

**Govt. T. R. S. (Autonomous) College Rewa (M.P.)**

**(Affiliated to A.P.S. University Rewa)**

**Department of Chemistry**

**Syllabus for B.Sc. (Hons.) Chemistry on CBCS**

**Session 2023-24**

<b>Part A - Introduction</b>			
<b>Program: UG (Degree)</b>	<b>Class: B.Sc. (Hons) Chemistry</b>	<b>Semester: III</b>	<b>Session: 2023-24</b>
<b>Subject: Chemistry (Honours)</b>			
<b>1</b>	<b>Course code</b>	<b>CHST-03</b>	
<b>2</b>	<b>Course title</b>	<b>Fuel Chemistry</b>	
<b>3</b>	<b>Course type</b>	<b>Skill Enhancement Course</b>	
<b>4</b>	<b>Pre-requisite (if any)</b>	<b>Open for All</b>	
<b>5</b>	<b>Course Objective</b>	The course aims to provide students with a basic scientific and technical understanding of the production, behaviour and handling of hydrocarbon fuels and lubricants, including emerging alternative & renewable fuels. This will enable them to be industry ready to contribute effectively in the field of petroleum chemistry and technology.	
<b>6</b>	<b>Course Learning Outcomes (CLO)</b>	<b>By the end of this course, the students will be able to:</b> <ul style="list-style-type: none"><li>• The course covers both conventional petroleum-based fuels, and alternative &amp; renewable fuels, including gaseous fuels.</li><li>• The students will learn the chemistry that underpins petroleum fuel technology, will understand the refining processes used to produce fuels and lubricants and will know how differences in chemical composition affect properties of fuels and their usage in different applications.</li><li>• The course will also cover origin of petroleum, crude oil, composition, different refining processes employed industrially to obtain different fractions of petroleum. Further, course will cover various alternative and renewable fuels like Biofuels (Different generations), Gaseous Fuels (e.g. CNG, LNG, CBG, Hydrogen etc.).</li><li>• The course will also cover fuel product specifications, various test methods used to qualify different types of fuels as well characterization methods.</li><li>• Review of energy scenario (Global &amp; India), Energy sources (renewable and non-renewable). Types of Crude Oils, Composition and Properties. Crude oil assay</li></ul>	

<b>7</b>	<b>Credit Value</b>	<b>3</b>
<b>8</b>	<b>Total Marks</b>	<b>Max. Marks (40+60): CCE+ESE</b> <b>Min. Passing Marks:</b>
<b>Part B – Content of the course</b>		
<b>Total No. of Lectures-Tutorials-Practical (2 hours per week):</b>		
<b>L-T-P: 30-0-00</b>		
<b>Unit</b>	<b>Topic</b>	<b>No. of Lectures</b>
<b>1</b>	Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value. Determination of calorific value by Bomb calorimeter and Junker's calorimeter.	<b>4</b>
<b>2</b>	Coal: Analysis of coal, Proximate and ultimate Analysis, Uses of coal (fuel and nonfuel) in various industries, its composition, carbonization of coal. Coal gas, producer gas and water gas composition and uses. Fractionation of coal tar, uses of coal tar based chemicals, requisites of a good metallurgical coke, Coal gasification (Hydrogasification and Catalytic gasification), Coal liquefaction and Solvent Refining.	<b>7</b>
<b>3</b>	Petroleum and Petrochemical Industry: Composition of crude petroleum, Refining and different types of petroleum products and their applications.	<b>4</b>
<b>4</b>	Fractional Distillation (Principle and process), Cracking (Thermal and catalytic cracking), Reforming Petroleum and non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels.	<b>6</b>
<b>5</b>	Petrochemicals: Vinyl acetate, Propylene oxide, Isoprene, Butadiene, Toluene and its derivatives Xylene.	<b>4</b>
<b>6</b>	Lubricants: Classification of lubricants, lubricating oils (conducting and non-conducting) Solid and semi-solid lubricants, synthetic lubricants.  Properties of lubricants (viscosity index, cloud point, pour point and aniline Point) and their determination.	<b>5</b>
<b>Part C – Learning Resources</b>		
<b>Text Books, Reference Books, Other resources</b>		
<b>Suggested Reading:</b>		
1. Stocchi, E.(1990), <b>Industrial Chemistry</b> , Vol -I, Ellis Horwood Ltd. UK.		
<b>Suggested equivalent online:</b>		
<b>Part D – Assessment &amp; Evaluation</b>		

Suggested Continuous Evaluation Method	
Any remark / suggestion:	
This course can be opted as an elective by the students of the following subjects: <b>Open for All</b>	
Continuous & Comprehensive Evaluation shall be based on allotted Assignment and Class Test	

**Keywords:**

Energy; Fuels; Petroleum; Biofuels; Synthetic Lubricants.

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<b>Subject: Chemistry (Honours)</b>			
<b>1</b>	<b>Course code</b>	<b>CHSP-03</b>	
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<b>3</b>	<b>Course type</b>	<b>Skill Enhancement Course</b>	
<b>4</b>	<b>Pre-requisite (if any)</b>	<b>Open for All</b>	
<b>5</b>	<b>Course Objective</b>	The objective of this course to make students aware about the roll of chemistry in daily life.	
<b>6</b>	<b>Course Learning Outcomes (CLO)</b>	<b>By the end of this course, the students will be able to:</b> <ul style="list-style-type: none"><li>• Learn about the preparation of Talcum powder</li><li>• Know about the preparation of shampoo</li><li>• Prepare new innovative formulations.</li><li>• Understand the preparation of hand sanitizer</li></ul>	
<b>7</b>	<b>Credit Value</b>	<b>2</b>	
<b>8</b>	<b>Total Marks</b>	<b>Max. Marks (40+60):</b>	<b>Min. Passing Marks:</b>
<b>Part B – Content of the course</b>			
<b>Total No. of Lectures-Tutorials-Practical (4 hours per week):</b>			
<b>L-T-P: 00-0-60</b>			
<b>Unit</b>	<b>Topic</b>		<b>No. of Lectures</b>
<b>1</b>	1. Test Methods for Petroleum products 2. To prepare biodiesel from vegetable oil 3. Calorific value of a fuel 4. Characterization of different petroleum products using UV and IR 5. To determine pore point and cloud point of fuel 6. To determine the viscosity of biodiesel ay various temperature using biodiesel. 7. To determine free fatty acid content in given sample. 8. To determine the density of the given fuel sample.		<b>60</b>

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