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

ಎಸ್.ಎಸ್.ಎಲ್.ಸಿ. ಪರೀಕ್ಷೆ, ಮಾರ್ಚ್/ಏಪ್ರಿಲ್ – 2020
S. S. L. C. EXAMINATION, MARCH/APRIL, 2020

ಮಾದರಿ ಉತ್ತರಗಳು
MODEL ANSWERS

ದಿನಾಂಕ : 04. 04. 2020]

ಸಂಕೇತ ಸಂಖ್ಯೆ : **71**

Date : 04. 04. 2020]

CODE NO. : **71**

ವಿಷಯ : ಎಲಿಮೆಂಟ್ಸ್ ಆಫ್ ಮೆಕ್ಯಾನಿಕಲ್ ಅಂಡ್
ಎಲೆಕ್ಟ್ರಿಕಲ್ ಇಂಜಿನಿಯರಿಂಗ್ - 2

**Subject : ELEMENTS OF MECHANICAL AND
ELECTRICAL ENGINEERING-2**

(ಹೊಸ ಪಠ್ಯಕ್ರಮ / New Syllabus)

(ಶಾಲಾ ಅಭ್ಯರ್ಥಿ & ಪುನರಾವರ್ತಿತ ಶಾಲಾ ಅಭ್ಯರ್ಥಿ / Regular Fresh & Regular Repeater)

[ಗರಿಷ್ಠ ಅಂಕಗಳು : 100

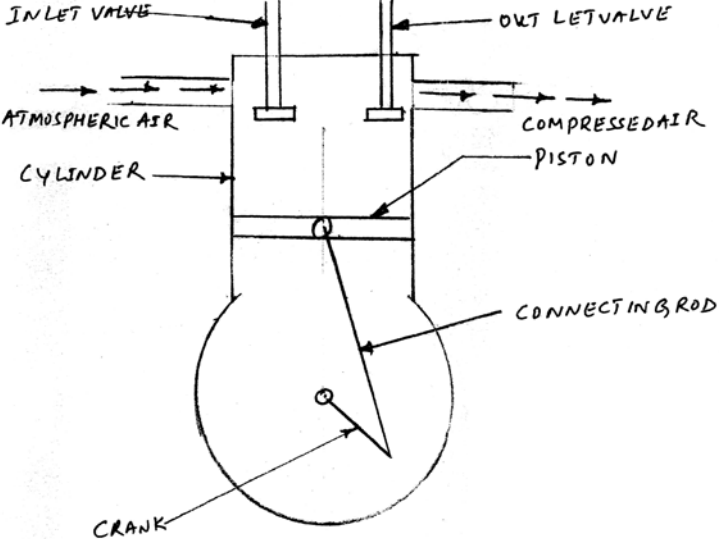
[Max. Marks : 100

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
SECTION - A			
1.	a)	Classify the internal combustion engine on the basis of fuel used. 2 Ans. i) Petrol engine ii) Diesel engine iii) Gas engine iv) Bt-fuel engine.	$4 \times \frac{1}{2} = 2$

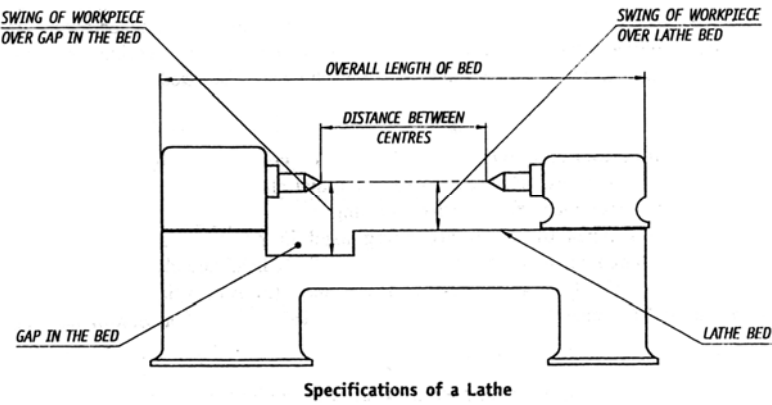
RF & RR (A)-319

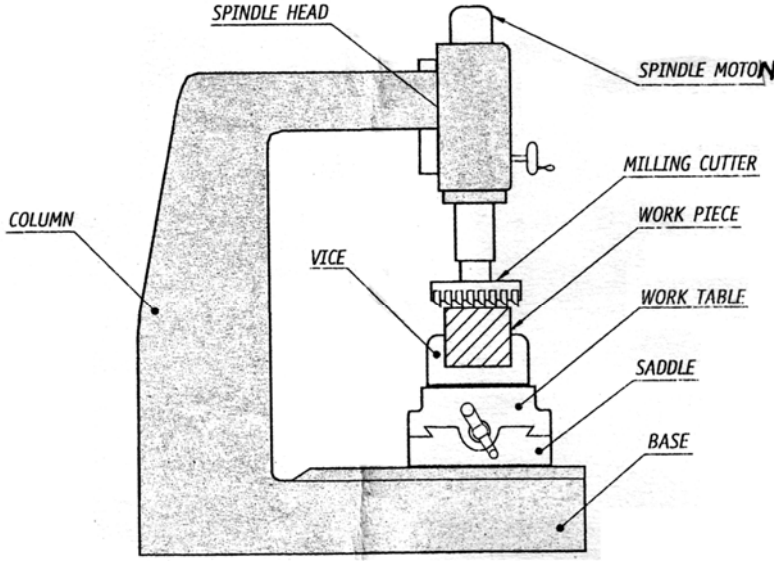
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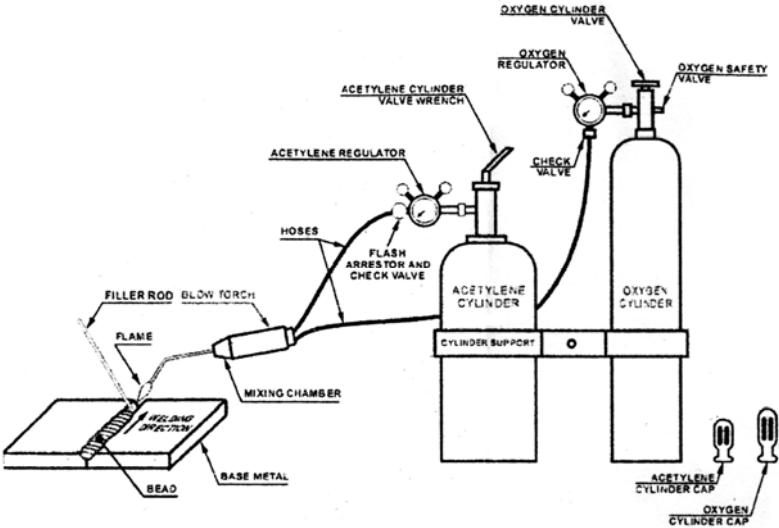
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	b)	<p>Explain the use of piston rings in an internal combustion engine. 3</p> <p><i>Ans.</i></p> <p>The piston rings are the metallic rings inserted into the circumferential grooves provided at the top end of the piston. These rings maintain a gas tight joint between the piston and the cylinder while the piston is reciprocating in the cylinder.</p>	3
	c)	<p>Differentiate between two-stroke engine and four-stroke engine. 5</p> <p><i>Ans.</i></p> <p style="text-align: center;"><u>Two-stroke Engine</u></p> <p>i) Requires only two strokes of the piston to complete one cycle of operation</p> <p>ii) The number of cycles per minute will be equal to the speed of the engine</p> <p>iii) Number of cycles/min $n = N$</p> <p>iv) Power developed in every revolution of the crank shaft</p> <p>v) The torque will be more uniform</p> <p>vi) Charge is first admitted into the crank case & then transferred to the engine cylinder.</p> <p style="text-align: center;"><u>Four stroke</u></p> <p>i) Requires four separate strokes of the piston to complete one cycle of operation</p> <p>ii) The number of cycles per min is equal to half the speed of the engine</p> <p>iii) Number of cycles/min $n = \frac{N}{2}$</p> <p>iv) Power is developed in every alternate revolution of the crank shaft</p> <p>v) The torque will not be uniform</p> <p>vi) The charge is directly admitted into the cylinder.</p>	5 × 1 = 5
2.	a)	<p>What is an air compressor ? 2</p> <p><i>Ans.</i></p> <p>Air compressors are power absorbing devices which are used to increase the pressure of air at least by two times.</p>	2
	b)	<p>Mention the uses of air compressor. 3</p> <p><i>Ans.</i></p> <p>i) Used for inflating tubes and tyres for two wheelers and automobiles</p> <p>ii) Used in spray painting</p> <p>iii) Used for washing vehicle in automobile service station</p> <p>iv) Used for pneumatic brakes in automobiles</p> <p>v) Used for cooling the building</p> <p>vi) Used for pneumatic drives</p> <p>vii) Used to lift pneumatic gates</p>	3 × 1 = 3

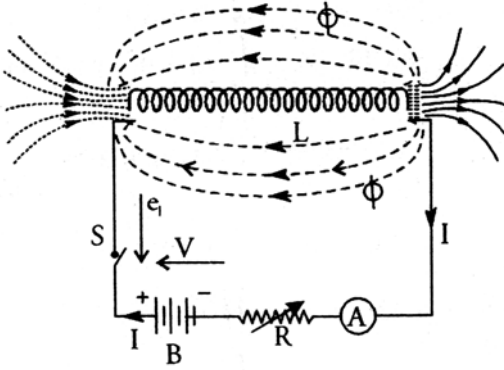
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>Draw a neat sketch of reciprocating air compressor and label the parts. 5</p> <p>Ans.</p>  <p style="text-align: center;">Reciprocating Air Compressor</p> <p style="text-align: right;">Sketch = 4 Parts = 1</p>	5
3.	a)	<p>What is a refrigerant ? 2</p> <p>Ans.</p> <p>In a refrigerator medium called refrigerant continuously extracts the heat from the space within the refrigerator which is to be kept cool at temperature less than the atmosphere and finally rejects some of the fluids.</p>	2
	b)	<p>Explain central air conditioning. 3</p> <p>Ans.</p> <p>Centralised air conditioning systems widely employed in theatres, offices, stores, restaurants, public buildings. Provide the controlled atmosphere by heating cooling and ventilation. The centralized air conditioning systems include refrigerating units, blowers, air ducts and a plenum chamber in which the air from the interior of the building is mixed with outside air. In such installations, cooling and dehumidifying are done during summer months and regular heating systems are used during winter.</p>	3

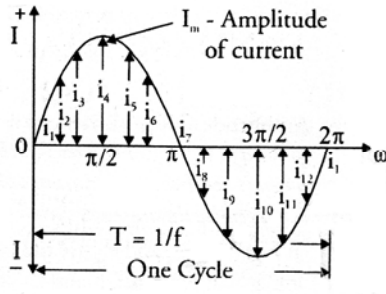
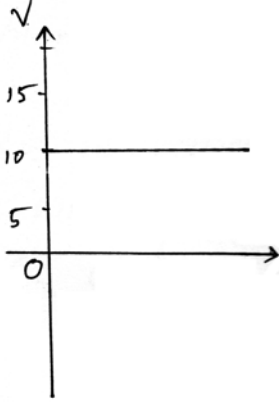
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	<p>c)</p> <p>Draw a neat diagram of room air conditioner and label the parts.</p> <p>5</p> <p>Ans.</p>	<p style="text-align: center;">Room Air Conditioner</p> <p style="text-align: right;">Sketch = 4 Parts = 1</p>	<p>5</p>
<p>4.</p>	<p>a)</p>	<p>What is the main function of lathe ?</p> <p>2</p> <p>Ans.</p> <p>A lathe is a machine tool employed generally to produce circular objects. It is said to be mother of all the machine tools. The main function of lathe is to remove material from the work piece in which the job is held in a chuck and fed against the cutting tool. The material removed in the form of chips.</p>	<p>2</p>
	<p>b)</p>	<p>Explain knurling operation.</p> <p>3</p> <p>Ans.</p> <p>Knurling is defined as an operation performed on the lathe to generate serrated surfaces on work piece by using a special tool called knurling tool which impresses its pattern on the work piece. The serration impression pattern can be straight lines or diamond pattern.</p>	<p>3</p>

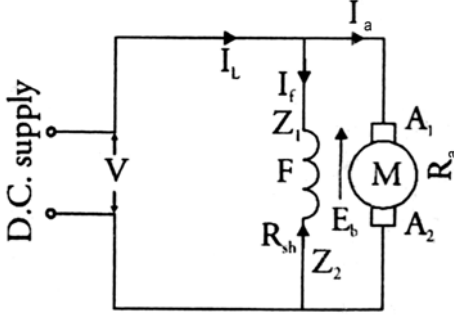
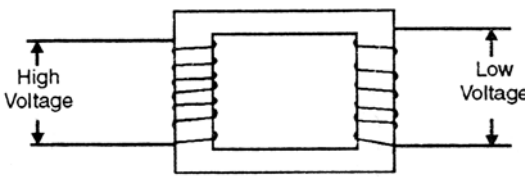
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>Draw a line diagram of lathe and mark the specifications of lathe. 5</p> <p><i>Ans.</i></p>  <p style="text-align: right;">Sketch = 4 Parts = 1</p>	5
OR			
	a)	<p>Name the types of column and knee type of milling machine. 2</p> <p><i>Ans.</i></p> <ul style="list-style-type: none"> i) Horizontal type milling machine ii) Vertical milling machine iii) Universal milling machine iv) Omniversal milling machine 	2
	b)	<p>Explain plain milling processes. 3</p> <p><i>Ans.</i></p> <p>Plain milling or slab milling is a process used to mill flat surfaces of work pieces in such a way that the milling cutter axis is parallel to the surface that is being milled. In plain milling the surface of the work piece is parallel to the table surface.</p>	3

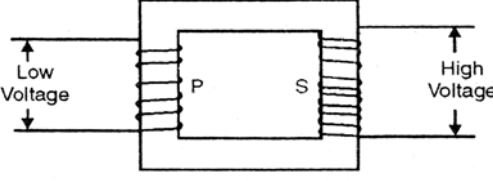
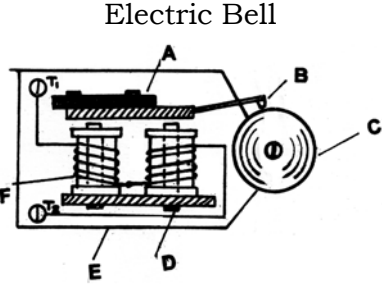
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>Draw a neat sketch of vertical milling machine and label the parts. 5</p> <p><i>Ans.</i></p>  <p style="text-align: center;">Vertical Milling Machine</p> <p style="text-align: right;">Sketch = 4 Parts = 1</p>	5
5.	a)	<p>What is fusion welding ? 2</p> <p><i>Ans.</i></p> <p>In the fusion welding or no pressure welding process. The material at the joint is heated to a molten state and allowed to solidify. These welding are also known as liquid state welding process. This includes gas welding, arc welding, thermite welding.</p>	2
	b)	<p>Explain electric arc welding. 3</p> <p><i>Ans.</i></p> <p>When two conductors of an electric circuit are touched together momentarily and then instantaneously separated slightly assuming that there is sufficient voltage in the circuit to maintain flow of current an electric arc is formed.</p>	3

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>Draw a neat sketch of oxy-acetylene welding equipment and label the parts. 5</p> <p><i>Ans.</i></p>  <p style="text-align: center;">Oxy-Acetylene Welding Equipments</p> <p style="text-align: right;">Sketch = 4 Parts = 1</p>	5
SECTION - B			
6.	a)	<p>List any two types of induced <i>emfs</i>. 2</p> <p><i>Ans.</i></p> <p>i) Statically induced e.m.f.</p> <p>ii) Dynamically induced e.m.f.</p>	2 × 1 = 2 (each 1)
	b)	<p>State the use of Fleming's Right hand rule and Left hand rule. 3</p> <p><i>Ans.</i></p> <p>Fleming's right hand rule is used to find the direction of induced e.m.f.</p> <p>Fleming's left hand rule is used to find the direction of rotation of d.c. motor.</p>	3

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>Draw a neat sketch of self induced <i>emf</i> and explain. 5</p> <p><i>Ans.</i></p> <div style="text-align: center;"> <p>Self induced e.m.f.</p>  <p>Self induced e.m.f.</p> </div> <p>The e.m.f. induced in a coil, due to the changing flux created by the current flowing through same coil, is called self induced e.m.f. This is always in opposition to the applied voltage. It is denoted by e_L & measured in volts.</p>	$2\frac{1}{2} + 2\frac{1}{2} = 5$
7.	a)	<p>What is an alternating current ? 2</p> <p><i>Ans.</i></p> <p>The current which changes both in magnitude and direction, at regular intervals of time is called an alternating current.</p>	2
	b)	<p>Define electrical power & power factor. 3</p> <p><i>Ans.</i></p> <p>i) Power is given by the product of the voltage and current in the circuit is called power. It is expressed in watts or kilo-watts.</p> <p>ii) Power factor is the cosine of the angle between voltage and current in a circuit is called power factor.</p>	3

Qn. Nos.	Sub. Qn.No.	Value Points	Marks										
	c)	<p>Represent graphically AC and DC waveforms and compare them. 5</p> <p>Ans.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>AC</p>  </div> <div style="text-align: center;"> <p>DC</p>  </div> </div> <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th style="width: 50%;">A.C.</th> <th style="width: 50%;">D.C.</th> </tr> </thead> <tbody> <tr> <td>A.C. means alternating current</td> <td>D.C. means direct current</td> </tr> <tr> <td>Changes its magnitude & direction</td> <td>Does not changes its magnitude & direction</td> </tr> <tr> <td>A.C. have phase and neutral</td> <td>D.C. have positive and negative</td> </tr> <tr> <td>A.C. cannot be stored</td> <td>D.C. can be stored.</td> </tr> </tbody> </table>	A.C.	D.C.	A.C. means alternating current	D.C. means direct current	Changes its magnitude & direction	Does not changes its magnitude & direction	A.C. have phase and neutral	D.C. have positive and negative	A.C. cannot be stored	D.C. can be stored.	5
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8.	a)	<p>Define Transformer. 2</p> <p>Ans.</p> <p>Transformer is a static machine, which transfers electrical power from one winding to another winding.</p>	2										
	b)	<p>Mention the role of Excitor in an alternator. 3</p> <p>Ans.</p> <p>Excitor is a small d.c. shunt or compound generator, which is mounted on the same shaft of an alternator. It supplies d.c. voltage to the rotor windings to produce rotative magnetic field.</p>	3										

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	<p>Draw a neat diagram of DC shunt motor and explain its working in brief. 5 <i>Ans.</i></p> <div style="text-align: center;">  <p>Shunt Motor</p> <p>In d.c. shunt motor, field winding and armature windings are connected in parallel. Field winding consists of large no. of turns of fine enamelled copper wire. The speed of a shunt motor remains almost constant and motor cannot be started with a heavy load. It is suitable for stable and light load.</p> </div>	5
		OR	
	a)	<p>Define alternator. 2 <i>Ans.</i> Alternator is an a.c. generator, which converts mechanical energy into A.C. Electrical energy is called alternator.</p>	2
	b)	<p>Explain working of an alternator. 3 <i>Ans.</i> Working of alternator. When d.c. supply (excitation) is given to the field windings of rotor through slip rings, field flux is produced around the rotor. When the rotor rotates, this flux cuts the stator windings, hence e.m.f. is induced.</p>	3
	c)	<p>Draw a neat diagram of step-up and step-down transformer and explain its working. 5 <i>Ans.</i></p> <div style="text-align: center;">  <p>Step-down Transformer</p> <p>Step-down transformer</p> </div>	

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
		<p style="text-align: center;">Step-up Transformer</p>  <p style="text-align: center;"><i>Step-up transformer</i></p> <p>Step-up transformer increases the voltage, it has less no. of turns in primary winding, but more no. of turns in secondary winding. Step-down transformer decreases the voltage, it has more no. of turns in primary winding, but less no. of turns in secondary winding.</p>	5
9.	a)	What is an electric fan ? 2 <i>Ans.</i> Electric fan is an a.c. single phase motor, which converts electrical (a.c.) energy to mechanical energy.	2
	b)	Explain working of electric stove. 3 <i>Ans.</i> Electric stove consists of porcelain plate, spiral shaped heating element, Bakelite handle. When an a.c. supply is given to the heating element, current flows through the coil, thus produces heat according to the heating effect of an electric current.	3
	c)	Draw a neat sketch of electric bell and label the parts. 5 <i>Ans.</i>  <p style="text-align: right;">Sketch = 4 Parts = 1</p> <p>A. Armature B. Hammer or clapper C. Gong D. Soft iron core E. Bakelite base F. Coil. T₁, T₂ Terminals</p>	5

