iv. Chemical Process Safety v. Fundamentals of Petroleum Refining vi. Renewable Energy Sources	3	0	0	3	PCC	Plant Design and Economics for Chemical Engineers	3	0	0	3			35
PEC	PROFESSIONAL ELECTIVE – II i. Solid Waste Management ii. Green Process Technologies	3	0	0	3	PEC	Professional Elective courses i. Process Modelling and Simulation ii. Bio Chemical Engineering iii. Materials Science and Engineering	3	0	0	3			60
PEC	PROFESSIONAL ELECTIVE – III i. General Chemical Technology ii. Industrial Biotechnology	3	0	0	3	OEC	Open Elective Course/Job oriented elective i. Basics of Waste Management ii. Introduction to Petrochemicals iii. Fundamentals of Green Technologies	2	0	2	3	YES		10
PCC	Chemical Reaction Engineering – Laboratory	0	0	3	1.5	PCC	Chemical Reaction Engineering – Laboratory	0	0	3	1.5			
PCC	Mathematical methods – Laboratory	0	0	3	1.5	PCC	Process Equipment Design & Drawing – Laboratory	0	0	3	1.5			
**HSS	Universal Human Values 2: Understanding Harmony	3	0	0	3	PCC	Simulation – Laboratory	0	0	3	1.5			

*MC	Employability Skills – I: Python Programming	1	0	1	0	SC	Data Science	**1**	**0**	**2**	**2**			
						MC	IPR & Patenting	2	0	0	0			
TOTAL					21	**TOTAL**					21.5			

Program Code: 021A08 **Program Name:B.Tech – CHEMICAL ENGG.** **Year : IV** **Semester: I**

R19						**R20**						**Remarks**		
Course code	**Course name**	**L**	**T**	**P**	**C**	**Course code**	**Course name**	**L**	**T**	**P**	**C**	**New Course? (R20)**	**Deleted Course? (R19)**	**Content Revision %**
PCC	Transport Phenomena	3	0	0	3	PEC	Professional Elective courses i. Process Intensification ii. Optimization Techniques for Chemical Engineers iii. Fluidization Engineering	3	0	0	3	YES		
PCC	Plant Design and Economics for Chemical Engineers	3	0	0	3	PEC	Professional Elective courses i. Petroleum Production Engineering ii. Computational Fluid Dynamics iii. Petroleum Reservoir Engineering	3	0	0	3			
PEC	PROFESSIONAL ELECTIVE – IV i. Process Modelling and Simulation	3	0	0	3	PEC	Professional Elective courses i. Industrial Safety & Hazard Management	3	0	0	3			

	ii. Fluidization Engineering						ii. Nanotechnology iii. Natural Gas Engineering							
PEC	PROFESSIONAL ELECTIVE – V i. Optimization Techniques for Chemical Engineers ii. Industrial Safety & Hazard Management	3	0	0	3	OEC	Open Elective Courses/ Job oriented elective i. Pipeline Engineering ii. Chemical Process Safety iii. Fundamentals of Liquefied Natural Gas	2	0	2	3			
OEC	OPEN ELECTIVE – II (for other Branches) i. Hazard Operability and Fault Tree Analysis in Process Plants ii. Heat Integration and Pinch Analysis iii. Design of Experiments and Analysis.	3	0	0	3	OEC	Open Elective Courses/ Job oriented elective iv. Hazard Operability and Fault Tree Analysis in Process Plants v. Heat Integration and Pinch Analysis vi. Design of Experiments and Analysis	2	0	2	3			
PCC	Process Equipment Design & Drawing – Laboratory	0	0	3	1.5	MC	Universal Human Values 2: Understanding Harmony	3	0	0	3			
PCC	Process Simulation – Laboratory	0	0	3	1.5	SC	Cloud Computing	1	0	2	2			
PROJ	Presentation/Seminar (SIP Report)	0	0	0	1	PEC	Professional Elective courses i. Process Intensification ii. Optimization Techniques for Chemical Engineers	3	0	0	3			

							iii. Fluidization Engineering								
PROJ	Project (Industrial/In-house) (Phase-1)	0	0	0	2		**Industrial/Research Internship (Mandatory) after third year to be evaluated during VII semester**	0	0	0	3				
TOTAL					21		**TOTAL**				23				

Program Code: 021A08 **Program Name:B.Tech – CHEMICAL ENGG.** **Year : IV** **Semester: II**

R19						**R20**						**Remarks**		
Course code	**Course name**	**L**	**T**	**P**	**C**	**Course code**	**Course name**	**L**	**T**	**P**	**C**	**New Course? (R20)**	**Deleted Course? (R19)**	**Content Revision %**
PEC	PROFESSIONAL ELECTIVE – VI i. Nanotechnology ii. Petroleum Production Engineering	3	0	0	3	Major Project	Project (internship in industry)/ Project (in-house) and seminar.	0	0	0	12		YES	
PEC	PROFESSIONAL ELECTIVE – VII i. Natural Gas Engineering ii. Computational Fluid Dynamics	3	0	0	3									

OEC	OPEN ELECTIVE – III (for Chemical Engineering) i. NPTEL-Data Analysis & Decision making ii. NPTEL- E-Business iii. NPTEL- Innovation, Business Models & Entrepreneurship	3	0	0	3									
PROJ	Project (Industrial / In-house) (Phase-2)	0	0	12	8									
TOTAL					20	**TOTAL**					12			

TOTAL CREDITS: (R19) I Year (39) II Year (42) III Year (41) IV Year (38) = 160 Credits