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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 — **2019**

S. S. L. C. EXAMINATION, MARCH/APRIL, 2019

ಮಾದರಿ ಉತ್ತರಗಳು

MODEL ANSWERS

ದಿನಾಂಕ : 23. 03. 2019] ಸಂಕೇತ ಸಂಖ್ಯೆ : **71**

Date : 23. 03. 2019] **CODE NO. : 71**

ವಿಷಯ : ಎಲಿಮೆಂಟ್ಸ್ ಆಫ್ ಮೆಕ್ಯಾನಿಕಲ್ ಅಂಡ್ ಎಲೆಕ್ಟ್ರಿಕಲ್ ಇಂಜಿನಿಯರಿಂಗ್ - 2

Subject : ELEMENTS OF MECHANICAL AND ELECTRICAL ENGINEERING-2

(ಹೊಸ ಪಠ್ಯಕ್ರಮ / New Syllabus)

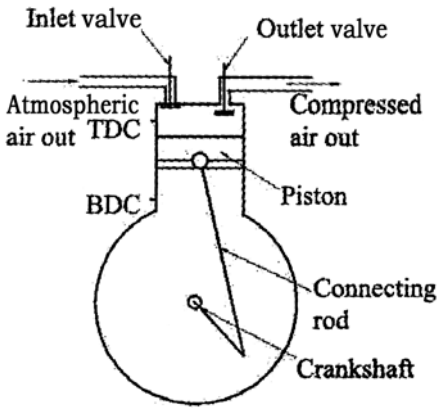
(ಶಾಲಾ ಅಭ್ಯರ್ಥಿ & ಪುನರಾವರ್ತಿತ ಶಾಲಾ ಅಭ್ಯರ್ಥಿ/ Regular Fresh & Regular Repeater)

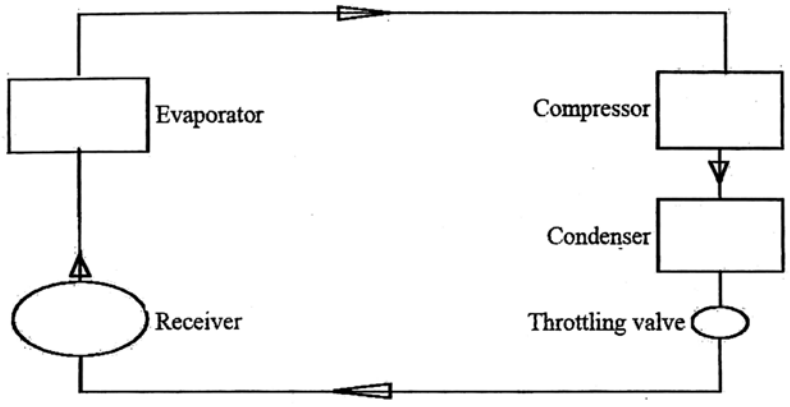
[ಗರಿಷ್ಠ ಅಂಕಗಳು : **100**

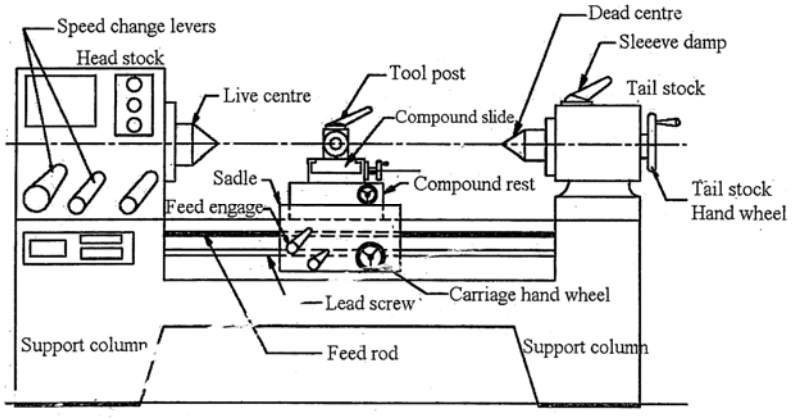
[Max. Marks : 100

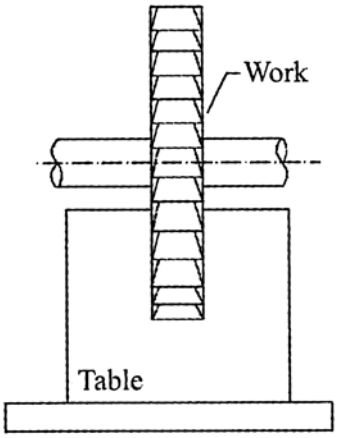
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
		SECTION - A	
1.	a)	List the advantages of I.C. engines. *Ans.* *Advantages of I. C. engine* : i) They are simple, smaller size, less expensive, light weight and more reliable. ii) They have higher efficiency iii) The fuel consumption is comparatively lesser than external combustion engines. 2×1	2

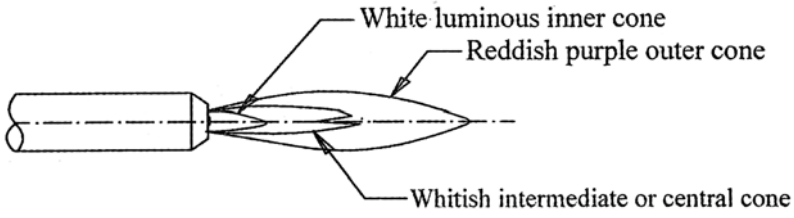
<table>
<tr><th>Qn. Nos.</th><th>Sub. Qn.No.</th><th>Value Points</th><th>Marks</th></tr>
<tr><td></td><td>b)</td><td>Write the classification of I.C. engines according to the type of fuel used.
Ans.
Classification of I.C. engines according to the type of fuel used
i) Petrol engines
ii) Diesel engines
iii) Gas engines. 3 × 1</td><td>3</td></tr>
<tr><td></td><td>c)</td><td>How are the petrol engines different from diesel engines ?
Ans.
<table>
<tr><th></th><th>Petrol engine</th><th>Diesel engine</th></tr>
<tr><td>i)</td><td>Works on Otto cycle</td><td>Works on diesel cycle</td></tr>
<tr><td>ii)</td><td>Requires carburetors</td><td>Do not require carburetors</td></tr>
<tr><td>iii)</td><td>Charge is admitted into the cylinder</td><td>Only air is admitted into the cylinder</td></tr>
<tr><td>iv)</td><td>Spark plug required</td><td>Do not require spark plug</td></tr>
<tr><td>v)</td><td>Charge is ignited by contact with electric spark</td><td>Diesel fuel is injected into the compressed air</td></tr>
<tr><td>vi)</td><td>Compression ratio lower 6 : 11</td><td>Compression ratio is high 16 to 22</td></tr>
<tr><td>vii)</td><td>Lower cost more running cost</td><td>Higher cost less running cost</td></tr>
<tr><td>viii)</td><td>Used in car, motors, cycles and light vehicles</td><td>Used in bus, truck and heavier vehicles</td></tr>
<tr><td>ix)</td><td>Run at higher speed.</td><td>Comparatively lower speed.</td></tr>
</table>
5 × 1</td><td>5</td></tr>
</table>

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
2.	a)	Define air compressor. 2 *Ans.* Compressors are the power absorbing devices which enable increasing pressure of air. They may be either reciprocating or centrifugal type.	2
	b)	Explain the applications of air compressor. 3 *Ans.* i) inflating tubes and tyres ii) inflating balloons iii) used in hospitals iv) used in automobile workshops v) used in painting industries vi) used in bore well digging machines. 3×1	3
	c)	Draw a neat sketch of single stage reciprocating air compressor and label the parts. 5 *Ans.*  Single stage reciprocating air compressor. Sketch = 03 Parts = 02	5
3.	a)	Name the different types of refrigerants. 2 *Ans.* i) Air ii) Ammonia iii) Sulphur dioxide	

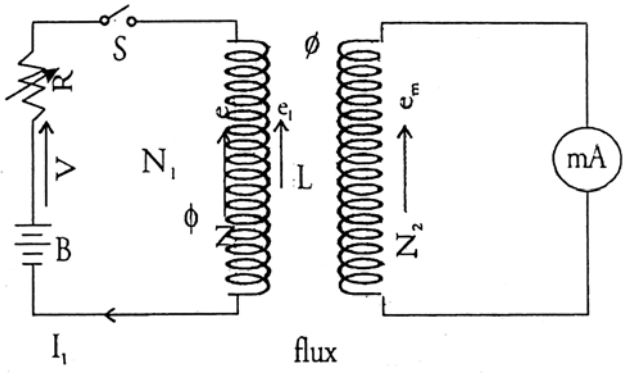
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
		iv) Carbon dioxide v) Freon vi) Methyl chloride. 4 × ½	2
	b)	Why do we need refrigeration ? Give reasons. 3 *Ans.* i) comfort air conditioning ii) preservation of medicines, blood and other organs possible by refrigeration. This is essential to keep these alive and active all time iii) preservation of vegetables and fruits to avoid bacterial growths iv) manufacture of ice v) it is most widely used in production of rocket fuels vi) computer cooling to avoid malfunctioning of the semiconductor chips used in computers vii) preservation of milk, ghee, butter etc. to avoid any bacterial growth in food products.	3 × 1 = 3
	c)	Draw a neat sketch of refrigeration system and label the parts. 5 *Ans.*  Parts of the referigeration system Sketch = 03 Parts = 02	5

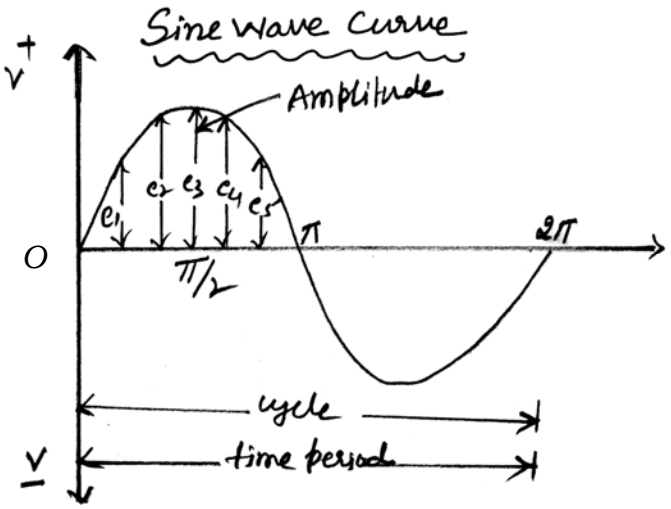
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
4.	a)	Mention the types of lathes. 2 *Ans.* *Types of lathes* : i) Engine lathe ii) Bench lathe iii) Tool room lathe iv) Speed lathe v) Capstan and turret lathe vi) Automatic lathe. $4 \times \frac{1}{2}$	2
	b)	Differentiate between three jaw chuck and four jaw chuck. 3 *Ans.* *Three jaw chuck* : it is called as self centering chuck as it takes and aligns the workpiece along the axis of the lathe. It is also called dependent chuck as all the jaws are move simultaneously. 1½ *Four jaw chuck* : it is also called independent chuck because the movement of jaw is independent. It has four jaws that are located at 90°. This jaw is used for holding and rotating heavy and iregular shaped jobs. 1½	3
	c)	With a line diagram show the important parts of an engine lathe or centre lathe. 5 *Ans.*  Lathe Diagram Sketch = 04 Parts = 01 Total	5
		OR	

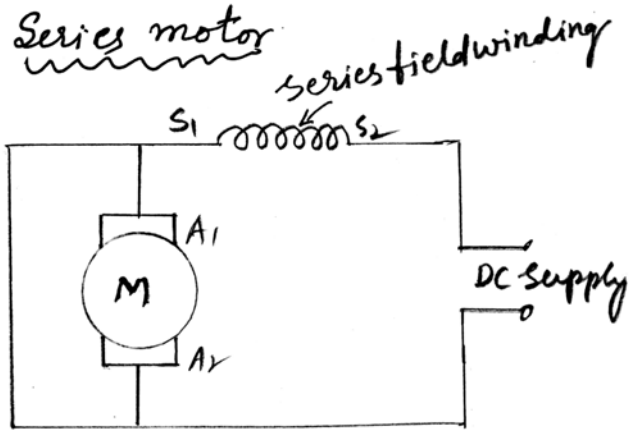
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	a)	Name the types of drilling machine. 2 *Ans.* *Drilling machine types* : i) Portable drilling machine ii) Sensible drilling machine iii) Upright drilling machine iv) Radial drilling machine v) Multiple drilling machine vi) Gang drilling machine. $4 \times ½$	2
	b)	Explain the following drilling machine operations : 3 i) drilling ii) reaming. *Ans.* *Drilling :* The operation of producing a cylindrical hole in a solid workpiece using drill is called as drilling. 1½ *Reaming* : The operation of accurate sizing and finishing of the previously drilled hole is called reaming. The tool used for such operation is called reamer. 1½	3
	c)	With a neat sketch explain slot milling. 5 *Ans.*  *Slot milling* : it is the operation of producing slots or grooves is a workpiece using end mill or side milling cutter. This operation can be performed on horizontal milling machine. Sketch = 03 Explanation = 02 Total	5

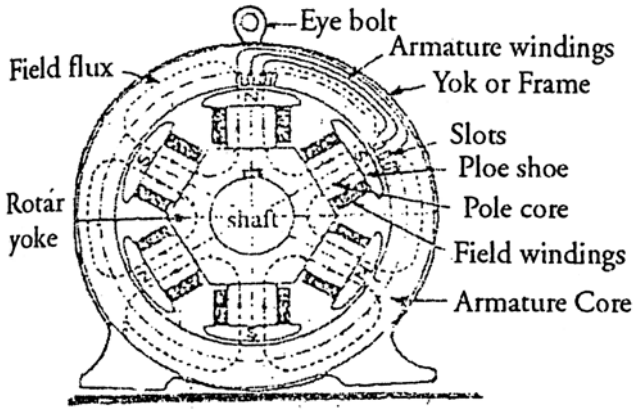
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
5.	a)	What is welding ? 2 *Ans.* *Welding* : it as a permanent fastening and it is the process of joining two metal pieces by the application of required heat and with or without application of pressure and filter metal.	2
	b)	Explain the applications of welding. 3 *Ans.* *Applications of Welding* : i) used in automotive and manufacturing industries ii) used in railways for wagon building works iii) used to weld pressure vessels, storage tanks, pipeline joining iv) used to repair and maintenance equipment and other metallic parts v) special method of welding used in aircraft works vi) used in fabrication such as cabinets, cupboards, gates and refrigerators.	3 × 1 = 3
	c)	Draw a neat sketch of carburizing flame and explain briefly. 5 *Ans.* *Carburizing Flame* : it can be obtained by supplying excess volume of acetylene in which oxygen and acetylene are mixed in the proportion of 1 :0·84 – 0·98:1. This flame generates low temperature about 3000 – 3150˚C. It is used for welding mainly aluminium and its alloys.  Sketch = 03 Explanation = 02	5

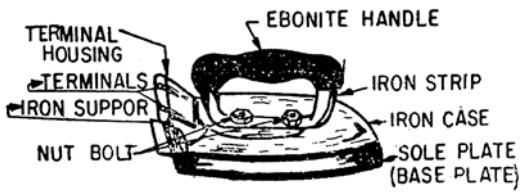
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
		SECTION – B	
6.	a)	What is self induced *emf* ? 2 *Ans.* The *e.m.f.* induced in a coil, due to the changing flux created by the current flowing through the same coil, is called self induced e.m.f. This is always in opposition to the applied voltage.	2
	b)	Differentiate between Fleming's left hand rule and right hand rule. 3 *Ans.* *Flemings left hand rule* : Stretch the three fingers of your left hand — the fore finger, the middle finger and the thumb at right angles to each other. The fore finger indicates the direction of flux, the middle finger indicates the direction of current and the thumb indicates the direction of motion of the conduction. *Flemings right hand rule* : Stretch the fore finger, the middle finger and the thumb of your right hand at right angles to each other. The fore finger indicates the direction of flux, the thumb indicates the direction of motion of the conductor and middle finger indicates the direction of e.m.f. induced in the conductor.	$2 \times 1\frac{1}{2} = 3$

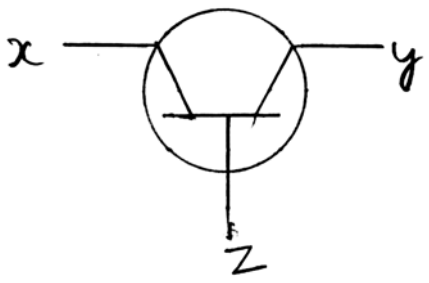
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	c)	Draw a neat sketch of mutually induced *emf* and explain it briefly. 5 *Ans.* Mutually induced e.m.f.  Sketch = 03 Explanation = 02 *Explanation* : The e.m.f. induced in a coil due to changing flux created by the current flowing through the neighbouring coil, is called multually induced *e.m.f.* and is measured in volts.	5
7.	a)	Define average value. 2 *Ans.* *Average value* : Average value of an alternating current is that direct current which when flowing through a given circuit for a given time transfers the same amount of charge as it is transferred by an alternating current flowing through the same circuit for the same time.	2
	b)	Explain the following : 3 i) *rms* value ii) Instantaneous value. *Ans.* i) *rms value* : *rms* value of an alternating current is that direct current which when flowing through a given circuit for a given time transfers the same amount	

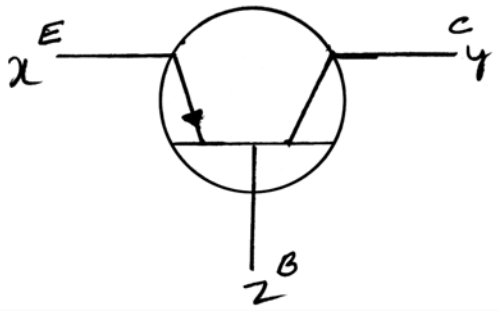
Qn. Nos.	Sub. Qn.No.	Value Points	Marks
		of heat as it produced by an alternating current flowing through the same circuit for the same time. ii) Instantaneous value : Instantaneous value of an alternating quantity is the value of that alternating quantity at any particular instant, in a general instantaneous values of sine wave voltage and current.	2 × 1½ = 3
	c)	Draw a neat diagram of sine wave curve and mark the following on it : 5 i) Amplitude ii) Cycle iii) Time period. *Ans.*  Sketch = 3 M Marking = 2 M	5
8.	a)	Define step-up transformer. 2 *Ans.* *Step-up transformer* : The transformer which takes power at a lower voltage and delivers power at a higher voltage is called step up transformer. $N_1 < N_2, E_1 < E_2, I_1 > I_2$	2

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	b)	Explain the working principle of *dc* generator. 3 *Ans.* *Working principle of d.c. generator* : *DC* generator works on the principle of Faraday's laws of electromagnetic induction, whenever the flux linking with a conductor changes an e.m.f. is induced in the conductor. The magnitude of the e.m.f. induced is equal to the rate of change of flux linking with the conductor. $e = N\frac{d\phi}{dt}$ volts	3
	c)	Draw a neat sketch of *dc* series motor and explain briefly. 5 *Ans.*  The *d.c.* series motor in which the field winding is connected in series with the armature winding is called series winding. The field is made of a few number of turns of thick wire. It has low resistance. Sketch = 2½ Explanation = 2½	5
		OR	

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
	a)	What is an alternator ? 2 *Ans.* An alternator is an electrical machine which converts mechanical energy into alternating current electrical energy. It is an alternating current generator.	2
	b)	Explain the applications of transformer. 3 *Ans.* i) transformers are extensively used in all A.C. power transmission and distribution systems to step-up and step-down voltage ii) step-up transformers are used in generating stations and receiving stations to step up the voltage iii) step-down transformers are used in master unit substations and in distribution centres to step-down the voltage iv) core type transformers are used for higher capacity v) shell type transformers are used for lower capacity.	3
	c)	Draw a neat sketch of an alternator and label the parts. 5 *Ans.* <u>Alternator sketch and parts</u>  Sketch = 3 Marking = 2	5

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
9.	a)	Name the types of electric iron. 2 *Ans.* *Types of electric iron* : i) Non-automatic iron ii) Automatic iron	2 × 1 = 2
	b)	Describe the working of an electric stove. 3 *Ans.* The electric stove mostly consists of metal body of thick iron sheet heater plate made of china clay or porecelain, heating element made of nichrome wire, terminal housing in which the terminals are fitted with nuts and insulated with porcelain cleats. The ends of heating element are connected with these two terminals. The heater plate is supported with thick iron strip fitted with nut-bolts. The ends of element are insulated with porcelain beads each other. The metal body is supported with legs. When supply is given current is passed and the heating element is heated and produces heat. Electric stove works on the principle of Heating effect of electric current.	3
	c)	Draw a neat sketch of electric iron and label the parts. 5 *Ans.* Electric iron sketch and parts  Sketch = 3 Parts = 2	5

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
10.	a)	What is transistor ? 2 *Ans.* Transistor is a three terminal semiconductor device formed by sandwiching a layer of one type of semiconductor (*p* or *n*) is between two layers of another type of semiconductor (*N* or *P*)	2
	b)	Explain the applications of transistor. 3 *Ans.* Applications of transistor i) transistor is used as switch ii) it is used both as a general and phase shift oscillator iii) It is used in LED circuits iv) it is used in oscillator circuits v) it is used as an amplifier.	3 × 1 = 3
	c)	The incomplete *n-p-n* transistor is given in figure. What do *x, y, z* indicate ? Mark the arrow which indicates the direction of flow of charge and functions of regions. 5 	

Qn. Nos.	Sub. Qn.No.	Value Points	Marks
		Ans.  *Ans.* *x* = Emitter *y* = Collector *z* = Base *Functions of regions* : i) Base : Its function is to allow majority charge carrier (electrons or holes) from the emitter ii) Emitter : Its function is to emit majority charge carrier into the base iii) Collector : Its function is to collect the majority charge carrier from the base. Marking = 2 Function = 3	5