May 2015

APPLIED CHEMISTRY

Time Allowed: 2 Hours *Full Marks: 35*

Answer to Question No.1 is compulsory and to be answered first.
This answer is to be made in separate loose script(s) provided for the purpose.
Maximum time allowed is 30 minutes, after which the loose answer scripts will be collected and fresh answer scripts for answering the remaining part of the question will be provided.
On early submission of answer scripts of Question No.1, a student will get the remaining script earlier.

Answer <u>any five</u> questions from Group-A, B & C, taking <u>at least one</u> from each group.

1. Choose the correct answer from the given alternatives (any ten): 10x1

i) Chemical composition of asbestos is – (a) calcium magnesium silicate, (b) aluminium silicate, (c) calcium sulphate, (d) magnesium carbonate.

ii) Producer gas contains – (a) CO & CO_2, (b) CO & H_2, (c) CO & N_2, (d) CH_4 & CO.

iii) Which material is not required to determine the calorific value of coal by Bomb Calorimeter? – (a) Beckman thermometer, (b) N_2, (c) O_2, (d) magnesium wire.

iv) Condensation polymerisation is observed during the formation of – (a) Buna-N, (b) Polyvinyl Chloride, (c) Sarron, (d) Nylon 6:6.

v) All are called green house gases except – (a) NO_x, (b) CO_2, (c) H_2S, (d) CH_4.

vi) Mostly used metal for electroplating purpose is – (a) Ni, (b) Cu, (c) Ag, (d) Cr.

vii) The BOD value (in ppm) of average sewage water is – (a) 40-50, (b) 400, (c) 100-150, (d) 500.

viii) The nitrating reagent to benzene is – (a) concentrated HNO_3, (b) concentrated HNO_3 and concentrated H_2SO_4, (c) $NaNO_3$, (d) anhydrous $AlCl_3$, HNO_3.

ix) Setting and hardening of cement involves – (a) hydration and hydrolysis, (b) hydration and neutralisation, (c) hydrolysis and neutralisation, (d) dehydration and neutralisation.

x) The substance used for cutting metals is – (a) ebonite, (b) graphite, (c) steel, (d) B_4C.

xi) Ultimate analysis involves the estimation of – (a) H, S, NH_3, C, (b) H, C, S, N, O, (c) NH_3 and moisture, (d) C and O.

xii) Bottle used for carrying drinking water is made of – (a) polypropylene, (b) polyethylene, (c) neoprene, (d) PVC.

xiii) Varnish doesn't contain – (a) thinner, (b) solvent, (c) pigment, (d) resin.

<u>Group-A</u>

2. a) Write the raw materials required for manufacture of Portland cement. What in the fuel used for this preparation?
b) What is called CLINKER and what is the purpose of mixing gypsum with cement? (2+1)+1+1

3. a) How will you distinguish an aldehyde and ketone? Give necessary reaction.
   b) What is meant by diazotisation reaction? Explain by reaction.
   c) Write the reagents to prepare alkyl benzene by Friedel Craft's reaction. 2+2+1

4. a) Define 'octane number' and 'cetane number'.
   b) What is 'knocking property' and 'cracking'? 3+2

5. A coal sample contains 92% C, 4% H, 1% S and 1% O; calculate the quantity of air required for complete burning of 100kg of coal. Given, air contains 20% by weight of air. 5

Group-B

6. a) How does chemical corrosion occur? Explain with examples.
   b) How are – (i) Plaster of Paris, and (ii) Glass prepared? Give the reactions involved. 2+3

7. a) What are 'drier' and 'filler' in preparation of paints? Give one example in each.
   b) Write two characteristics of a good paint. (1+1+1)+2

8. a) What is vulcanisation of rubber?
   b) Write the raw materials to prepare – (i) silicone, (ii) Buna-S, (iii) Teflon. 2+3

Group-C

9. a) What is 'acid rain'? What are its effects to environment? Explain with reaction, if any.
   b) How are CO and NO_x gases converted to less harmful substance in automobile? 3+2

10. a) Describe in brief how pollution in sewage water is controlled before going to river.
    b) What is Freon? How does it affect to living system? 3+2