

**Time: 3 Hours** 

Maximum Marks: 80 Min. Passing Marks Main: 26 Min. Passing Marks Back: 24

#### Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. <u>NIL</u>

2. <u>NIL</u>

### <u>UNIT – I</u>

- Q.1 (a) How metallurgical coke is manufactured by Otto-Hoffmann's by product coke oven process? [10]
  - (b) What are the advantages of gaseous fuel over solid and liquid fuel? Give one example of gaseous fuel with its calorific value. [6]

#### <u>OR</u>

- Q.1 (a) Describe Fischer Tropsch's process for the manufacture of synthetic petrol. [10]
  - (b) What is knocking and Octane number? Give names of two antiknocking substances. [6]

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[1500]

# UNIT – II

- Q.2 (a) Derive complete formula for determining calorific value of a solid fuel by bomb calorimeter. [10]
  - (b) Calculate the mass of air required for complete combustion of 5 kg of coal containing 80% carbon, 15% hydrogen and rest is oxygen, if 40% excess air is supplied.
    [6]

#### <u>OR</u>

Q.2 (a) Write short notes on any two of the following:

[5+5]

- (i) Significance of proximate analysis
- (ii) Delong's formula for calorific value of a fuel.
- (iii) Combustion: Write balanced equation for the combustion of methane, acetylene and Hydrogen gases.
- (iv) Importance of ultimate analysis.
- (b) The ultimate analysis of a coal sample gives :
  - C = 84%
  - O = 8.4%
  - H = 5.5%
  - S = 1.5%
  - N = 0.6%

Calculate the higher (Gross) and lower (Net) calorific values of the sample. [6]

#### <u>UNIT – III</u>

Q.3 State and explain phase rule of one component system with diagram, taking water system as an example [16]

<u>OR</u>

Q.3 Describe the application of phase rule to Ag – Pb system with the help of diagram.What is Eutectic point? [16]

[2E1026]

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[1500]

# UNIT – IV

strate offer a me offer a public conductor.	s: write important applications
of superconductors.	[10]
(b) Discuss the structure of $C_{60}$ fullerenes.	[6]
OR	

Q	.4	(a)	)	What	t are	organ	nic el	ectronic	mate	erial?	How	conj	ugated	IΠ	- ele	ctrons	are	used	for
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			240 m.p.	cond	uctiv	ity in	poly	-aniline	, poly	у-руп	ole, a	ind po	oly-ac	ety	lene.			ſ	101
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(b) Discuss the principle and working of optical fibres. [6]

# <u>UNIT – V</u>

Q.5 (a)	What is corrosi	on? Describe in	detail the	electrochemical	(wet) corrosion of
	metals.				[10]
(b)	Explain cathodic	c protection to pro	event corros	sion.	[6]

#### <u>OR</u>

- Q.5 (a) What is corrosion? Describe in detail the chemical (dry) corrosion of metals. [10]
  - (b) Explain anodic sacrificial protection to minimize corrosion. [6]

