Register Number:……..

KUMARAGURU
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GENERAL INSTRUCTIONS TO THE CANDIDATES

1. Candidates are instructed to answer the questions as per Bloom's Taxonomy knowledge level (K_1 to K_6)
2. Candidates are strictly instructed not to write anything in the question paper other than their roll number.
3. Candidates should search their pockets, desks and benches and handover to the Hall Superintendent/ Invigilator if any paper, book or note which they may find therein as soon as they enter the examination hall.
4. Candidates are not permitted to bring electronic watches with memory, laptop computers, personal systems, walkie-talkie sets, paging devices, mobile phones, cameras, recording systems or any other gadget / device /object that would be of unfair assistance to him / her.
5. Corrective measures as per KCT examination policies will be imposed for malpractice in the hall like copying from any papers, books or notes and attempting to elicit the answer from neighbours.

B.E/B.TECH DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2014)

Second Semester

U14CHT202 : APPLIED CHEMISTRY

(Common to AERO/AUTO/ME & MCT)

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match list I (gaseous fuels) with list II (composition) and select the correct answer using the codes given below [K_1]

List I	List II
A. Natural gas	1. $CO + H_2$ with high $CO_2 + N_2$
B. Producer gas	2. $CH_4 + C_2H_6 + H_2 + CO + CO_2$
C. Water gas	3. $CO_2 + O_2 + CO + N_2$
D. Flue gas	4. $CO + H_2$ with little $CO_2 + N_2$

Codes :

	A	B	C	D
(a)	4	1	2	3
(b)	2	1	4	3
(c)	2	4	1	3
(d)	4	2	1	3

2. Lubricant used in a machine working at low temperatures should possess [K_3]

a) High pour-point b) Low pour-point

c) High wax content d) All the above

3. Consider the following statements regarding Refractories [K_2]

1. Capacity of a refractory brick to withstand sudden changes in temperature is called spalling resistance
2. Test piece for the determination of RUL of a refractory is heated in an electric furnace
3. With increase in the porosity, thermal spalling resistance of a refractory brick decreases
4. Refractories are dried in tunnel kilns

Which of these statements are correct?

a) 1,2,3 b) 2,3,4

c) 1,3,4 d) 1,2,4

4. Consider the following varieties of coal [K_2]

1. Lignite 2. Anthracite 3. Peat 4. Bituminous

The correct sequence of coal varieties in increasing order of calorific value is

a) 2-3-4-1 b) 1-3-2-4

c) 3-1-4-2 d) 4-1-3-2

5. Consider the following statements regarding corrosion [K_3]

1. Generally acidic media are more corrosive than alkaline and neutral medium
2. In a galvanic couple, the more noble metal suffers corrosion
3. With increase of temperature, the corrosion rate is generally decreased
4. Reduction in overvoltage of the corroding metal accelerates the corrosion rate

Which of these statements are correct?

a) 1,2 b) 1,3

c) 1,4 d) 2,4

6. Match list I (Metals) with list II (nature of oxide layer formed) and select the correct answer using the codes given below [K_3]

List I	List II
A. Aluminium	1. porous
B. Silver	2. stable
C. Molybdenum	3. unstable
D. Lithium	4. volatile

Codes :

	A	B	C	D
(a)	4	1	2	3
(b)	2	3	4	1
(c)	2	4	3	1
(d)	3	2	1	4

7. The following item consists of two statements, one labeled as the "Assertion (A)" and other as "Reason(R)". You are to examine those two statements carefully and select the answers to these items using the codes given below: [K_3]

Assertion (A) : In external treatment, water is usually first passed through the cation exchanger and then through the anion exchanger

Reason (R) : Cation exchangers are easily attacked by alkalis

a) both A and R individually true and R is the correct explanation of A

b) both A and R individually true and R is not the correct explanation of A

c) A is true but R is false

d) A is false but R is true

8. Presence of silica in boilers leads to [K_3]

a) Sludge formation

b) Scale formation

c) Caustic embrittlement

d) Blow down operation

9. Consider the following steps in powder metallurgy [K_2]

1. mechanical pulvarisation 2. compacting 3. sintering 4. mixing and blending

The correct sequence of steps in powder metallurgy is

a) 1-2-3-4

b) 1-4-3-2

c) 1-3-2-4

d) 1-4-2-3

10. The following item consists of two statements, one labeled as the "Assertion (A)" and other as "Reason(R)". You are to examine those two statements carefully and select the answers to these items using the codes given below: [K_3]

Assertion (A) : The solid-liquid equilibrium of an alloy system is represented on temperature – composition diagrams

Reason (R) : A solid – liquid equilibrium of an alloy has practically no gas phase and the effect of pressure is small on this type of equilibrium

a) both A and R individually true and R is the correct explanation of A

b) both A and R individually true and R is not the correct explanation of A

c) A is true but R is false

d) A is false but R is true

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11.	Define octane number of a gasoline	[K_1]
12.	Explain the explosive range of a fuel with example	[K_2]
13.	Differentiate between abrasives and refractories.	[K_2]
14.	Illustrate the significance of determining the pour-point of a lubricant	[K_3]
15.	A pure metal rod half-immersed vertically in water starts corroding at the bottom – justify	[K_3]
16.	During electroplating, pH of the electrolytic bath is strictly maintained. Why?	[K_3]
17.	Differentiate between scale and sludge.	[K_2]
18.	What is the main advantage of reverse osmosis over ion-exchange process?	[K_2]
19.	What is condensed phase rule? When it is applied?	[K_3]
20.	List the advantages of powder metallurgy	[K_1]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

21.	(i)	Construct a phase diagram for lead-silver alloy system and elaborate how it could explain pattinson's process.	(10)	[K_3]
	(ii)	Explain the break-point chlorination	(4)	[K_2]
22.	(i)	Describe in brief, the manufacture of metallurgical coke by Otto-Hoffman's method.	(7)	[K_2]
	(ii)	Discuss in brief the proximate analysis of coal	(7)	[K_4]
23.	(i)	What are solid lubricants? Explain the structure, properties and use of any two solid lubricants	(7)	[K_2]
	(ii)	Illustrate the preparation, properties and uses of high alumina and magnesite bricks	(7)	[K_2]
24.	(i)	Explain the mechanism of electrochemical corrosion	(7)	[K_2]
	(ii)	What is Cathodic protection? Discuss sacrificial anodic protection for controlling corrosion	(7)	[K_2]
25.	(i)	Describe ion-exchange method of demineralization of water	(7)	[K_2]
	(ii)	Explain caustic embrittlement in boilers and how it can be avoided.	(7)	[K_2]
26.	(i)	State phase rule. With the help of suitable examples, explain the terms components, degree of freedom and phase	(7)	[K_2]
	(ii)	Explain any two methods for the preparation of metal powders.	(7)	[K_2]

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