



# KLS Vishwanathrao Deshpande Institute of Technology, Haliyal

(Accredited with A Grade by NAAC)

(Approved by AICTE, New Delhi. Affiliated to VTU, Belagavi)

(Recognised Under Section 2(f) by UGC, New Delhi)

Udyog Vidya Nagar, Haliyal – 581329, Dist: Uttara Kannada

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23/8/2025

To,  
The HOD  
KLS VDIT, Haliyal

Respected Sir,

Subject: Seeking permission to Float Add-on Courses for 3<sup>rd</sup>, 5<sup>th</sup> and 7<sup>th</sup> Semester. (2025-26 Odd)

With reference to the above subject, we are interested to float Add-on courses for 3<sup>rd</sup> & 5<sup>th</sup> semester Students of Mechanical Engineering Department, the details of the courses are as follows:

Semester	Title of the Course	Duration	Total Duration	Link
3 <sup>rd</sup> SEM	1. Mathematical Statistics Foundation for Machine learning	8h	31 Hr.	<a href="https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384355984472473641519_shared/overview">https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384355984472473641519_shared/overview</a>
	2. AWS-DGL-SS-Math for Machine learning	10h		<a href="https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013782310872580096330/overview">https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013782310872580096330/overview</a>
	3. Explore Machine Learning using R	13h		<a href="https://infyspringboard.onwingspan.com/web/en/app/toc/lex_1001082580639572000_shared/overview">https://infyspringboard.onwingspan.com/web/en/app/toc/lex_1001082580639572000_shared/overview</a>
5 <sup>th</sup> SEM	1. Artificial Intelligence & ChatGPT for Cyber Security 2024	7h 4m	30 Hr: 14 min	<a href="https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_014157683266969600103/overview">https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_014157683266969600103/overview</a>
	2. Cyber Security Foundation	11h 5m		<a href="https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth0130752807862845445_shared/overview">https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth0130752807862845445_shared/overview</a>
	3. Cyber Security and Applied Ethical Hacking	12h 5m		<a href="https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384318264289689632577_shared/overview">https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384318264289689632577_shared/overview</a>
7 <sup>th</sup> SEM	Material and Manufacturing of Internal Combustion Engines	30 Hr		Offline

In this connection, we request your kind self to give us permission sir.

Thank you.

*(Signature)*  
Your Sincerely

(Chandrasanth M. P.)

*(Signature)*  
HOD

Mechanical Engineering  
KLS Vishwanathrao Deshpande  
Institute of Technology  
Haliyal-581329

*(Signature)*  
Principal

KLS Vishwanathrao Deshpande  
Institute of Technology, Haliyal

Semester: VII -Addon						
Materials and Manufacturing of Internal Combustion Engines						
Course Code	:	Addon_7		CIE	:	10
L:T:P	:	2: 0: 0		SEE	:	-----
Total Hours	:	30		SEE Duration	:	-----

	Topics	Hours
<b>1. Introduction &amp; Fundamentals</b>	Types of IC engines (SI, CI, 2-Stroke, 4-Stroke), Applications, Basic working principles. Overview of performance parameters (power, torque, efficiency).	3
<b>2. Materials in IC Engines – Overview</b>	Role of material science in engine design; property requirements (strength, wear resistance, thermal conductivity, corrosion resistance). Trends in lightweight materials.	2
<b>3. Component-wise Material Selection</b>	Cylinder block & head, piston, piston rings, connecting rod, crankshaft, valves, bearings, manifolds, gaskets. Case studies of material failure.	4
<b>4. Manufacturing Processes</b>	Casting (sand, die), forging, machining, heat treatment, coating processes. Process selection criteria for engine components.	4
<b>5. Precision &amp; Quality in Engine Manufacturing</b>	Tolerances, surface finish, balancing, assembly practices. Non-destructive testing (NDT) methods for engine parts.	3
<b>6. Surface Treatments &amp; Coatings</b>	Chrome plating, molybdenum coating, ceramic thermal barrier coatings, DLC (Diamond-Like Carbon).	2
<b>7. Engine Performance &amp; Material Interaction</b>	How material properties influence performance, fuel efficiency, and emissions.	2
<b>8. Sustainability &amp; Future Trends</b>	Advanced alloys, composites, ceramics. Role of additive manufacturing (3D printing). Transition to hybrid/electric powertrains and their impact on IC engine design.	10

- CO1** – Explain the fundamentals, classifications, and operating principles of IC engines and their performance parameters.
- CO2** – Select suitable engineering materials for different IC engine components based on mechanical, thermal, and tribological properties.
- CO3** – Apply manufacturing processes, heat treatments, and surface coating techniques for producing and enhancing IC engine components.
- CO4** – Analyze the influence of material properties and manufacturing quality on engine performance, efficiency, and emissions.
- CO5** – Evaluate sustainability challenges, emerging material technologies, and manufacturing trends in the evolution of IC engines.

CO / PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	1	-	-	-	1	-	1	1	1
CO2	3	2	2	2	1	1	-	-	-	1	-	1	1	1
CO3	3	2	3	2	2	1	-	-	1	1	-	2	1	1
CO4	3	3	3	3	2	1	-	-	1	1	-	2	1	1
CO5	2	2	2	2	2	2	1	3	-	1	-	3	2	2

#### Text Book

1. Internal Combustion Engine Fundamentals — John B. Heywood  
([https://www.iust.ac.ir/files/mech/ayatgh\\_c5664/files/internal\\_combustion\\_engines\\_heywood.pdf](https://www.iust.ac.ir/files/mech/ayatgh_c5664/files/internal_combustion_engines_heywood.pdf))
2. I.C. Engines — V. Ganesan
3. The Science and Technology of Materials in Automotive Engines — Hiroshi Yamagata

#### Reference Books

1. Materials Science and Engineering: An Introduction — William D. Callister, Jr.

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 Mechanical Engineering  
 KLS Vishwanathrao Deshpande  
 Institute of Technology  
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## COURSE PLAN

Semester: VII

Year: 2025-26 (Odd/Even)

Course Title	Materials and Manufacturing of Internal Combustion Engines	Course Code	Addon_7
Total Teaching Hours	30	Teaching hours/week	02
CIA: 10	SEE:-	Prerequisites	-
Course Plan prepared by	Dr. Gururaj Hatti	Approved by	Dr K S Pujari

## Course Outcomes

- CO1 - Explain the fundamentals, classifications, and operating principles of IC engines and their performance parameters.
- CO2 - Select suitable engineering materials for different IC engine components based on mechanical, thermal, and tribological properties.
- CO3 - Apply manufacturing processes, heat treatments, and surface coating techniques for producing and enhancing IC engine components.
- CO4 - Analyze the influence of material properties and manufacturing quality on engine performance, efficiency, and emissions.
- CO5 - Evaluate sustainability challenges, emerging material technologies, and manufacturing trends in the evolution of IC engines.

## CO's And PO's Mapping Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	1	1	1	1	-	-	-	1	-	1	1	1
2	3	2	2	2	1	1	-	-	-	1	-	1	1	1
3	3	2	3	2	2	1	-	-	1	1	-	2	1	1
4	3	3	3	3	2	1	-	-	1	1	-	2	1	1
5	2	2	2	2	2	2	1	3	-	1	-	3	2	2

## Text/Reference Books

## Textbooks / Reference Books:

- Internal Combustion Engine Fundamentals – John B. Heywood ([https://www.iust.ac.ir/files/mech/ayatgh\\_c5664/files/internal\\_combustion\\_engines\\_heywood.pdf](https://www.iust.ac.ir/files/mech/ayatgh_c5664/files/internal_combustion_engines_heywood.pdf))
- I.C. Engines – V. Ganesan
- The Science and Technology of Materials in Automotive Engines – Hiroshi Yamagata
- Materials Science and Engineering: An Introduction – William D. Callister, Jr.
- Handbook of Advanced Ceramics and Composites Defense, Security, Aerospace and Energy Applications, Reference work © 2020, Yashwant R. Mahajan, Roy Johnson. <https://link.springer.com/referencework/10.1007/978-3-030-16347-1>
- Additive Manufacturing Advanced Materials and Design Techniques, Edited By Pulak Mohan Pandey, Nishant Kumar Singh, Yashvir Singh, 1<sup>st</sup> Edition. ISBN 9781032192659, 220 Pages 65 Color & 11 B/W Illustrations, Published October 4, 2024 by CRC Press. <https://www.routledge.com/Additive-Manufacturing-Advanced-Materials-and-Design-Techniques/Pandey-Singh-Singh/p/book/9781032192659>
- Hybrid Electric Power Train Engineering and Technology: Modeling, Control, and Simulation Part



KLS

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Doc. No.: VDIT/ACAD/CP/01a

Rev.No.:03

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**COURSE PLAN**

of the Research Essentials Collection Antoni Szumanowski (Warsaw University of Technology, Poland), ISBN13: 9781466640429 | ISBN10: 1466640421 | EISBN13: 9781466640436. <https://www.igi-global.com/book/hybrid-electric-power-train-engineering/73555>

**Module Wise Text /Reference Books**

Module 1: 1,2

Module 2,3: 1,2,3

Module 4,5: 1,2,3,4

Module 6: 4

Module 7,8: 4,5,6,7

**Syllabus for the Internal Assessment Test (Tentative)**

IA Test

Test pattern

MCQuestions will be set based on above syllabus for 25 Marks reduce to 10 marks.

  
(Mr. G. Katti)

  
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