



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Branch: Electrical Engineering

Subject Code: BE100501

Subject Name : Contributor

Personality Development Program

w. e. f. Academic Year:	2024-25
Semester:	5TH
Category of the Course:	PD(elective)

Prerequisite:	Personality development (elective)
Rationale:	This course is designed to transform the mindset of students from being just “workers” to becoming “contributors.” In today’s dynamic work environment, organizations seek individuals who go beyond task execution — those who take initiative, create value, and demonstrate ownership.

Teaching and Examination Scheme –

Hours per Week			Course Credits	Examination Marks				
L	T	P		Theory Marks		Practical Marks		Total Marks
				E	M	I	V	
2	0	0	2	60	40	20	30	150

Detailed Syllabus –

Unit	Content	Total Hrs	% Of Weight
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Personality Development Program

1	The Contributor Work Ideal: In this topic, students explore what is their “ideal” of work – is the ideal to be a “worker” or to be a “contributor”? For example, an employee who has the ideal of a “worker” goes to work to pass time, earn a living, get benefits; in contrast to an employee with the ideal of a “contributor” who wants to make a difference, get things done well, create value for the company. This enables students to transform their expectation of themselves in work	7	16.7%
2	Identity & Self-esteem: In this topic, students engage with the question “who am I?” or on what basis do they define themselves. Is their identity defined by what others think of them (extrinsic self-esteem) or by what they think of themselves (intrinsic self-esteem)? Further, they discover positive identities that lead to intrinsic self-esteem, such as an I-can identity based on one’s capacity and inner strength. This enables them to build confidence and self-esteem.	7	16.7%



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3	<p>Become a Creator of one's destiny: In a "victim stance", we see the career environment as full of difficulties and hurdles. We feel powerless or blame our circumstances for not having many opportunities. This makes us fearful of uncertainty and makes us settle for jobs where we remain mediocre. In this topic, students discover the "creator of destiny stance" to challenges and situations. This stance frees them to try out new things, open up new possibilities, take on responsibility, see the opportunity hidden in their environment.</p>	7	16.7%
4	<p>Achieving Sustainable Success: In this topic, students discover how to achieve sustainable or lasting success, by building one's "engine of success", making them success worthy. Where their focus shifts to building one's "engine of success" Rather than being on chasing the "fruit of success". This is important, because over a lifetime of work, all people go through ups and downs – where the fruits are not in their control. People who are focused on the fruit of success, fall prey to disappointment, losing motivation, quitting too early, trying to find shortcuts – when fruits don't come. Whereas people focused on building their engine of success continue to contribute steadily, irrespective of whether fruits come or not. And with a strong engine of success, fruits come to them in time.</p>	7	16.7%



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5	Career Development Models: In this topic, students explore arrange of diverse “career development models” and the possibilities for contribution each opens up to them (e.g. start-up career model, change-maker career model, etc.). This opens their mind to different and even unconventional career models possible, beyond the usual (such as “stable large company career model” where one gets an engineering degree, then MBA, then get a job in a large company). This frees them from a herd mentality when making career choices.	7	16.7%
6	Expanding contribution in every role: In this topic, students explore the many roles they can play in their life & discover the power they have to expand the contribution possible in any role. (E.g. role of student, role of manager, role of a project site engineer). So, the potential of a role is in the individual’s hands. This opens their mind to an alternative way of career growth.	7	16.7%
Teaching hours		42	100

Course Outcomes –

CO No.	Course Outcome	RBT Level
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CO1	Recognize and appreciate two alternative ideals of work – “worker” vs “contributor”	Understand
CO2	Recognize and appreciate positive identities for building intrinsic self-esteem	Understand, Apply
CO3	Distinguish between “victim” stance and “creator of destiny” stance in facing challenges	Analyze, Evaluate
CO4	Differentiate between ‘building engine of success’ vs ‘chasing fruits of success’ for sustainable growth	Analyze
CO5	Explore and appreciate diverse career development models	Understand, Apply
CO6	Expand the contribution possible in any role and interpret experiences in terms of contribution	Apply, Evaluate

CO\PO MATRIX

CO \ PO	CO1	CO2	CO3	CO4	CO5	CO6
PO1 Basic knowledge	2	1	2	2	2	2
PO2 Discipline knowledge	-	-	2	2	-	2
PO3 Experiments and practice	-	-	-	1	-	1
PO4 Engineering tools	-	-	-	-	-	-
PO5 The engineer and society	-	-	-	-	-	-
PO6 Environment and sustainability	3	2	3	2	1	2
PO7 Ethics	-	-	-	-	-	-
PO8 Individual and team work	3	3	2	2	2	2
PO9 Communication	2	2	2	2	2	3
PO10 Life-long learning	2	2	2	2	2	3



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CO\PSO	PSO1(Ability to develop self-awareness and professional conduct)	PSO2(Ability to demonstrate leadership and team contribution in real-world roles)
CO1	3	2
CO2	3	2
CO3	3	3
CO4	3	3
CO5	2	3
CO6	3	3

Reference book-

Basic reference for both students and teachers

- Contributor Personality Program text book cum work book developed by Illumine
- Web-based Activ Guide™ for self-exploration of rich media resources to vividly understand many of the ideas, watch role models, learn from industry people, get reference readings – that help them enrich the understanding they gained in the class published by Illumine Foundation

Advanced reference for teachers

- On Contributors, Srinivas V.;Illumine Ideas, 2011
- Enlightened Citizenship and Democracy; Swami Rangan at hananda, Bharatiya Vidya Bhavan, 1989
- Eternal Values for a Changing Society – Vol I-IV, Swami Rangan at hananda; Bharatiya Vidya Bhavan
- Karma Yoga,Swami Vivekananda;Advaita Ashrama
- Vivekananda:His Call to the Nation ,Swami Vivekananda; Advaita Ashrama
- Six Pillars of Self Esteem, Nathaniel Branden ;Bantam, 1995
- Mindset:TheNewPsychologyofSuccess,CarolS.Dweck;RandomHousePublishingGroup, 2007
- Lasting Contribution:How to Think ,Plan ,and Actto Accomplish Meaningful Work, Tad



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Waddington; Agate Publishing, 2007

- Why not?: how to use everyday ingenuity to solve problems big and small, Barry Nalebuff, Ian Ayres; Harvard Business School Press, 2003
- Thevaluemindset:returningtothefirstprinciplesofcapitalistenterprise(Ch8&9);Erik Stern, Mike Hutchinson; John Wiley and Sons, 2004
- The Power of Full Engagement: Managing Energy, Not Time, is the Key to High Performance and Personal Renewal, Jim Loehr, Tony Schwartz; Simon and Schuster, 2003
- CreatingSharedValue,MichaelE.PorterandMarkR.Kramer;HarvardBusinessReview; Jan/Feb2011, Vol. 89 Issue ½
- TheSpeedofTrust:TheOneThingThatChangesEverything,StephenM.R.Covey,Rebecca R.Merrill,StephenR.Covey;FreePress,2008
- TheCouragetomeetthedemandsofReality,HenryCloud;HarperCollins,2009
- Responsibilityatwork:howleadingprofessionalsact(ordon'tact)responsibly,HowardGardner ; John Wiley & Sons, 2007



SWAMINARAYAN UNIVERSITY

Program Name: Engineering

Level: UG

Branch: Electrical Engineering

Subject Code: BE100502

**Subject Name : IPDC-1(Integrated
Personality Development Course)**

w. e. f. Academic Year:	2025-26
Semester:	5TH
Category of the Course:	Personality development (elective)

Prerequisite:	Personality development (elective)
Rationale:	The Integrated Personality Development Course (IPDC-1) is designed to help students develop a holistic, value-based personality that supports success in academic, professional, and personal life. The course nurtures self-awareness, positive habits, ethical thinking, emotional intelligence, communication skills, and national pride. It introduces students to the lives of great personalities and emphasizes applying values such as empathy, unity, responsibility, and discipline. It also helps bridge the gap between soft skills and technical skills, producing ethically sound, socially responsible, and emotionally stable professionals.

Teaching and Examination Scheme –

Hours per Week			Course Credits	Examination Marks				
L	T	P		Theory Marks		Practical Marks		Total Marks
				E	M	I	V	
2	0	0	2	60	40	20	30	150



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Branch: Electrical Engineering

Subject Code: BE100502

Subject Name : IPDC-1(Integrated Personality Development Course)

Detailed Syllabus –

Lecture No.	Module-Lecture	Lecture Description	Hours	% Of Weight
1	Remaking Yourself Restructuring Yourself	Students learn how self-improvement enables them to secure a bright future for themselves. They will learn 6 powerful thought-processes that can develop their intellectual, physical, emotional, and spiritual quotients.	2	6
2	Remaking Yourself- Power of Habit	Students will undergo a study of how habits work, the habits of successful professionals, and the practical techniques that can be used to develop good habits in their life.	2	6
3	Learning from Legends- Tendulkar & Tata	Students will learn from the inspiration allives of India's two legends, Sachin Tendulkar and RatanTata. They will implement these lessons through relatable case studies.	2	6
4	From House to Home- Listening & Understanding	Active listening is an essential part of academic progress and communications. Students will learn to listen with their eyes, ears, mind, and heart.	2	6
5	Facing Failures- Welcoming Challenges	This lecture enables students to revisit the way in which they b approach challenges. Through the study of successful figures such as Disney, Lincolnand Bachchan, students will earn to face difficulties through a positive perspective.	2	6
6	Facing Failures- Significance of Failures	Failure is a student's daily source of fear, negativity, and depression. Students will be given the constructive skills to understand failure as formative learning experiences.	2	6
7	My India My Pride- GloriousPast-Part1	India's ancient Rishis, scholars, and intellectuals have made tremendous contributions to the world, they developed an advanced, sophisticated culture and civilization which began thousands of years ago. Students will learn the importance of studying India's glorious past so that they could develop a strong passion and pride for our nation.	2	8



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8	My India My Pride- GloriousPast-Part2	Our ancient concepts can be used to seek revolutionary ideas and to generate inspiration. Students will develop a deeper interest in India's Glorious Past – by appreciating the need to read about it, research it, write about it, and share it.	2	6
9	Learning from Legends- A.P.J.Abdul Kalam	Dr Kalam's inspirational life displayed legendary qualities which apply to students (1) Dare to Dream (2) Work Hard (3) Get Good Guidance (4) Humility (5) Use Your Talents for the Benefit of Others.	2	6
10	Soft Skills- Networking & Leadership	Students are taught the means of building a professional network and developing a leadership attitude.	2	6
11	Soft Skills- Project Management	Students will learn the secrets of project management through the Akshardham case study. They will then practice these skills through an activity relevant to student life.	2	8
12	Remaking Yourself- Handling Social Media	Students will learn how social media can become addictive and they will imbibe simple methods to take back control.	2	6
13	Facing Failures- Power of Faith	Students will learn about the power and necessity of faith in our daily lives.	2	6
14	From House to Home- Bonding the Family	Students will understand the importance of strong family relationships. They will learn how to overcome the generation gap and connect with their family more.	2	6
15	Selfless Service- Seva	Students will learn that performing sevas is beneficial to one's health, wellbeing, and happiness. It also benefits and inspires others.	2	5
Teaching Hours			30	100



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Subject Name : IPDC-1(Integrated Personality Development Course)

Course Outcomes –

CO No	Course Outcome Description	RBT Level
CO1	To provide students with a holistic value-based education that will enable them to be successful in their academic, professional, and social lives.	Remember
CO2	To give the students the tools to develop effective habits, promote personal growth, and improve their wellbeing, stability, and productivity.	Understand
CO3	To allow students to establish a stronger connection with their family through critical thinking and development of qualities such as unity, forgiveness, empathy, and effective communication.	Understand
CO4	To provide students with soft skills that complement their hard skills, making them more marketable when entering the workforce.	Apply
CO5	To enhance awareness of India's glory and global values, and to create considerate citizens who strive for the betterment of their family, college, workforce, and nation.	Apply
CO6	To inspire students to strive for a higher sense of character by learning from role models who have lived principled, disciplined, and value-based lives.	Evaluate

CO\PO MATRIX

CO \ PO	CO1	CO2	CO3	CO4	CO5	CO6
PO1 Basic knowledge	2	2			1	
PO2 Discipline knowledge	2	2	1	2		
PO3 Experiments and practice						
PO4 Engineering tools				2		
PO5 The engineer and society	-	-	-	-	-	
PO6 Environment and sustainability	-	-	-	-	3	



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PO7 Ethics	2	2	3	2	2	3
PO8 Individual and team work	-	-	2	3	-	2
PO9 Communication	-	-	2	2		
PO10 Life-long learning	3	3	2	3	2	2

CO\PSO MATRIX

CO \ PSO	PSO1(Apply the concepts of value-based education to build an ethically and emotionally balanced personality.)	PSO2(Use self-discipline, communication, and leadership traits to become a contributor in society and workplace.
CO1	3	2
CO2	3	2
CO3	3	3
CO4	2	3
CO5	3	2
CO6	3	3

Reference book-

Module No.	Module	References
1	Facing Failures	<ol style="list-style-type: none"> 1. Thomas Edison's factory burns down, New York Times Archives, Page 1, 10/12/1914 2. Lincoln Financial Foundation , Abraham Lincoln's "Failures": Critiques , Forgotten Books, 2017 3. J.K. Rowling Harvard Commencement Speech Harvard University Commencement, 2008 4. Born A gain on the Mountain: A Story of Losing Everything and Finding It Back, Arunima Sinha, Penguin, 2014 5. Failing Forward: Turning Mistakes Into Stepping Stones for Success, John C. Maxwell, Thomas Nelson, 2007 6. Steve Jobs: The Exclusive Biography Paperback, Walter Isaacson, Abacus, 2015



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		7. Failing Forward: Turning Mistakes Into Stepping Stones for Success, John C. Maxwell, Thomas Nelson, 2007
2	Learning from Legends	8. Chase Your Dreams: My Auto biography, Sachin Tendulkar, Hachette India, 2017 9. Playing It My Way: My Autobiography, Sachin Tendulkar, Hodder & Stoughton, 2014 10. The Wit and Wisdom of Ratan Tata, Ratan Tata, Hay House, 2018 11. The Tata Group: From Torchbearer to Trailblazers, Shashank Shah, Penguin Portfolio, 2018 12. The Leader Who Had No Title, Robin Sharma, Jaico Publishing House, 2010 13. In the Joy of Others: A Life-Sketch of Pramukh Swami Maharaj, Mohanlal Patel and BAPSS adhus, Swaminarayan Aksharpath, 2013
3	My India My Pride	1. Rishis, Mystics, and Heroes of India, Sadhu Mukundcharandas, Swaminarayan Aksharpath, 2011 2. Physics in Ancient India, Narayan Dongre, Shankar Nene, National Book Trust, 2016 3. The Rise of Civilization in India and Pakistan, Raymond Allchin, Bridget Allchin, Cambridge University Press, 1982 4. The Āryabhaṭīya of Āryabhaṭa: An Ancient Indian Work on Mathematics and Astronomy (1930), Walter Eugene Clark, University of Chicago Press, reprint, Kessinger Publishing, 2006



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4	Remaking Yourself	<ol style="list-style-type: none"> 1. Power of Habit, Charles Duhigg, RandomHouseTradePaperbacks,2014 2. Change Your Habit, ChangeYourLife, TomCorley, NorthLoopBooks,2016 3. The Seven Habits of Highly Effective People, Stephen Covey, Simon & Schuster,2013 4. Seven Habits of Highly Effective Teens, Sean Covey, Simon & Schuster,2012 5. Atomic Habits, James Clear, Random House,2018 6. Howahandfuloftechcompaniescontrolbillionsofmindseveryday,TristanHarris,TED Talk, 2017
5	From House to Home	<ol style="list-style-type: none"> 1. “What Makes a Good Life? Lessons from the Longest Study on Happiness”, R.Waldinger, Ted Talks, 2015 2. Long Walk To Freedom, Nelson Mandela, Back Bay Books,1995 3. Outliers,MalcolmGladwell,BackBayBooks,2011
6	Soft Skills	<ol style="list-style-type: none"> 1. The 17 Indisputable Laws of Team work, John Maxwell, Harper Collins, 2013 2. Team of Teams: New Rules of Engagement for a Complex World, Stanley Mc Chrystal, Portfolio, 2015 3. PredictablyIrrational,RevisedandExpandedEdition:TheHiddenForcesThatShapeOur Decisions, Dan Ariely, Harper Perennial, 2010
7	Selfless Service	<ol style="list-style-type: none"> 1. Open: An Autobiography, Andre Agassi, Vintage, 10August 2010 2. The Physiological Power of Altruism [online], James Hamblin, The Atlantic, December 30, 2015, https://www.theatlantic.com/health/archive/2015/12/altruism-for-a-better-body/422280/ [lastaccessedJune10,2020] 3. TBIB logs: From Entrepreneurs to Doorkeepers, Every body Serves with Love & Warmthat This Ahmadabad Café [online], The People Place Project, The Better India, May 29, 2017, https://www.thebetterindia.com/102551/small-way-serve-ahmedabad-seva-cafe/, [last accessed June10,2020]



SWAMINARAYANUNIVERSITY

Program Name: Engineering

Level: UG

Course/ Subject Code: BE101501

Course/Subject Name: Heat Transfer

w.e.f. Academic Year:	2024-25
Semester:	5 th SEM / 3 rd year
Category of the Course:	Professional Core

Prerequisite:	Nil
Rationale:	The course is prepared to provide the detailed understating of various modes of heat transfer and its applications in Mechanical Engineering. The course also provides the basic technical knowledge related to heat exchangers.

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA(M)	PA(I)	ESE(V)	
4	0	2	5	60	40	20	30	150



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Program Name: Engineering

Level: UG

Course/ Subject Code: BE101501

Course/Subject Name: Heat Transfer

CourseContent:

Unit No.	Content	No.of Hours	% of Weigh tage
1	Conduction: <ul style="list-style-type: none"> Fourier's law, effect of temperature on thermal conductivity of different solids, liquids and gases,generalized equation in Cartesian, cylindrical and spherical coordinates and its reduction to specific cases, One dimensional steady state conduction, heat conduction through plane and composite walls, cylinders and spheres, electrical analogy, critical radius of insulation for cylinder and sphere, overall heat transfer coefficient Heat transfer from extended surface: <ul style="list-style-type: none"> Types of fin, heat flow through uniform cross-sectional area fin for various cases like infinitely long fin, fin insulated at the tip and fin losing heat at the tip, efficiency and effectiveness of fin, Estimation of error in temperature measurement in a thermometer well Transient heat conduction: <ul style="list-style-type: none"> lumped capacitance method for bodies of infinite thermal conductivity, time constant, one dimensional transient heat conduction in plane wall with finite conduction and convective resistances 	18	30
2	Convection: <ul style="list-style-type: none"> Newton's law of cooling, dimensional analysis applied to forced and free convection, dimensionless numbers and their physical significance, empirical correlations for free and forced convection,Continuity, momentum and energy equations, thermal and hydrodynamic boundary layer, Blasius solution for laminar boundary layer, General solution for Von-Karman integral momentum equation 	12	20
3	Radiation: <ul style="list-style-type: none"> Absorptivity, reflectivity and transmissivity, black, white and grey body, emissive power, emissivity, Kirchhoff's law,Planck's law, Rayleigh-Jeans' law, Wien's law, Wien's displacement law, Stefan-Boltzmann law, intensity of radiation, radiation heat exchange between black bodies, shape factor, electrical analogy, radiation heat exchange between gray bodies, radiosity, irradiation, radiation shields 	12	20



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Course/Subject Name: Heat Transfer

4	Heat exchanger: <ul style="list-style-type: none"> • Classification, heat exchanger analysis, • LMTD for parallel and counter flow exchanger, condenser and evaporator, • overall heat transfer coefficient, fouling factor, • correction factors for multi pass arrangement, • effectiveness-NTU method for parallel and counter flow heat exchanger, introduction of heat pipe and compact heat exchanger 	08	15
5	Two-phase heat transfer: <ul style="list-style-type: none"> • Boiling of liquids, Pool boiling curve, modes of pool boiling, • correlation for pool boiling, condensation of vapor, • film wise and drop wise condensation, • condensation on flat surfaces and horizontal tubes 	06	15
	Total	56	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
18	28	14	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)



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Program Name: Engineering

Level: UG

Course/ Subject Code: BE101501

Course/Subject Name: Heat Transfer

Course Outcome:

After Completion of the Course , the Student will be able to:

No	Course Outcomes	RBT level
CO1	To classify the heat transfer problems and to apply the principles of steady state one-dimensional heat transfer, extended surface, and unsteady conduction for Mechanical engineering problems.	Apply
CO2	To identify the type of convection problems and apply concepts of natural and forced convection for related problems.	Apply
CO3	To explain laws of radiation heat transfer and determine radiation heat transfer between black and grey surfaces.	Apply
CO4	To practice LMTD and effectiveness-NTU method for simple heat exchange devices.	Understand
CO5	To identify types of boiling and condensation heat transfer processes and estimate heat transfer coefficients.	Understand

Program Outcomes (POs)

PO No.	Program Outcome
PO1	Engineering knowledge
PO2	Problem analysis
PO3	Design/development of solutions
PO4	Conduct investigations of complex problems
PO5	Modern tool usage

Course Outcome to Programme Outcome (CO-PO) Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2
CO2	3	3	2	2	2
CO3	3	3	2	2	2
CO4	3	2	2	2	3
CO5	3	2	2	2	2



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Program Name: Engineering

Level: UG

Course/ Subject Code: BE101501

Course/Subject Name: Heat Transfer

Program Specific Outcomes (PSOs)

PSO No.	Program Specific Outcome
PSO1	Apply fundamental knowledge of mechanical engineering to solve thermal and fluid systems problems.
PSO2	Use engineering tools and techniques to design and analyze heat transfer components.

CO-PSO MAPPING:

CO \ PSO	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	2	3
CO5	3	3

References/Suggested Learning Resources:

(a) Books:

1. Heat and Mass Transfer by P.K. Nag, McGraw Hill
2. Heat and Mass Transfer: Fundamentals and Application by YunusCengel, McGraw Hill
3. Fundamental of Heat and Mass Transfer by Incropera and Dewitt, Wiley Publication
4. Heat Transfer by Mills and Ganesan, Pearson Education
5. Heat Transfer by J P Holman , McGraw Hill
6. Heat and Mass Transfer by R K Rajput, S.Chand Publication

(b) Open-sourcewebsite:

1. <http://nptel.ac.in/>

Suggested Course Practical List:

1. To determine the thermal conductivity of given metal rod
2. To determine the thermal conductivity of the given composite walls.
3. To determine Stephan Boltzmann constant experimentally.
4. To determine heat transfer co-efficient by forced convection.
5. To determine heat transfer co-efficient by natural convection.
6. To determine the overall heat transfer co-efficient of shell and tube type heat exchangers.
7. To determine the emissivity of gray body.



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Level: UG

Course/ Subject Code: BE101501

Course/Subject Name: Heat Transfer

8. To study film and drop wise condensation and to determine the film co-efficient
9. To measure convective heat transfer co-efficient and effectiveness of the fin under forced convection.
10. To measure convective heat transfer co-efficient and effectiveness of the fin under natural convection.
11. To determine heat transfer co-efficient for hair pin heat exchanger.
12. To determine heat transfer co-efficient for transient heat transfer process.
13. To determine critical radius of insulation.

List of Laboratory/Learning Resources Required:

- Hair pin heat exchanger,
- Shell and tube heat exchanger,
- Pin fin apparatus,
- Emissivity measurement apparatus,
- Composite wall apparatus,
- Stefan Boltzmann apparatus,
- Natural and force convection apparatus,
- transient heat transfer apparatus,
- critical radius apparatus,
- film and drop wise condensation apparatus



SWAMINARAYAN UNIVERSITY

Program Name: Engineering Level: Degree

Course/ Subject Code: BE101502

Course/Subject Name: DYNAMICS OF MACHINERY

w.e.f.Academic Year:	2024-25
Semester:	5 TH Semester/ 3 RD Year
Category of the Course:	Professional core

Prerequisite:	Kinematics and theory of machines
Rationale:	The course is designed to give fundamental knowledge of behavior of machines under dynamic condition

Teaching and Examination Scheme:

TeachingScheme(inHours)			TotalCredits L+T+(PR/2)	AssessmentPatternandMarks				TotalMark s
L	T	PR	C	Theory		Tutorial/Practical		
				(E)	(M)	(I)	(V)	
4	0	2	5	60	40	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Dynamic force analysis of mechanisms: Introduction, D'Alembert's principle, equivalent offset inertia force, dynamic analysis of four link mechanism, dynamic analysis of slider crank mechanism, velocity & acceleration of piston, angular velocity & angular acceleration of connecting rod, engine force analysis, dynamically equivalent system inertia of the connecting rod, inertia force in reciprocating engines. .	04	15
2.	Turning moment diagrams and flywheel Turning moment diagram for various type of engines, fluctuation of energy, fluctuation of speed, flywheel, energy stored in flywheel, dimensions of flywheel rims, flywheel in punching presses.	04	10
3.	Balancing: Introduction, static balancing, dynamic balancing, transference of force from one plane to another plane, balancing of several masses in different planes, force balancing of linkages, balancing of reciprocating mass, balancing of locomotives, Effects of partial balancing in locomotives, secondary balancing, balancing of inline engines, balancing of v-engines, balancing of radial engines, balancing machines	11	20



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Program Name: Engineering Level: Degree

Course/ Subject Code: BE101502

Course/Subject Name: DYNAMICS OF MACHINERY

सर्व विद्या अधिपतये

4.	Gyroscope: Angular velocity, angular acceleration, gyroscopic torque, gyroscopic effect on naval ships, aero plane, stability of an automobile, stability of two wheel vehicle	05	10
5.	Free vibrations and damped free vibrations: Types of vibrations, elements constituting vibration, spring mass system, free undamped vibrations, equation of motion, equivalent spring stiffness, free damped vibrations, equation of motion for viscous damper, damping factor, under damped system, critically damped system, over damped system, logarithmic decrement, free torsional vibration of a two and three rotor system, torsionally equivalent shaft, torsional vibration of a geared system	12	20
6.	Forced damped vibrations: Analytical solution of forced damped vibration, vector representation of forced vibrations, Magnification factor, force transmissibility, forced vibration with rotating and reciprocating unbalance, forced vibration due to excitation of support, vibration frequency measurement	08	15
7.	Critical speeds of shafts: Critical speed of shaft carrying single rotor and having no damping, Critical speed of shaft carrying single rotor and having damping, secondary critical speeds in horizontal shafts, critical speed of shaft having multiple rotors. .	05	10
Total		49	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
22%	32%	46%	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Summarize dynamic forces and turning moments in mechanisms.	Understand,



SWAMINARAYAN UNIVERSITY

Program Name: Engineering Level: Degree

Course/ Subject Code: BE101502

Course/Subject Name: DYNAMICS OF MACHINERY

सर्व विद्या अधिपतये

2	Minimize unbalance in mechanical systems by means of static and dynamic balancing	Apply / Analyze
3	Analyze gyroscopic effect in aeroplane, ships and automobiles.	Analyze
4	Demonstrate longitudinal vibrations, transverse vibrations and torsional vibrations in single degree of freedom systems .	Understand / Apply
5	Determine critical speed of the shaft.	Apply

Course Outcome to Programme Outcome (CO-PO) Mapping

CO-PO Mapping					
PO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5
PO-1 Basic Engg Knowledge	3	3	3	3	2
PO-2 Problem Analysis	3	2	2	2	2
PO-3 Design/Development	2	2	2	3	2
PO-4 Investigations	2	2	1	2	1
PO-5 Modern Tool Usage	2	2	2	2	2
PO-6 Engineer & Society	0	0	0	0	0
PO-7 Environment & Sustainability	0	0	0	0	0
PO-8 Ethics	0	0	0	0	0
PO-9 Individual & Team Work	0	0	0	0	0
PO-10 Communication	1	1	1	1	1
PO-11 Project Management	1	0	0	1	0
PO-12 Lifelong Learning	1	1	1	1	1
CO-PSO Mapping					
PSO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5
PSO-1 Programming Skills	3	2	2	3	2
PSO-2 Analytical Ability	2	2	2	2	1
PSO-3 Software Tools Use	1	1	1	1	1



SWAMINARAYAN UNIVERSITY

Program Name: Engineering Level: Degree

Course/ Subject Code: BE101502

Course/Subject Name: DYNAMICS OF MACHINERY

References/Suggested Learning Resources:

(a) Books:

1. Theory of Machines, S.S.Rattan , Tata Mc-Graw Hill.
2. Mechanical Vibrations and Noise Engineering, A. G. Ambekar, Prentice Hall of India.
3. Dynamics of Machinery, Farazdak Haideri, Nirali Prakashan.
4. Dynamics of Machines, S. Balaguru, Cengage Learning India Pvt. Ltd.
5. Kinematics and Dynamics of Machinery, Norton R L, McGraw-Hill
6. Theory of Machines : Kinematics and Dynamics, Sadhu Singh, Pearson

(b) Open source software and website:

1. <http://nptel.ac.in/>

Suggested Course Practical List:

1. Static and dynamic balancing of rotating masses.
2. Understanding of gyroscopic effect using motorized gyroscope.
3. Longitudinal free vibration of spring mass system.
4. Study of torsional vibration in shaft (single rotor and two rotor system)
5. Study of free damped vibration and logarithmic decrement.
6. Study of forced damped vibration.
7. Critical speed of the shaft.
8. Study of dynamic forces and turning moments in mechanisms.

List of Major Equipment/ Laboratory/Learning Resources/ Required:

- Two stroke and Four stroke Engines
- Cut section models for Fuel supply and lubrication systems
- Single plate, Multi-plate and Centrifugal clutch assemblies
- Cut section of Constant mesh, Sequential, Differential and CVT gearbox assemblies
- Cut section of Leaf springs, Telescopic suspension and Mono suspension system
- Single and double cradle frames, Engine based frame
- Layout of Electrical systems

Suggested Project List:



SWAMINARAYAN UNIVERSITY

Program Name: Engineering Level: Degree

Course/ Subject Code: BE 101503

Course/Subject Name: Control Engineering

w.e.f. Academic Year:	2024-25
Semester:	5 TH Semester/ 3 RD Year
Category of the Course:	Open Elective - 1

Prerequisite:	Nil
Rationale:	develop comprehensive knowledge and understanding of classical and modern control theory, industrial automation, and systems analysis. Control engineering is a diverse and rapidly expanding discipline which has become increasingly important in a wide range of industries.

Teaching and Examination Scheme:

TeachingScheme(inHours)			TotalCredits L+T+(PR/2)	AssessmentPatternandMarks				TotalMark s
L	T	PR	C	Theory		Tutorial/Practical		
				(E)	(M)	(I)	(V)	
3	0	0	3	60	40	00	00	100

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Basic concepts of control system: Control System, Basic components of control system, classification of control system, Closed loop control versus open loop control, Servomechanism, Regulator and process control, Example of control system.	03	10
2.	Modelling of control systems: Transfer function and impulse response function, Procedure for determining the transfer function of a control system, Block diagram of system, signal flow graph representation of physical systems along with rules, properties, Automatic control system, Linearization of nonlinear mathematical model, mathematical modeling of Mechanical systems and Electrical systems, Mathematical modeling of pneumatic and hydraulic systems, Fluid systems and Thermal systems.	09	15
3.	Modelling in time domain and its response analysis: Standard test signals along with examples of their usage, Applying state space representation, converting transfer function to state space, converting state space to transfer function, diagonalisation of state matrix, solution of state equation, concepts of controllability and observability, Poles, Zeros, and	09	15



SWAMINARAYAN UNIVERSITY

Program Name: Engineering Level: Degree

Course/ Subject Code: BE 101503

Course/Subject Name: Control Engineering

	System response, First order systems, Second order systems, Higher order systems, Transient response analysis, Routh's stability criterion, Effects of Integral and Derivative control, steady state errors of feedback control systems, Root Locus plot, Lead Compensation, Lag compensation, Lag-Lead compensation, Parallel Compensation.		
4.	Frequency response analysis: Bode diagram, Polar plots, Log Magnitude versus Phase plot, Nyquist stability criterion, Stability analysis, Relative stability analysis, closed loop frequency response of unity feedback system, experimental determination of transfer function, control system design by frequency response approach, Lead Compensation, Lag compensation, Lag-Lead compensation	08	15
5.	PID controllers Tuning PID controllers, Design PID controllers, Modification of PID control, Two degree of freedom control	04	15
6.	Hydraulic control system: Basic elements of hydraulic circuit, Principle used in hydraulic circuit, Sources of hydraulic power, Integral, Derivative, PD & PID controller with its transfer function, Comparison between hydraulic and electrical control system.	04	15
7.	Pneumatic control system: Basic elements of pneumatic circuit, Difference between pneumatic and hydraulic control systems, Force balance and force distance type controllers, Nozzle-flapper amplifier, PD, PI and PID control system along with its transfer function.	04	15
	Total	41	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
16%	24%	30%	20%	10%	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)



SWAMINARAYAN UNIVERSITY

Program Name: Engineering Level: Degree

Course/ Subject Code: BE 101503

Course/Subject Name: Control Engineering

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Summarized fundamentals of control systems and components of control systems.	Remembering (R) / Understanding (U)
2	Demonstrate the methodology for modelling mechanical, hydraulic and pneumatic systems for control.	Understanding (U) / Applying (A)
3	Develop the transfer functions, state space representation and block diagrams of physical systems for its control and stability.	Applying (A) / Analyzing (An)
4	Analyze time domain and frequency domain responses of mechanical systems.	Analyzing (An)
5	Make use of PID controllers for control of physical systems.	Applying (A)

Course Outcome to Programme Outcome (CO-PO) Mapping

CO-PO Mapping					
PO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5
PO-1 Basic Engg Knowledge	3	3	3	3	2
PO-2 Problem Analysis	2	2	3	3	2
PO-3 Design/Development	1	2	2	2	2
PO-4 Investigations	2	2	2	3	2
PO-5 Modern Tool Usage	2	2	2	2	2
PO-6 Engineer & Society	0	0	0	0	0
PO-7 Environment & Sustainability	0	0	0	0	0
PO-8 Ethics	0	0	0	0	0
PO-9 Individual & Team Work	0	0	0	0	0
PO-10 Communication	1	1	1	1	1
PO-11 Project Management	0	0	1	1	1
PO-12 Lifelong Learning	1	1	1	1	1
CO-PSO Mapping					
PSO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5
PSO-1 Programming Skills	3	3	3	3	2
PSO-2 Analytical Ability	2	2	2	3	2
PSO-3 Software Tools Use	1	1	2	2	1



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Program Name: Engineering Level: Degree

Course/ Subject Code: BE 101503

Course/Subject Name: Control Engineering

References/Suggested Learning Resources:

(a) Books:

1. Modern control theory, Katsuhiko Ogata, Pearson Education International, Fifth edition.
2. Control system engineering, Norman S Nise, John Wiley & Sons, Inc., Sixth edition
3. Control system engineering, S. K. Bhattacharya, Pearson India
4. Modern control systems, Richard C. Dorf, Robert H Bishop, Pearson Education International, Twelfth edition.
5. Automatic control systems, Farid Golnaraghi, Benjamin C Kuo, John Wiley & Sons, Inc., Ninth edition

(b) Open source software and website:

1. <http://nptel.ac.in/>

Suggested Course Practical List:

List of Major Equipment/ Laboratory/Learning Resources/ Required:

Computational facility.

Suggested Project List:



SWAMINARAYANUNIVERSITY

Program Name: Engineering

Level: UG

Course/ Subject Code: BE101504

Course/Subject Name: Oil Hydraulics and Pneumatics

w.e.f. Academic Year:	2024-25
Semester:	5 th SEM / 3 rd year
Category of the Course:	Professional Core

Prerequisite:	Nil
Rationale:	Course gives idea about the basic system working on fluid power and compressed air. Also different valves related to hydraulic and pneumatic systems are discussed in syllabus. Subject is also useful for designing the various hydraulic and pneumatic circuits for various engineering applications.

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA(M)	PA(I)	ESE(V)	
3	0	0	3	60	40	00	00	100



SWAMINARAYANUNIVERSITY

Program Name: Engineering

Level: UG

Course/ Subject Code: BE101504

Course/Subject Name: Oil Hydraulics and Pneumatics

CourseContent:

Unit No.	Content	No.of Hours	% of Weigh tage
1	Introduction: <ul style="list-style-type: none"> • Introduction, Global fluid power Scenario, • Basic system of Hydraulics-Major advantages and disadvantages, • Comparison among Electrical, Hydraulics and Pneumatics System, • Principles of Hydraulic Fluid power, Hydraulic Symbols, • Electrical Elements used in hydraulic circuits. • Basic Requirements for Pneumatic System, Basic Symbols of Pneumatic Systems, • Applications of Pneumatics. Electrical elements used in Pneumatic System. 	08	20
2	Hydraulic Oils, Fluid Properties and Filter: <ul style="list-style-type: none"> • Types, Properties, physical characteristics & functions of hydraulic Oils, • Classification Mineral based, Fire resistant& Biodegradable Oils, • Filters, Contaminations, location of filter. 	06	15
3	Hydraulic Pumps, Motors,Valves and Actuators: <ul style="list-style-type: none"> • Classification of hydraulic pumps, Gear Pumps, Vane Pumps, Piston Pumps, Axial piston pumps, • Hydraulic motors, Direction control valves, Pressure control valves, • Flow control valves, Non-return valves, Reservoirs, Accumulators, • Heating & cooling devices, Hoses. Types of Hydraulic Actuators, • Selection criterion of Actuators, Linear and Rotary Actuators, • Hydrostatic Transmission Systems. 	10	20
4	Air Preparation and Service Unit: <ul style="list-style-type: none"> • Types & Selection criteria for Air Compressors, • Air receiver, Pipeline Layout, Air filter, • Pressure regulator and Lubricator (FRL unit). 	05	10
5	Pneumatic Cylinders, Motors and Valves: <ul style="list-style-type: none"> • Types of Pneumatic Cylinders & Air motors, • Cushion assembly, mounting Arrangements, • Pneumatic Direction control valves, Quick exhaust, • Time delay Shuttle and Twin pressure valves. 	05	10
6	Circuit Design: <ul style="list-style-type: none"> • Basic hydraulic circuits, Industrial hydraulic circuits, • Power losses in flow control circuits, Basic pneumatic circuits, • Development of single Actuator Circuits, • Development of multiple Actuator Circuits, • Cascade method for sequencing 	06	15



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Program Name: Engineering

Level: UG

Course/ Subject Code: BE101504

Course/Subject Name: Oil Hydraulics and Pneumatics

7	Automation and Simulation of Hydraulics and Pneumatics: <ul style="list-style-type: none"> • Introduction to Automation in hydraulic and Pneumatic Systems, • Case study of Automation using Hydraulics and pneumatics. • Introduction to software of hydraulic and Pneumatic system, • Circuit designing in software, Simulation in software, • Simulation with actual component using software like automation in industry 	04	10
	Teaching hours	45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
28	18	14	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)



SWAMINARAYANUNIVERSITY

Program Name: Engineering

Level: UG

Course/ Subject Code: BE101504

Course/Subject Name: Oil Hydraulics and Pneumatics

Course Outcome:

After Completion of the Course , the Student will be able to:

No	Course Outcomes	RBT level
CO1	Demonstrate components for hydraulic and pneumatic systems and their applications.	Apply
CO2	Interpret functions of different hydraulic and pneumatic valves and make use of them in circuit design.	Apply
CO3	Design and analyze hydraulic and pneumatic circuits for specific applications.	Understand
CO4	Compile and make use of automation in hydraulic and pneumatic systems.	Analyzing (An)

Program Outcomes (POs)

PO No.	Program Outcome
PO1	Engineering knowledge
PO2	Problem analysis
PO3	Design/development of solutions
PO4	Conduct investigations of complex problems
PO5	Modern tool usage

Course Outcome to Programme Outcome (CO-PO) Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	0	0
CO2	3	3	2	0	0
CO3	3	3	3	2	2
CO4	3	2	3	2	3

Program Specific Outcomes (PSOs)

PSO No.	Program Specific Outcome
PSO1	Apply knowledge of hydraulics and pneumatics to design and maintain fluid power



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Program Name: Engineering

Level: UG

Course/ Subject Code: BE101504

Course/Subject Name: Oil Hydraulics and Pneumatics

	systems for mechanical applications.
PSO2	Use modern tools and simulation software to analyze and automate hydraulic and pneumatic systems.

CO-PSO MAPPING:

CO \ PSO	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	3
CO4	2	3

References/Suggested Learning Resources:

(a) Books:

1. Industrial Hydraulics by John Pippenger and Tyler Hicks, McGraw Hill.
2. Oil Hydraulic Systems, Principle and Maintenance by S R Majumdar, McGraw-Hill.
3. Fluid Power with Applications by Anthony Esposito, Pearson.
4. Fluid Power: Generation, Transmission and Control, Jagadeesha T., ThammaiahGowda, Wiley.
5. The Analysis & Design of Pneumatic Systems by B. W. Anderson, John Wiley.
6. Control of Fluid Power Analysis and Design by Mc Clay Donaldson, Ellis Horwood Ltd.
7. Hydraulic and Pneumatic Controls: Understanding made Easy, K.ShanmugaSundaram, S.Chand& Co Book publishers, New Delhi, 2006 (Reprint 2009)
8. Basic Pneumatic Systems, Principle and Maintenance by S R Majumdar, McGraw-Hill.

(b) Open-source website:

1. NPTEL
2. Simulation Software of Hydraulic Pneumatic system.

Suggested Course Practical List:

List of Laboratory/Learning Resources Required:



SWAMINARAYAN UNIVERSITY

Program Name: Engineering Level: Degree

Course/ Subject Code: BE102501

Course/Subject Name: Road Passenger Transport in India

w.e.f. Academic Year:	2024-25
Semester:	5 TH Semester/ 3 RD Year
Category of the Course:	Humanities and Social Science

Prerequisite:	Nil
Rationale:	Subject will cover various transport management aspects and motor vehicle laws after studying this subject the students will be able to manage a transport fleet and their related activities for minimizing operational cost.

Teaching and Examination Scheme:

TeachingScheme(inHours)			TotalCredits L+T+(PR/2)	AssessmentPatternandMarks				TotalMark s
L	T	PR	C	Theory		Tutorial/Practical		
				(E)	(M)	(I)	(V)	
3	0	0	3	60	40	00	00	100

Course Content:

Unit No.	Content	No. of Hours	% of Weight age
1.	Introduction Introduction to various transport systems, Advantages of motor transport, Staff administration, Recruitment and Training, welfare, driver's health and safety, Basic principles of supervising, Organizing time and people, Driver and mechanic hiring, economical and safe driving tips for city and highway, understanding of traffic rules, Trip leasing, Vehicle operation and types of operations.	05	10
2.	Transport Management Transport organization structure, operations, Forms of ownership ,management – internal organization, centralized condition, decentralized condition (Engineering, traffic and administration)Planning Scheduling operation & control, Propaganda, publicity and passenger amenities Parcel traffic, General set up, transport industry, Government / (STU) State Government Undertakings and private Bus transport organizations, Bus depot organization structure, Truck fleet operators organization, Requirements and Problems on fleet management. Fire brigade, fleet and Ambulance operations management 108, organizational activities and it's benefits for the society.	10	15



SWAMINARAYAN UNIVERSITY

Program Name: Engineering Level: Degree

Course/ Subject Code: BE102501

Course/Subject Name: Road Passenger Transport in India

3.	Scheduling and fare structure Need for scheduling, Principal features of operating costs for transport vehicles, Fare structure, and Various types of fare collecting methods, Theory of fares-Basic principles of fare charging, Differential rates for different types of services, Depreciation & debt charges, Operation cost and Revenues, Economics & records Basic factors of bus scheduling, Problems on bus scheduling.	05	15
4.	Planning for New Transport Organization Geographical considerations, economic factors, vehicles used, planning of trips. Concept of BRTS operations. Organization of Transport Services: Records and fleet management, vehicles schedule, booking and reservation, statistical records, recording of goods transport Scheduling of goods transport, Management Information System (MIS) in passenger / goods transport operation. Storage & transportation of petroleum products, Advanced Techniques in Traffic Management, Traffic navigation, Global positioning system, Study of BRTS concept, system and management. It's advantages and disadvantages in terms of mass transportation.	10	15
5.	Motor Vehicle Act Short titles & definitions, Laws governing to use of motor vehicle & vehicle transport, Licensing of drivers & conductors, Registration of vehicle, State & interstate permits, Traffic rules, Signals & controls, Accidents, Causes & analysis, Liabilities & preventive measures, Rules & regulations, Responsibility of driver, Public & public authorities, Offences, penalties & procedures, Different types of forms, Government administration structure, Personnel, Authorities & duties, Rules regarding construction of motor vehicles, Licensing of taxis and buses, testing and passing of vehicles, Description of goods carrier, delivery van, tanker, tipper, municipal, firefighting and break down service vehicle. Taxation: Taxation Objectives, Structure & methods of levying taxation, Onetime tax, Tax exemption & tax renewal Toll tax reasons & operational management. Build Operate Transfer arrangement. Highway traffic rules, Traffic signs, National and international driving conditions / rules.	07	15
6.	Accident & Prevention Vehicle accident, laws, injury, safety precautions, road transport regulations. Insurance Insurance types & significance, Comprehensive, Third party insurance, Furnishing of particulars of vehicles involved in accident, MACT (Motor Accident Claims Tribunal), Solarium Fund, Hit & Run case, Duty of driver in case of accident, Surveyor & Loss Assessor, Surveyors report.	04	15



SWAMINARAYAN UNIVERSITY

Program Name: Engineering Level: Degree

Course/ Subject Code: BE102501

Course/Subject Name: Road Passenger Transport in India

7.	Laws Related to Pollution Under Control (PUC) Pollution Under control certification agency, Authority & procedure for PUC certification agency. Harmful exhaust gas constituents, permissible limits, Euro / Bharat Stage -I, II, III, IV, V, VI norms and implementation, testing and measurements. Study of Odd-Even formula, high power to weight ratio & higher capacity diesel vehicles and other possible methods for reduction of atmospheric pollution and its impact.	04	15
Total		45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
13%	19%	25%	19%	18%	6%

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	To apply transport and management theory for the various organization structure	Applying (A)
2	To explain scheduling and fare structure for different types of services.	Understanding (U)
3	To judge the need of different factors for the Planning of new transport organization	Evaluating (E)
4	To explain the motor vehicle act, laws related to insurance and PUC Norms	Understanding (U)



SWAMINARAYAN UNIVERSITY

Program Name: Engineering Level: Degree

Course/ Subject Code: BE102501

Course/Subject Name: Road Passenger Transport in India

Course Outcome to Programme Outcome (CO-PO) Mapping

CO-PO Mapping				
PO \ CO	CO-1	CO-2	CO-3	CO-4
PO-1 Basic Engg Knowledge	2	2	2	3
PO-2 Problem Analysis	2	2	2	2
PO-3 Design/Development	1	2	1	2
PO-4 Investigations	1	2	2	2
PO-5 Modern Tool Usage	1	2	1	2
PO-6 Engineer & Society	1	1	1	2
PO-7 Environment & Sustainability	2	1	1	2
PO-8 Ethics	1	1	1	2
PO-9 Individual & Team Work	1	1	1	1
PO-10 Communication	1	1	1	1
PO-11 Project Management	0	0	0	0
PO-12 Lifelong Learning	1	1	1	1
CO-PSO Mapping				
PSO \ CO	CO-1	CO-2	CO-3	CO-4
PSO-1 Programming Skills	2	2	2	3
PSO-2 Analytical Ability	1	2	2	2
PSO-3 Software Tools Use	1	1	1	2

References/Suggested Learning Resources:

(a) Books:

1. Motor Vehicle Act - Govt. of India Publications.
2. Goods vehicle operation - C.S. Dubbar
3. Road transport law - L.D. Kitchen
4. 5.S.L. Bhandarkar, Vehicle Transport Management, Dhanpat Rai & Co. (Pvt.) Ltd.
5. M.V. Act 1988-RTO rules and regulation manual.



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Program Name: Engineering Level: Degree

Course/ Subject Code: BE102501

Course/Subject Name: Road Passenger Transport in India

6. Fuel Economy of Motor Vehicle, Allied Publishers.
7. National Research Council, Automotive Fuel Economy, National Academic Press.
8. CIRT Journal of Transport Management
9. John Duke - Fleet Management – McGraw-Hill Co
10. S.K. Shrivastava, "Economics of Transport" 3. "Transport Development in India", S. Chand & Co. Pvt.Ltd., New Delhi.

(b) Open source software and website:

1. <http://ocw.mit.edu/>
2. <https://nptel.ac.in/course.php>

Suggested Course Practical List:

List of Major Equipment/ Laboratory/Learning Resources/ Required:

Suggested Project List:



SWAMINARAYAN UNIVERSITY

Program Name: Engineering Level: Degree

Course/ Subject Code: BE102502

Course/Subject Name: Automotive Engine

w.e.f.Academic Year:	2024-25
Semester:	5 TH Semester/ 3 RD Year
Category of the Course:	Basics and Fundamental

Prerequisite:	Nil
Rationale:	Subject will cover various transport management aspects and motor vehicle laws after studying this subject the students will be able to manage a transport fleet and their related activities for minimizing operational cost

Teaching and Examination Scheme:

TeachingScheme(inHours)			TotalCredits L+T+(PR/2)	AssessmentPatternandMarks				TotalMark s
L	T	PR	C	Theory		Tutorial/Practical		
				(E)	(M)	(I)	(V)	
3	0	2	4	60	40	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Engine Construction and Operation: 4-stroke engines constructional details, working principle, Otto cycle, Diesel cycle, valve timing diagrams and actual indicator diagram. 2-stroke engine construction and operation, port timing diagrams, comparison of four strokes and two-stroke engine operation. Firing order and its significance.	08	15
2.	SI Engine Fuel System: Carburettor working principle. Requirements of an automotive carburettor; Starting, idling, acceleration and normal circuits of carburettors, compensation, Maximum power devices, constant choke and constant vacuum carburettors. Fuel feed systems, Mechanical and electrical pumps. MPFI systems for petrol. Properties of SI engine fuels	08	20
3.	CI Engine Fuel System: Fuel Injection System: Requirements, Air and solid injection, function of components, Jerk and distributor type Pumps. Unit injector, Mechanical and Pneumatic governors. Fuel injector-types of injection nozzle, Spray characteristics, injection timing, pump calibration. CRDI systems for diesel. Properties of CI engine fuels.	09	20
	Cooling and Lubrication System: Need for cooling system. Types of		



SWAMINARAYAN UNIVERSITY

Program Name: Engineering Level: Degree

Course/ Subject Code: BE102502

Course/Subject Name: Automotive Engine

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4.	cooling system, Liquid cooled system, Thermo syphon system, and Pressure cooling system. Properties of coolants. Lubrication system, Mist lubrication system, Wet sump and dry sump lubrication. Properties of lubricants.	05	10
5.	Combustion in IC (SI & CI) engines: Combustion in IC engines, stages of combustion, flame propagation, rate of pressure rise, abnormal combustion, knocks. Effect of engine variables and knock.	05	10
6.	Supercharging, Turbo charging and Scavenging: Necessity and limitation of supercharging and turbo charging, Charge cooling, Types of Super charging and turbo charging, relative merits, Matching of turbocharger. Theoretical scavenging methods. Scavenging pumps	06	15
7.	Engine Testing and Performance: Automotive and stationary engine testing, Engine power and efficiencies. Variables affecting engine performance. Methods to improve engine performance. Heat balance. Performance Maps.	04	10
Total		45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
12%	25%	29%	24%	10%	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

Course Outcome:

After Completion of the Course, Student will be able to:

No	Course Outcomes	RBT level
1	Explain types of engine working cycles and their operation.	U – Understand
2	Demonstrate fuel supply systems for SI and CI Engines	A – Apply
3	Illustrate cooling and lubrication systems of engine	U – Understand
4	Identify problem due to abnormal combustion and knocking	A – Apply
5	Analyze performance of engines and supercharging	N – Analyze

Course Outcome to Programme Outcome (CO-PO) Mapping



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Program Name: Engineering Level: Degree

Course/ Subject Code: BE102502

Course/Subject Name: Automotive Engine

सर्व विद्या अधिपतये

CO-PO Mapping					
PO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5
PO-1 Basic Engg Knowledge	3	3	2	2	3
PO-2 Problem Analysis	2	2	2	2	2
PO-3 Design/Development	2	2	1	2	2
PO-4 Investigations	1	2	2	2	2
PO-5 Modern Tool Usage	2	2	2	2	2
PO-6 Engineer & Society	0	0	0	0	0
PO-7 Environment & Sustainability	0	0	0	0	0
PO-8 Ethics	0	0	0	0	0
PO-9 Individual & Team Work	0	0	0	0	0
PO-10 Communication	1	1	1	1	1
PO-11 Project Management	1	1	1	0	1
PO-12 Lifelong Learning	1	1	1	1	1
CO-PSO Mapping					
PSO \ CO	CO-1	CO-2	CO-3	CO-4	CO-5
PSO-1 Programming Skills	3	3	2	2	3
PSO-2 Analytical Ability	2	2	2	2	2
PSO-3 Software Tools Use	1	1	1	1	1

References/Suggested Learning Resources:

(a) Books:

1. Ganesan.V.Internal Combustion Engines, Tata-McGraw Hill Publishing Co., New Delhi, 1994.
2. Heldt.P.M, High Speed Combustion Engines, Oxford IBH Publishing Co., Calcutta, 1985.
3. Obert.E.F, International Combustion Engines Analysis and Prattice, International Text Book Co., Scranton, Pennsylvania, 1988.
4. Automotive Engines (McGraw-Hill International Editions: Automotive Technology Series) Paperback – International Edition, September 1, 1994 by William H. Crouse and Donald Anglin.
5. Ellinger.H.E, Automotive Engines, Prentice Hall Publishers, 1992
6. Maleev.V.M, Diesel Engine Operation and Maintenance, McGraw Hill, 1974



SWAMINARAYAN UNIVERSITY

Program Name: Engineering Level: Degree

Course/ Subject Code: BE102502

Course/Subject Name: Automotive Engine

(b) Open source software and website:

1. <http://nptel.ac.in/>
2. www.learnerstv.com
3. <http://auto.howstuffworks.com/>
4. nptel.iitk.ac.in/

Suggested Course Practical List:

1. To identify the major components of different automobile engines.
2. To study two stroke cycle engine.
3. To study four stroke CI and SI engine.
4. To study the fuel supply system of SI engine.
5. To study the fuel supply system of CI engine.
6. To study the engine Cooling and lubrication system circuit.
7. To study the performance characteristics of petrol / diesel engine by using an engine test rig.

List of Major Equipment /Laboratory/Learning Resources Required:

1. Multi Cylinder Petrol Engine
2. Multi Cylinder Diesel Engine
3. Petrol and Diesel fuel systems
4. Ignition system of petrol/gas engines
5. Cut section models of multi cylinder I.C. engines with drive.

Suggested Project List:



Swaminarayan University

Teaching & Examination Scheme
Course – Faculty of Engineering (Degree)
Branch – Automobile Engineering
Semester – 5th

Subject Code	Subject Name	Category	L	T	P	Total Credit	E	M	I	V	Total Marks
BE100501	Contributor Personality Development Program	Personality Development (Elective)	2	0	0	2	60	40	20	30	150
BE100502	Integrated Personality Development Course		2	0	0	2	60	40	20	30	150
BE102501	Road Passenger Transport in India	Humanities and Social Science	3	0	0	3	60	40	0	0	100
BE102502	Automotive Engines	Professional Core	3	0	2	4	60	40	20	30	150
BE101501	Heat Transfer	Professional Core	4	0	2	5	60	40	20	30	150
BE101502	Dynamics of Machinery	Professional Core	4	0	2	5	60	40	20	30	150
BE101503	Control Engineering	Open Elective - 1	3	0	0	3	60	40	0	0	100
BE101504	Oil Hydraulics and Pneumatics		3	0	0	3	60	40	0	0	100
	Total		19	0	6	22					

L=Lecture, T=tutorial, P=Practical, E=Theory External, M=Theory Internal, I=Practical Internal, V=Practical External