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ಕರ್ನಾಟಕ ಪ್ರೌಢ ಶಿಕ್ಷಣ ಪರೀಕ್ಷಾ ಮಂಡಳಿ, ಮಲ್ಲೇಶ್ವರಂ, ಬೆಂಗಳೂರು – 560 003  
KARNATAKA SECONDARY EDUCATION EXAMINATION BOARD, MALLESHWARAM,  
BANGALORE – 560 003

ಎಸ್.ಎಸ್.ಎಲ್.ಸಿ. ಪರೀಕ್ಷೆ, ಮಾರ್ಚ್/ಏಪ್ರಿಲ್, 2022  
S. S. L. C. EXAMINATION, MARCH/APRIL, 2022

ಮಾದರಿ ಉತ್ತರಗಳು  
MODEL ANSWERS

ದಿನಾಂಕ : 01. 04. 2022 ]

ಸಂಕೇತ ಸಂಖ್ಯೆ : 71

Date : 01. 04. 2022 ]

CODE NO. : 71

ವಿಷಯ : ಎಲಿಮೆಂಟ್ಸ್ ಆಫ್ ಮೆಕ್ಯಾನಿಕಲ್ ಅಂಡ್  
ಎಲೆಕ್ಟ್ರಿಕಲ್ ಇಂಜಿನಿಯರಿಂಗ್ - 2

**Subject : ELEMENTS OF MECHANICAL AND  
ELECTRICAL ENGINEERING-2**  
( ಶಾಲಾ ಅಭ್ಯರ್ಥಿ & ಪುನರಾವರ್ತಿತ ಶಾಲಾ ಅಭ್ಯರ್ಥಿ / Regular Fresh & Regular Repeater )

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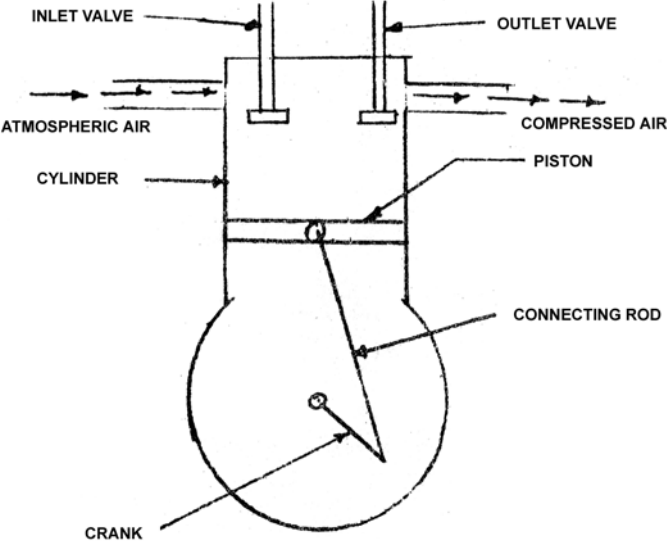
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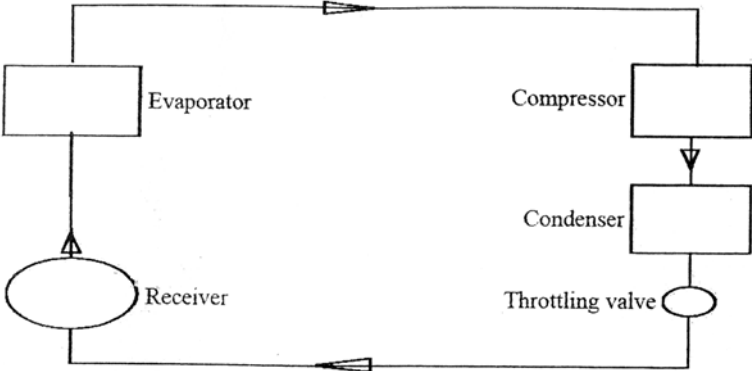
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
		<b>SECTION - A</b>	
1.	a)	Define I.C. engine. <i>Ans.</i> I.C. engine is a heat engine which converts the heat energy released by the combustion of fuel into mechanical work.	2 2
	b)	Mention the parts of IC engine. <i>Ans.</i> <u>Parts</u> i) Cylinder ii) Piston	3

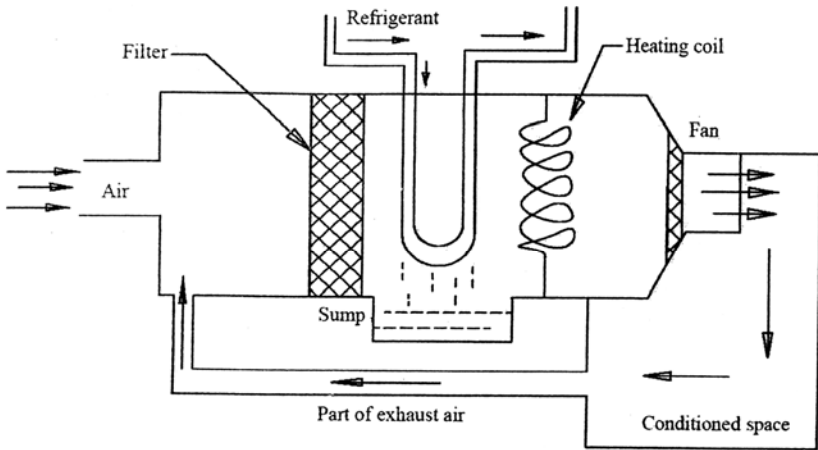
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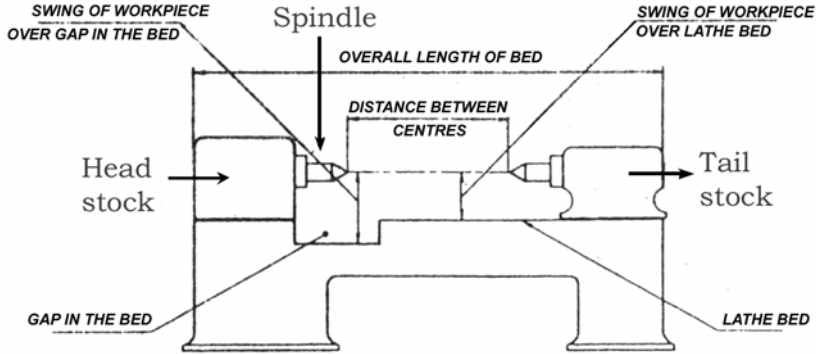
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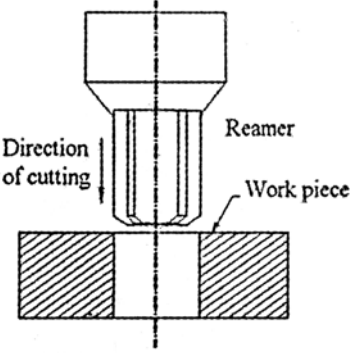
Qn. Nos.	Sub. Qn.No.	Value Points	Marks												
		iii) Piston rings iv) Connecting rod v) Crank and crank shaft vi) Valves vii) Fly wheel viii) Crank case.	3												
	c)	Differentiate between petrol engine and diesel engine. 5 Ans. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Petrol engine</th> <th style="width: 50%;">Diesel engine</th> </tr> </thead> <tbody> <tr> <td>i) It works on otto cycle which is also called as constant volume cycle</td> <td>i) It works on diesel cycle which is also called as constant pressure cycle</td> </tr> <tr> <td>ii) Petrol is used</td> <td>ii) Diesel is used</td> </tr> <tr> <td>iii) Air and Petrol mixture is drawn during the suction stroke</td> <td>iii) Only air is drawn during the suction stroke</td> </tr> <tr> <td>iv) Low compression ratio ranging from 7 : 1 to 12 : 1</td> <td>iv) High compression ratio ranging from 16 : 1 to 20 : 1.</td> </tr> <tr> <td>v) High engine speed of about 3000 rpm</td> <td>v) Low engine speed ranging from 500 to 1500 rpm.</td> </tr> </tbody> </table>	Petrol engine	Diesel engine	i) It works on otto cycle which is also called as constant volume cycle	i) It works on diesel cycle which is also called as constant pressure cycle	ii) Petrol is used	ii) Diesel is used	iii) Air and Petrol mixture is drawn during the suction stroke	iii) Only air is drawn during the suction stroke	iv) Low compression ratio ranging from 7 : 1 to 12 : 1	iv) High compression ratio ranging from 16 : 1 to 20 : 1.	v) High engine speed of about 3000 rpm	v) Low engine speed ranging from 500 to 1500 rpm.	5
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2.	a)	What is an air compressor ? 2 Ans. Air compressors are power absorbing devices which are used to increase the pressure of air at least by two times.	2												
	b)	How are the air compressors classified ? 3 Ans. Air compressors are classified as i) Reciprocating air compressor ii) Centrifugal air compressor	3												

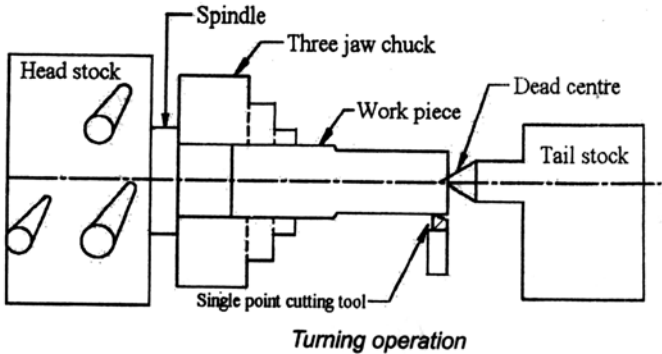
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>Draw a neat sketch of reciprocating air compressor and label the parts. <span style="float: right;">5</span></p> <p><i>Ans.</i></p> <p style="text-align: center;"><u>Sketch of air compressor</u></p>  <p style="text-align: center;"><b>Reciprocating Air Compressor</b>      Sketch -</p> <p style="text-align: right;">Parts - 1</p> <p>4</p>	5
3.	a)	<p>What is refrigeration ? <span style="float: right;">2</span></p> <p><i>Ans.</i></p> <p>Refrigeration is defined as a method of reducing the temperature of a system below that of the surroundings.</p>	2
	b)	<p>Mention the applications of air-conditioning. <span style="float: right;">3</span></p> <p><i>Ans.</i></p> <p><u>Applications</u></p> <ul style="list-style-type: none"> <li>i) Residential air conditioning</li> <li>ii) Commercial air conditioning</li> <li>iii) Industrial air conditioning.</li> </ul>	3

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>Draw a neat sketch of refrigeration system and label the parts.</p> <p>5</p> <p><i>Ans.</i></p> <p style="text-align: center;"><u>Diagram of Refrigeration system</u></p>  <p style="text-align: center;"><i>refrigeration system</i></p>	5
4.	a)	<p>List the types of refrigerants.</p> <p>2</p> <p><i>Ans.</i></p> <p><u>Types of Refrigerants</u></p> <ul style="list-style-type: none"> <li>i) Air</li> <li>ii) Ammonia</li> <li>iii) Carbon dioxide</li> <li>iv) Sulphur dioxide</li> </ul>	2
	b)	<p>Mention the uses of air compressor.</p> <p>3</p> <p><i>Ans.</i></p> <p><u>Uses of Air compressor</u></p> <ul style="list-style-type: none"> <li>i) Used for washing vehicles</li> <li>ii) Used for inflating tubes and tyres</li> <li>iii) Used in spray painting</li> <li>iv) Used for pneumatic drives</li> <li>v) Used for cooling buildings</li> <li>vi) Used in hospitals.</li> </ul>	3

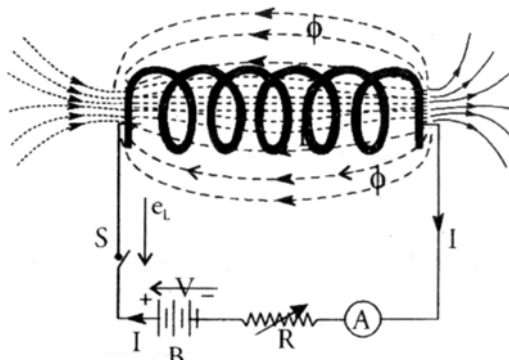
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>Draw a neat sketch of summer air-conditioning system and label the parts. 5</p> <p>Ans.</p> <p>Sketch of summer air-conditioning</p> 	5
5.	a)	<p>What is the main function of lathe ? 2</p> <p>Ans.</p> <p>The main function of the lathe is to remove material from the work piece.</p>	2
	b)	<p>Write the types of lathes. 3</p> <p>Ans.</p> <p><u>Types of lathes</u></p> <ul style="list-style-type: none"> <li>i) Engine lathe</li> <li>ii) Bench lathe</li> <li>iii) Tool Room lathe</li> <li>iv) Speed lathe</li> <li>v) Capstan and turret lathe</li> <li>vi) Automatic lathe.</li> </ul>	3

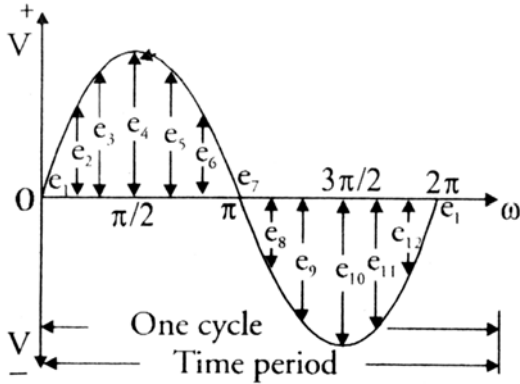
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>Draw a neat sketch of lathe and label the parts.</p> <p>5</p> <p><i>Ans.</i></p> <p style="text-align: center;"><u>Lathe</u></p> 	5
		OR	
	a)	<p>What is drilling ?</p> <p>2</p> <p><i>Ans.</i></p> <p>Drilling is the operation used to produce cylindrical holes in a work piece.</p>	2
	b)	<p>Write the types of drilling machines.</p> <p>3</p> <p><i>Ans.</i></p> <p><u>Types :</u></p> <ul style="list-style-type: none"> <li>i) Portable drilling machine</li> <li>ii) Sensible drilling machine</li> <li>iii) Upright drilling machine</li> <li>iv) Radial drilling machine</li> <li>v) Multiple drilling machine</li> <li>vi) Gang drilling machine.</li> </ul>	3

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>With a neat sketch explain reaming operation.</p> <p>5</p> <p><i>Ans.</i></p> <p style="text-align: center;"><u>Reaming operation</u></p>  <p style="text-align: center;"><i>Reaming operation</i></p> <p>Reaming operations used for sizing and smoothing the drilled holes.</p>	5
6.	a)	<p>Classify the IC engines according to the types of Ignition.</p> <p>2</p> <p><i>Ans.</i></p> <p><u>Classification of engine</u></p> <p>i) Spark ignition engine</p> <p>ii) Compression ignition engine.</p>	2
	b)	<p>Write a short note on connecting rod.</p> <p>3</p> <p><i>Ans.</i></p> <p><u>Connecting Rod</u></p> <p>It is a link that connects the piston and the crankshaft by means of Pin joints. It converts the rectilinear motion of the piston into rotary motion of the crankshaft.</p>	3

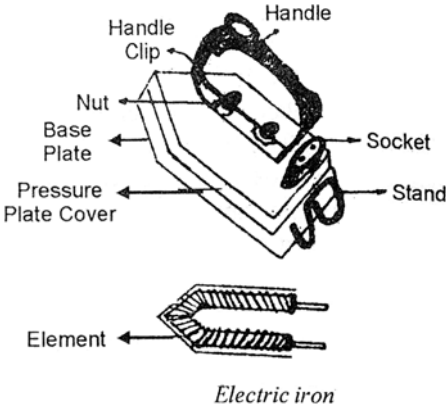
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>With a neat sketch explain the operation of plain turning.</p> <p style="text-align: right;">5</p> <p>Ans.</p> <p style="text-align: center;"><u>Sketch of Plain Turning</u></p>  <p style="text-align: center;">Turning operation</p> <p>In this type of turning, workpiece is supported in between the two centres which permit the rotation of the workpiece. This method of operation workpiece is reduced to the cylindrical section of required diameter.</p>	5
<b>SECTION - B</b>			
7.	a)	<p>List the types of induced <i>e.m.f.</i></p> <p>2</p> <p>Ans.</p> <p><u>Types of induced <i>e.m.f.</i></u></p> <div style="text-align: center;"> <p>Induced <i>e.m.f.</i></p> <p>├── Statically Induced <i>e.m.f.</i></p> <p>└── Dynamically Induced <i>e.m.f.</i></p> <p style="margin-left: 40px;">├── Self-induced <i>e.m.f.</i></p> <p style="margin-left: 40px;">└── Mutually induced <i>e.m.f.</i></p> </div>	2
	b)	<p>State Faraday's second law of electromagnetic induction.</p> <p style="text-align: right;">3</p> <p>Ans.</p> <p><u>Second Law</u></p> <p>The magnitude of the <i>e.m.f.</i> induced in a circuit is directly proportional to the rate of change of flux linkages.</p> $\epsilon = \frac{N(\phi_2 - \phi_1)}{t}$	3



Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>Draw a neat sketch of self-induced <i>e.m.f.</i> and label the parts. <span style="float: right;">5</span></p> <p><i>Ans.</i></p> <p style="text-align: center;"><u>Sketch of self-induced <i>e.m.f.</i></u></p>  <p>A - Ammeter    I - Current R - Rheostat    S - Switch B - Battery    <math>e_L</math> - Back <i>e.m.f.</i></p> <p style="text-align: right;">Sketch - 4 Parts - 1</p>	5
8.	a)	<p>Define the term 'maximum value'. <span style="float: right;">2</span></p> <p><i>Ans.</i></p> <p><u>Maximum Value</u></p> <p>Highest value of an alternating quantity attained in one half cycle called max. value.</p>	2
	b)	<p>Explain power and power factor. <span style="float: right;">3</span></p> <p><i>Ans.</i></p> <p>i) <u>Power</u></p> <p>The rate at which electrical work is done is called electrical power. S.I. unit is 'Watt' or 'Kilowatt'.</p> <p>ii) <u>Power factor</u></p> <p>Power factor is the ratio of true power and apparent power. It has no unit.</p>	3

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>Draw a neat sketch of sine wave and mark the following :</p> <p style="text-align: right;">5</p> <p>i) Time period ii) Cycle.</p> <p>Ans.</p> <p style="text-align: center;"><u>Sketch of sine wave</u></p>  <p>+ V = Positive voltage - V = Negative voltage</p> <p><math>\frac{\pi}{2} = 90^\circ</math>, <math>\pi = 180^\circ</math>, <math>3\frac{\pi}{2} = 270^\circ</math>, <math>2\pi = 360^\circ</math></p>	5
9.	a)	<p>List the types of statically induced <i>e.m.f.</i></p> <p>Ans.</p> <p><u>Types</u></p> <p>i) Self-induced <i>e.m.f.</i> ii) Mutually induced <i>e.m.f.</i></p>	2
	b)	<p>Describe dynamically induced <i>e.m.f.</i></p> <p>Ans.</p> <p><u>Dynamically induced <i>e.m.f.</i></u></p> <p>Whenever a conductor is moved in a magnetic field, which causes an <i>e.m.f.</i> is induced in a conductor this type of induced <i>e.m.f.</i> is called dynamically induced <i>e.m.f.</i></p>	3

Qn. Nos.	Sub. Qn.No.	Value Points	Marks				
	c)	<p>Draw a neat sketch of electromagnetic induction and label the parts. <span style="float: right;">5</span>                      Ans.</p> <p style="text-align: center;"><u>Sketch of Electro-magnetic Induction</u></p> <p>N = North pole                      S = South pole } Bar Magnet                      B = Bobbin                      C = Coil                      G = Galvanometer</p> <p style="text-align: right;">Sketch - 4 Parts = 1</p>	5				
		OR					
	a)	<p>Define the term 'form factor'. <span style="float: right;">2</span>                      Ans.</p> <p>Form factor is the ratio of <i>rms</i> value to the average value.</p>	2				
	b)	<p>Compare <i>rms</i> value and average value. <span style="float: right;">3</span>                      Ans.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Average value</th> <th style="width: 50%;">RMS value</th> </tr> </thead> <tbody> <tr> <td>The average of instantaneous values of <i>e.m.f.</i> is referred as average value</td> <td>Root mean square value of an alternating quantity is <i>rms</i> value</td> </tr> </tbody> </table>	Average value	RMS value	The average of instantaneous values of <i>e.m.f.</i> is referred as average value	Root mean square value of an alternating quantity is <i>rms</i> value	3
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	c)	<p>Draw the diagram of dynamically induced <i>e.m.f.</i> and label the parts. <span style="float: right;">5</span>                      Ans.</p> <p style="text-align: center;"><u>Sketch of Dynamically Induced <i>e.m.f.</i></u></p> <p style="text-align: center;">Dynamically Induced Induced <i>e.m.f.</i></p> <p style="text-align: right;">Sketch = 4 Parts = 1</p>	5				

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
10.	a)	<p>What do you mean by thermostat ?</p> <p><i>Ans.</i></p> <p><u>Thermostat</u></p> <p>Thermostat is automatic temperature control switch. It consists of bi-metal strips.</p>	2
	b)	<p>Explain Forward bias.</p> <p><i>Ans.</i></p> <p><u>Forward bias</u></p> <p>When an external voltage is applied, such that positive terminal of the battery is connected to P-type semiconductor and the negative terminal of the battery is connected to N-type semiconductor, is called forward bias.</p>	3
	c)	<p>Draw a neat diagram of an electric iron and label the parts.</p> <p><i>Ans.</i></p> <p style="text-align: center;"><u>Diagram of an Electric Iron</u></p>  <p style="text-align: center;"><i>Electric iron</i></p> <p style="text-align: right;">Sketch - 4 Parts - 1</p>	5