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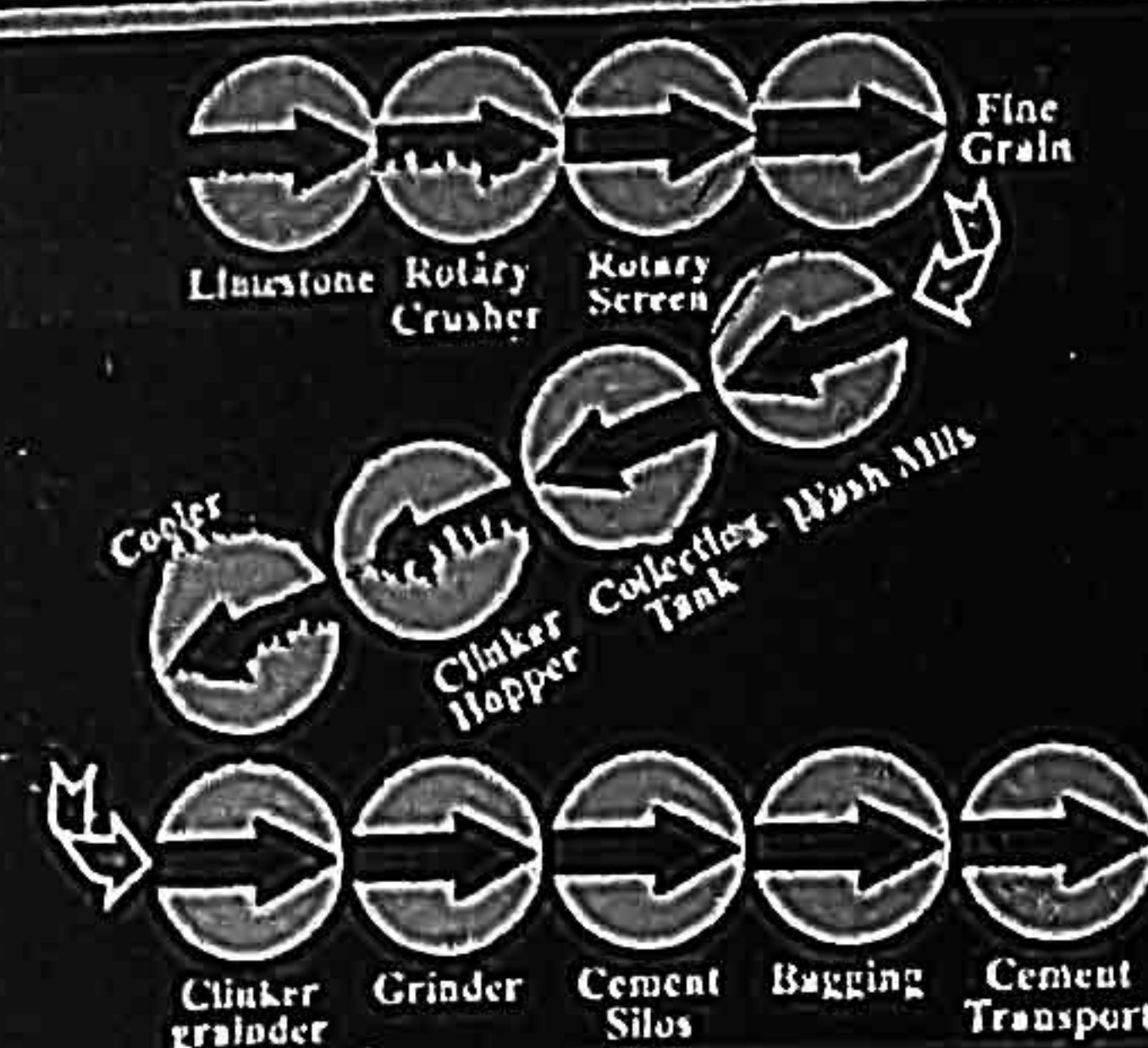
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Chapter

15

Common Chemical Industries In Pakistan

KEY POINTS

Acid rain/Acid deposition:

The formation of Sulphuric and nitric acids from the oxides of sulphur and nitrogen in the atmosphere in the presence of water and pollutants is called acid deposition.

Cement:

The material which is obtained by burning an intimate mixture of calcarious (lime bearing) and argillaceous (clay) materials at sufficiently high temperature to produce clinkers which are subsequently ground to a fine powder is called cement.

Digester:

It is the main unit of the pulp formation. It is usually 30 feet in length and 7 feet in diameter. It is made up of steel and wrought iron.

Fertilizers:

These are the substances added to the soil to make up the deficiency of essential elements like nitrogen, phosphorus and potassium required for the proper growth of plants.

Macro-nutrients:

The nutrients which are required in a very large amount for the growth of plants. These are generally required in quantities ranging from 5 kg to 200 kg per acre.

Paper:

Paper is defined in term of its method of production, that is a sheet material made up of a network of natural cellulosic fibres which have been deposited from an aqueous suspension. The product obtained is a network of interlocking fibres.

Slurry:

A suspension containing an appreciable quantity of a solid.



TOPICAL MULTIPLE CHOICE QUESTIONS

15.1 Introduction

15.2 Fertilizers

- (1) A manure is
 (a) An organic material
 (b) An inorganic material
 (c) A chemical compound
 (d) A mixture of organic and inorganic materials

15.3 Elements Essential for Plant Growth

- (2) The elements which are essential for plant growth can be classified into
 (a) Three types (b) Four types
 (c) Two types (d) Five types
- (3) Which one of the following is not the macronutrient for plants?
 (a) Zinc (b) Calcium
 (c) Potassium (d) Nitrogen
- (4) The nutrients which are required in very small amount for the growth of plants are called.
 (a) Nitrogenous fertilizers (b) Micronutrients
 (c) Phosphatic fertilizers (d) NPK fertilizers
- (5) Which one of the following is not the micronutrient?
 (a) Copper (b) Iron
 (c) Magnesium (d) Molybdenum
- (6) Micronutrients are generally required in quantities ranging from
 (a) 6g to 100g per acre (b) 6g to 150g per acre
 (c) 6Kg to 200kg. per acre (d) 6g to 200g per acre
- (7) The macronutrients for plant are those which
 (a) Are required in very large amount
 (b) Are produced from plants in very small amounts
 (c) Are required in very small amount
 (d) Retard the growth of plants
- (8) Which of two non-metals are included in micronutrients?
 (a) Carbon and Bromine (b) Hydrogen and oxygen
 (c) Boron and chlorine (d) Nitrogen and phosphorus
- (9) Macronutrients include
 (a) Metals only (b) Non-Metals only
 (c) Both Metals and Non-Metals (d) Both metals and metalloids
- (10) Macro-nutrients are generally required in quantities ranging from:
 (a) 5kg to 100Kg per acre (b) 5Kg to 200Kg per acre
 (c) 5Kg to 150Kg Per acre (d) 4Kg to 250. Kg per acre
- (11) Trace elements include
 (a) N, O, H (b) B, Cu, Fe
 (c) C, H, O (d) S, P, K
- (12) How many elements are included in macronutrients?
 (a) Five (b) Seven
 (c) Nine (d) Eleven

**15.4 Classification of Fertilizers:**

- (13) On the basis of the nature of the elements the fertilizers are classified into
 (a) Two types (b) Four types
 (c) Three types (d) Five types
- (14) Which one of the following is a high quality nitrogenous fertilizer?
 (a) Ammonia (b) Urea
 (c) Ammonium nitrate (d) Ammonium sulphate
- (15) Which element is essential for the development of stem and leaves?
 (a) Phosphorus (b) Calcium
 (c) Nitrogen (d) Boron
- (16) Which fertilizer is used in liquid state?
 (a) Ammonium nitrate (b) Ammonia
 (c) Calcium ammonium sulphate (d) Ammonium phosphate
- (17) Which one of the following fertilizers makes the soil acidic?
 (a) Calcium nitrate (b) Sodium nitrate
 (c) Potassium nitrate (d) Ammonium nitrate
- (18) The acidity caused by nitrogen fertilizers can easily be controlled by the
 (a) Addition of excessive water
 (b) Addition of gypsum at regular intervals
 (c) Addition of milk of magnesia at regular intervals
 (d) Addition of lime at regular intervals
- (19) Which has become an important fertilizer for direct application to soil in anhydrous form?
 (a) Ammonium nitrate (b) Ammonium chloride
 (c) Ammonium phosphate (d) Ammonia
- (20) Anhydrous ammonia contains
 (a) 52% nitrogen (b) 72% nitrogen
 (c) 82% nitrogen (d) 62% nitrogen
- (21) To what depth ammonia is injected under the surface of soil to avoid it from seeping out?
 (a) 3 inches (b) 9 inches
 (c) 6 inches (d) 12 inches
- (22) The %age of nitrogen in urea is
 (a) 46% (b) 56%
 (c) 48% (d) 60%
- (23) Which of the following is the most concentrated nitrogenous fertilizer?
 (a) Calcium nitrate (b) Ammonium sulphate
 (c) Urea (d) Ammonium chloride
- (24) Most widely used nitrogenous fertilizer in Pakistan
 (a) Ammonium nitrate (b) Urea
 (c) Ammonium chloride (d) Potassium nitrate
- (25) Maximum carbamate is converted into urea by
 (a) Oxidation (b) Hydration
 (c) Hydrolysis (d) Dehydration
- (26) In evaporation chamber, water is removed from urea solution by heating it with
 (a) Steam at high pressure (b) Steam under vacuum
 (c) Steam at moderate pressure (d) Direct flame



- (27) The molten urea which is obtained from evaporation section is pure up to
 (a) 100% (b) 98%
 (c) 97.9% (d) 99.7%
- (28) The percentage of nitrogen in ammonium nitrate is
 (a) 22 to 22.5% (b) 26 to 26.5%
 (c) 33 to 33.5% (d) 29 to 29.5%
- (29) Ammonium nitrate is
 (a) Deliquescent (b) Hygroscopic
 (c) Efflorescent (d) Basic
- (30) Ammonium nitrate is also used in combination with
 (a) Dry lime (b) Lime water
 (c) Lime stone (d) Alum stone
- (31) Which one of the following is water soluble phosphate fertilizer?
 (a) $\text{Ca}(\text{H}_2\text{PO}_4)_2$ (b) $\text{Ca}_3(\text{PO}_4)_2$
 (c) $(\text{NH}_4)_2\text{HPO}_4$ (d) both a and c
- (32) Which one of the following fertilizers accelerate the seed and fruit formation during the later stages of growth?
 (a) Nitrogen fertilizers (b) Phosphatic fertilizers
 (c) Potassium fertilizers (d) Sulphur fertilizers.
- (33) What are prills?
 (a) Big and soft pellets (b) Tiny and soft pellets
 (c) Big and hard pellets (d) Tiny and hard pellets
- (34) The reaction between ammonia and nitric acid to prepare ammonium nitrate is
 (a) Hydrolysis (b) Dehydration
 (c) Neutralization (d) Decomposition
- (35) The percentage of nitrogen in diammonium phosphate is
 (a) 16% (b) 20%
 (c) 18% (d) 48%
- (36) The percentage of P_2O_5 in diammonium phosphate is
 (a) 28% (b) 38%
 (c) 48% (d) 58%
- (37) How much plant nutrients are present in diammonium phosphate
 (a) 55% (b) 75%
 (c) 65% (d) 85%
- (38) Potassium is required for the formation of
 (a) Starch (b) Sugar
 (c) Fibrous material of the plant (d) All of above
- (39) Potassium fertilizers help in ripening of
 (a) Seeds (b) Fruits
 (c) Cereals (d) All of above
- (40) The potassium nitrate contains nitrogen
 (a) 23% (b) 33%
 (c) 13% (d) 44%
- (41) Potassium nitrate is obtained as
 (a) Pale yellow solid (b) White solid
 (c) Bluish white solid (d) Greenish blue solid



- (42) The percentage of potash in potassium nitrate
 (a) 14% (b) 24%
 (c) 34% (d) 44%
- (43) How many fertilizer plants in private as well as public sectors are manufacturing different types of fertilizers in the country?
 (a) 12 (b) 14
 (c) 10 (d) 16
- (44) What is the total production of urea fertilizer in Pakistan per annum
 (a) 46,20,300 metric tons (b) 36,40,200 metric tons
 (c) 56,30,100 metric tons (d) 25,10,400 metric tons
- (45) Phosphorus helps the growth of
 (a) Root (b) Leave
 (c) Stem (d) Seed

15.5 Cement

- (46) The percentage of lime (CaO) in a good sample of Portland cement is
 (a) 62% (b) 52%
 (c) 32% (d) 42%
- (47) The percentage of silica (SiO₂) in Portland cement is
 (a) 12% (b) 22%
 (c) 32% (d) 42%
- (48) A good sample of Portland cement contains alumina
 (a) 4.5% (b) 7.5%
 (c) 3.5% (d) 1.5%
- (49) Argillaceous material used for the manufacture of cement provide.
 (a) Basic components (b) Amphoteric components
 (c) Acidic components (d) Both acidic and basic components
- (50) In what proportion powdered limestone and clay paste is mixed?
 (a) 35% limestone, 65% clay (b) 65% limestone, 35% clay
 (c) 55% limestone, 15% clay (d) 75% limestone, 25% clay
- (51) What is the percentage of water in slurry obtained by mixing limestone and clay?
 (a) 25 to 35% (b) 15 to 25%
 (c) 35 to 45% (d) 45 to 55%
- (52) The slurry is sometimes filtered to reduce the water contents to
 (a) 10 to 20% (b) 20 to 30%
 (c) 5 to 15% (d) 15 to 25%
- (53) The charge present in rotatory kiln completes in journey in
 (a) 2-3 hours (b) 3-4 hours
 (c) 4-5 hours (d) 5-6 hours
- (54) Which one of the following is last zone of rotary kiln?
 (a) Burning zone (b) Decomposition zone
 (c) Cooling zone (d) Drying or pre-heating zone
- (55) In which zone of rotary kiln decomposition of limestone takes place
 (a) Burning zone (b) Moderate temperature
 (c) Cooling zone (d) Drying or pre-heating zone
- (56) Minimum temperature zone of rotary kiln is also called.
 (a) Decomposition zone (b) Cooling zone
 (c) Drying or preheating zone (d) Burning zone



- (57) The appearance of clinker is
 (a) Black (b) White
 (c) Brown (d) Greyish Black
- (58) In drying (pre-heating) zone of rotary kiln the temperature is kept at.
 (a) 300°C (b) 400°C
 (c) 500°C (d) 600°C
- (59) The production of cement per annum in Pakistan is
 (a) 9578802 metric tons (b) 8467701 metric tons
 (c) 6356600 metric tons (d) 5245500 metric tons
- (60) In cooling zone of rotary kiln the charge is cooled up to
 (a) 100-150°C (b) 150-200°C
 (c) 200-250°C (d) 200-300°C
- (61) In which zone of rotary kiln oxides e. g CaO, SiO₂, Al₂O₃ and Fe₂O₃ combine together
 (a) Burning zone (b) Decomposition zone
 (c) Drying zone (d) Pre-heating zone
- (62) In which zone of rotary kiln, the moisture is removed and the clay is broken into Al₂O₃, SiO₂ and Fe₂O₃?
 (a) Minimum temperature zone (b) Drying zone
 (c) Pre-heating zone (d) All of given
- (63) In which zone of rotary kiln, limestone (CaCO₃) decomposes into lime (CaO) and CO₂?
 (a) Moderate temperature zone (b) Cooling zone
 (c) Decomposition zone (d) Both a and c
- (64) The rotary kiln rotates on its axis at the rate of
 (a) 1-2 revolution per minute (b) 2-3 revolution per minute
 (c) 3-4 revolution per minute (d) 4-5 revolution per minute
- (65) A short time after the cement is mixed with water, tricalcium aluminate absorbs water and forms a colloidal gel of the composition.
 (a) 3Ca. Al₂O₃. 3H₂O (b) 3Ca Al₂O₃. 4H₂O
 (c) 3Ca Al₂O₃. 6H₂O (d) 3Ca. Al₂O₃. 8H₂O

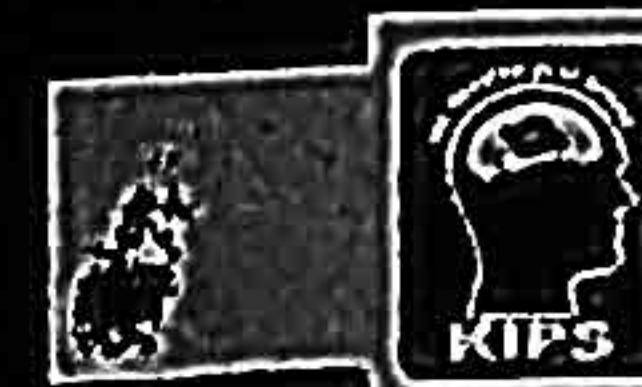
15.6 Paper Industry

- (66) The oldest industry known to man is
 (a) Agriculture (b) Chemical
 (c) Metallurgy (d) Leather
- (67) In the dryer section water is separated from fibre by
 (a) Gravity (b) Suction
 (c) Pressing (d) All of the above
- (68) Principal metals used for chemical pulping and production of paper pulps are
 (a) kraft process (b) sulphite process
 (c) natural sulphite semi-chemical process (d) all of the above
- (69) Essential steps for the manufacture of paper pulp and paper by NSSC are
 (a) five (b) two
 (c) ten (d) one

**MULTIPLE CHOICE QUESTIONS**

(From textbook exercise)

- (1) Which three elements are needed for the healthy growth of plants.
(a) N, S, P (b) N, Ca, P
(c) N, P, K (d) N, K, C
- (2) Which woody raw material is used for the manufacture of paper pulp?
(a) Cotton (b) Bagasse
(c) Poplar (d) Rice straw
- (3) The nitrogen present in some fertilizers helps plants
(a) to fight against diseases (b) to produce fat
(c) to undergo photosynthesis (d) to produce protein
- (4) Phosphorous helps the growth of
(a) root (b) leave
(c) stem (d) seed
- (5) Micro-nutrients are required in quantity ranging from
(a) 4-40g (b) 6-200g
(c) 6-200kg (d) 4-40kg
- (6) During the manufacturing process of cement the temperature of the decomposition zone goes up to
(a) 600°C (b) 800°C
(c) 1000°C (d) 1200°C
- (7) The word paper is derived from the name of which reedy plant
(a) Rose (b) Sun flower
(c) Papyrus (d) Water Hyacinth
- (8) Which is not a calcarious material?
(a) lime (b) clay
(c) marble (d) marine shell
- (9) How many zones through which the charge passes in a rotary kiln?
(a) 4 (b) 3
(c) 2 (d) 5
- (10) Ammonium nitrate fertilizer is not used for which crop?
(a) Cotton (b) Wheat
(c) Sugar cane (d) Paddy rice

**MULTIPLE CHOICE QUESTIONS**

(From past paper 2005-2011)

(Lahore & Gujranwala)

- (1) Macronutrient for soil is: (LHR 2005)
(a) N₂ (b) Cu
(c) Zn (d) Fe
- (2) The percentage of nitrogen in ammonium nitrate is: (GRW 2005)
(a) 46% (b) 82%
(c) 33% (d) 16%
- (3) The nitrogen present in fertilizers helps plants: (LHR 2008)
(a) to fight against disease (b) to produce fat
(c) to produce protein (d) to produce carbohydrates
- (4) Which woody raw material is used for the manufacture of paper pulp? (GRW 2008)
(a) cotton (b) bagasse
(c) poplar (d) rice straw
- (5) Which non – woody raw material is used for making pulp and paper: (LHR 2009)
(a) fur (b) rice/ wheat
(c) eucalyptus (d) poplar
- (6) Which is not a calcarious material? (GRW 2009)
(a) lime (b) clay
(c) marble (d) marine shell
- (7) Ammonium nitrate fertilizer is not used for which crop: (LHR 2010)
(a) Cotton (b) Wheat
(c) Sugarcane (d) Paddy rice
- (8) The three elements needed for the healthy growth of plants are: (GRW 2010)
(a) N,S,P (b) N,Ca,P
(c) N,P,K (d) N,K,C
- (9) The nitrogenous fertilizer easily taken up by plants is: (LHR 2011)
(a) Urea (b) Ammonium Nitrate
(c) Ammonia gas (d) Ammonia liquid
- (10) Which is not calcarious material? (GRW 2011)
(a) Lime (b) Clay
(c) Marble (d) Marine shell
- (11) Newspaper can be recycled again and again for how many times? (GRW 2011)
(a) 2 (b) 3
(c) 4 (d) 5

**MULTIPLE CHOICE QUESTIONS**

(From Past Papers 2008-2011)

(Faisalabad + Sargodha + Rawalpindi Board)

- (1) The word paper is derived from which reedy plant? (FSD 2009)
(a) Rose (b) Sunflower
(c) Papyrus (d) Water Hyacinth
- (2) Ammonium nitrate fertilizer is not used for which crops? (FSD 2009)
(a) Cotton (b) Wheat
(c) Sugarcane (d) paddy rice
- (3) The number of zones through which the charge passes in a rotary kiln during manufacture of cement are (FSD 2010)
(a) 2 (b) 3
(c) 4 (d) 5
- (4) A, Ammonium nitrate is not used as fertilizer for which crop? (FSD 2011)
(a) Cotton (b) Sugar
(c) Wheat (d) Paddy rice
- (5) Phosphorus helps the growth of (SGD 2009)
(a) Root (b) leave
(c) Stem (d) seed
- (6) Micronutrients are required in quantity are ranging from: (SGD 2010)
(a) 4-40 g (b) 6-200 g
(c) 6-200 kg (d) 10-200 kg
- (7) Phosphorous helps in growth of (SGD 2011)
(a) Root (b) Leave
(c) Stem (d) Seed
- (8) The natural fertilizer is called. (RWP 2008)
(a) Manure (b) Urea
(c) Super phosphate (d) Ammonium sulphate
- (9) Which of the following elements is not a micro nutrient? (RWP 2009)
(a) Cu (b) Fe
(c) Mg (d) Mo
- (10) Macronutrients are required for acre in quantity ranging from (RWP 2010)
(a) 2-200 Kg (b) 3-200 kg
(c) 4-200 kg (d) 5-200 kg
- (11) Calendar stock is the stage of paper making where: (RWP 2011)
(a) Paper is stored. (b) Thickness is reduced
(c) Water is removed (d) Stock is reduced to 1%

**MULTIPLE CHOICE QUESTIONS**

(From Past Papers 2008-2011)

(Multan + Bahawalpur + D.G. Khan Board)

- (1) Which sequence of steps is correct for the manufacture of cement: (MTN 2008)
(a) Mixing, heating, grinding, crushing (b) Crushing, heating, mixing, grinding
(c) Cushing, grinding, mixing, grinding (d) Crushing, grinding, mixing, heating
- (2) Ammonium Nitrate Fertilizer is not used for which crop? (MTN 2008)
(a) cotton (b) wheat
(c) sugar cane (d) paddy rice
- (3) The hottest zone in the rotary kiln is: (MTN 2008)
(a) Drying (b) Pre-heating
(c) Burning (d) Decomposition
- (4) It is not used in paper and pulp industry (MTN 2009)
(a) Bamboo (b) Cotton stalk
(c) poplar (d) He gas
- (5) A Manure is (MTN 2009)
(a) An organic compound
(b) An inorganic compound
(c) A mixture of organic and inorganic compounds
(d) A mixture of inorganic compound
- (6) The fertilizer that contains largest Nitrogen as Nutrient is (MTN 2010)
(a) Liquid Nitrogen (b) Urea
(c) Liquid Ammonia (d) Ammonia gas
- (7) Argillaceous material in the following is:- (MTN 2011)
(a) Lime (b) Clay
(c) Marble (d) Marine Shell
- (8) Which substance in cement has greater percentage? (BWP 2008)
(a) Silica (SiO_2) (b) Lime (CaO)
(c) Iron oxide (Fe_2O_3) (d) Alumina (Al_2O_3)
- (9) Which one is an Organic Fertilizer (BWP 2009)
(a) Manure (b) Ammonium Nitrate
(c) Urea (d) Both "a" and "b"
- (10) Which one is a micronutrient (BWP 2010)
(a) Boron (b) Nitrogen
(c) Phosphorus (d) Potassium
- (11) Organic compounds having fruity. Smell are: (BWP 2011)
(a) Carboxylic acids (b) Esters
(c) Alcohols (d) Ethers
- (12) The fertilizer, which contains 46% N is (DGK 2009)
(a) Urea (b) Ammonia
(c) Ammonium nitrate (d) None of these
- (13) Argillaceous material used for the manufacture of cement provides. (DGK 2010)
(a) Basic components (b) Amphoteric compounds
(c) Acidic components (d) Both acidic and basic components.
- (14) Zones through which the charge passes in a rotary kiln (DGK 2011)
(a) 5 (b) 4
(c) 3 (d) 2

**ANSWER KEY**

(Topical Multiple Choice Questions)

1	a	11	b	21	c	31	d	41	a	51	c	61	a
2	c	12	c	22	a	32	b	42	d	52	b	62	a
3	a	13	c	23	c	33	b	43	b	53	a	63	c
4	b	14	b	24	b	34	c	44	c	54	c	64	a
5	c	15	c	25	d	35	a	45	d	55	b	65	c
6	d	16	b	26	b	36	c	46	a	56	b	66	a
7	a	17	d	27	d	37	b	47	b	57	b	67	d
8	c	18	d	28	c	38	d	48	b	58	c	68	d
9	c	19	d	29	b	39	d	49	c	59	a	69	c
10	b	20	c	30	c	40	c	50	d	60	b	KIPS	

(From textbook exercise)

1	c	2	c	3	d	4	b	5	b
6	d	7	c	8	b	9	a	10	d

(From past papers 2005-2011)

(Lahore & Gujranwala Board)

1	a	2	c	3	c	4	c	5	b
6	b	7	b	8	d	9	b	10	b
11	d	KIPS COLLEGE AND SCHOOL							

(From Past Papers 2008-2011)

(Faisalabad + Sargodha + Rawalpindi Board)

1	c	3	c	5	d	7	d	9	c	11	b
2	d	4	d	6	b	8	a	10	d	KIPS	

(From Past Papers 2008-2011)

(Multan + Bahawalpur + D.G. Khan Board)

1	d	5	a	9	a	13	b
2	d	6	c	10	a	14	a
3	d	7	b	11	b	15	b
4	d	8	b	12	KIPS		

**KIPS SHORT QUESTIONS**

(Including Text Book Questions)

Q: 1 What are micro-nutrients?**Ans:** The nutrients which are required in a very small amount for the growth of the plant are called micronutrients.

These are generally required in quantities ranging from 6gram to 200 gram per acre for healthy plant growth. It may be dangerous to add too much quantity because they are poisonous in larger quantities.

These include Boron, Copper, Iron, Manganese, Zinc, Molybdenum and Chlorine.

Q: 2 If micro nutrients are supplied in large quantity then what will be effect over plant growth?**Ans:** The micro-nutrients are generally required in the quantity ranging from 6 gram to 200 gram per acre for healthy growth. It may be dangerous to add too much quantity because they are poisonous in larger quantities.**Q: 3** What are macro-nutrients?**Ans:** The nutrients which are required in a large amount for the growth of plants, are called macro-nutrients These are generally required in quantities ranging from 6 kilo grams to 200 kilo grams per acre for healthy plant growth.

These include Nitrogen, Phosphorous, Potassium, Calcium, Magnesium, Sulphur, Carbon, Hydrogen and Oxygen.

Q: 4 What are fertilizers?**Ans:** The fertilizers are the substances added to the soil to make up the deficiency of essential elements like Nitrogen, Phosphorous, Potassium (NPK) in order to enhance the natural fertility or replenish the chemical elements taken up from soil by the previous crop.**Q: 5** What are the types of the fertilizers? Give examples.**Ans:** There are three major types of fertilizers

(i) Nitrogenous Fertilizers

Ammonium sulphate, Calcium ammonium sulphate, Basic calcium nitrate

(ii) Phosphatic Fertilizers

Calcium super phosphate, Diammonium phosphate,

(iii) Potassium Fertilizers

Potassium nitrate

Q: 6 What is the requirement of a fertilizer? Every compound of desired elements cannot be a fertilizer. Explain.**Ans:** The basic requirement of a fertilizer is that it should be stable in soil as well as in storage i.e. it should not be deliquescent or set to hard stony material with time. Above all it should be cheap to manufacture.

Why every compound is not fertilizer?

Every compound of desired elements cannot be a fertilizer because all compounds of an element are not water soluble and they are not readily available to the plants so they cannot be taken up by the plants.

Q: 7 What is the role of nitrogen in plant growth?**Ans:** (i) Nitrogen is required during the early stage of plant growth for the development of (stem) and (leaves).
(ii) It is the main constituent of protein, imparts green colour to leaves.
(iii) It enhances the yield and quality of plants.

O.S. + NH_4OH
+ Trimethylamine
(TMA)



Q: 8 How seeping out of ammonia from the surface of the soil is prevented?
 Ans: The prevention of seeping out of ammonia from the surface of the soil is achieved by injecting the anhydrous ammonia under the surface of the soil about 6 inches.
 Anhydrous ammonia contains 82% Nitrogen.

Q: 9 Why ammonium nitrate is not used as fertilizer in paddy rice?
 Ans: Ammonium nitrate is not useful for paddy rice because the microbial bacteria in the flooded fields decompose it to nitrogen gas.

Q: 10 What is the role of phosphorous in plant growth?
 Ans: (i) Phosphorous is required to stimulate the early growth.
 (ii) It is required to accelerate the seed and fruit formation during the later stages of growth.
 (iii) It is required to increase the resistance against diseases.

Q: 11 What are the functions of potassium in plant growth?
 Ans: (i) Potassium is required for the formation of starch, sugar and fibrous material of plant.
 (ii) It is required to increase the resistance to diseases.
 (iii) It makes the plant strong by helping in healthy root development.
 (iv) It also help in ripening of seeds, fruits and cereals.

Q: 12 What are calcarious materials give its functions in cement?
 Ans: The materials which are mainly composed of calcium carbonate (CaCO_3) e.g. lime stone, marble, chalks and marine shell.

Function

Calcarious material helps in the formation of needle shaped crystals which get studded in the colloidal gel and impart strength to it.

Q: 13 What are argillaceous materials, give its functions in cement?

Ans: The material that provides acidic components to cement e.g. aluminates and silicates, is known as argillaceous material.

Function

Argillaceous material is used to fill the interstices that results in the hardening of cement.

Q: 14 What is slurry?

Ans: Definition: A suspension containing an appreciable quantity of a solid. e.g. *limestone + clay paste*
 The material obtained by making the mixture of finely ground limestone and clay paste in a proportion of 75:25 which is homogenized by means of compressed air mixing arrangements is known as slurry. *75:25*

Q: 15 Why NSSC process has come to occupy the dominant position?

Ans: The NSSC (Neutral Sulphite Semi Chemical) process has come to occupy the dominant position because of advantages in chemical recovery and pulp strength.

Q: 16 How many methods are used for the production of paper pulps? Which method is dominant over all.

Ans: Following are the three principal methods of chemical pulping which are used for the production of paper pulps.

(i) Kraft Process

(ii) Sulphite Process

(iii) Neutral Sulphite Semi Chemical (NSSC) Process

The NSSC (Neutral Sulphite Semi Chemical) process has come to occupy the dominant position because of advantages in chemical recovery and pulp strength.



Q: 17 Which factors are responsible for the choice of dry or wet process?

Ans: The manufacturing process of cement involves either by dry or wet process. The choice of dry or wet process depends on the following factors.

- Physical condition of raw materials
- Local climatic conditions of factory
- The price of fuel

Q: 18 Describe the origin of the name, Portland Cement.

Ans: Cement is a very important building material which was first introduced by an English Mason Joseph Aspdin. He found it when strongly heated mixture of lime stone and clay were mixed with water and allowed to stand, it hardened to a stone like mass which resembled Portland Rock, a famous building stone of England. Since then the name of Portland Cement is given to the mixture of lime, silica, iron oxide, alumina, magnesia, sulphur dioxide and sodium oxide etc.

Q: 19 Describe the composition of a good Portland cement.

Ans: Average Composition of Good Portland Cement:

Sr. No	Compound	% Age
1.	Lime (CaO)	62
2.	Silica (SiO_2)	22
3.	Alumina (Al_2O_3)	7.50
4.	Magnesia (MgO)	2.50
5.	Ironoxide (Fe_2O_3)	2.50
6.	Sulphur trioxide (SO_3)	1.50
7.	Sodium Oxide (Na_2O)	1.00
8.	Potassium oxide (K_2O)	1.00

Q: 20 Discuss digestion process in the manufacturing of paper.

Ans: Digestion

From wet silo the material is sent to digester to digest the material. The digestion process may be either batch or continuous. In our country batch process is mostly used. The digester has the following characteristics.

- It is the main unit of process
- It is made up of steel and wrought iron
- Its length is 10-meter
- Its diameter is 2-meters.
- It revolves at 2.5 RPM

Working

As the raw material enters into the digester,

- Steam is introduced from bottom.
- Liquor containing sodium sulphite is injected simultaneously to cover the raw material. Sodium sulphite is buffered with sodium carbonate or sodium hydroxide to maintain the pH. 7 - 9
- Digester is closed carefully
- The temperature is maintained at 180°C
- It takes 45 mints to attain the desired temperature after which it gets switched off automatically and pressure is released



Q: 21 What is role of gypsum in cement industry?

Ans: The cement clinkers are then air-cooled. The required amount of gypsum (2.0%) is first ground to a fine powder and then mixed with clinkers. At this stage, finished cement is pumped pneumatically to storage silos from where it is drawn for packing in paper bags or for dispatch in bulk containers.

Q: 22 What are the different zones in the rotary kiln? Give their temperature?

Ans: Following are the temperature zones

(i) **Drying or pre-heating Zone (minimum)/ temperature zone**

In this zone the temperature is kept at 500°C, where by the moisture is removed and the clay is broken into Al_2O_3 , SiO_2 , and Fe_2O_3 .

(ii) **Decomposition Zone (Moderate temperature zone)**

In this zone the temperature goes upto 1500°C, In this zone the limestone ($CaCO_3$) decomposes into lime (CaO) and CO_2 .



(iii) **Burning Zone (Maximum temperature zone)**

In this zone, the temperature goes up to 1500°C and the oxides, e.g. CaO , SiO_2 , Al_2O_3 and Fe_2O_3 combine together and form calcium silicate, calcium aluminate and calcium ferrite.

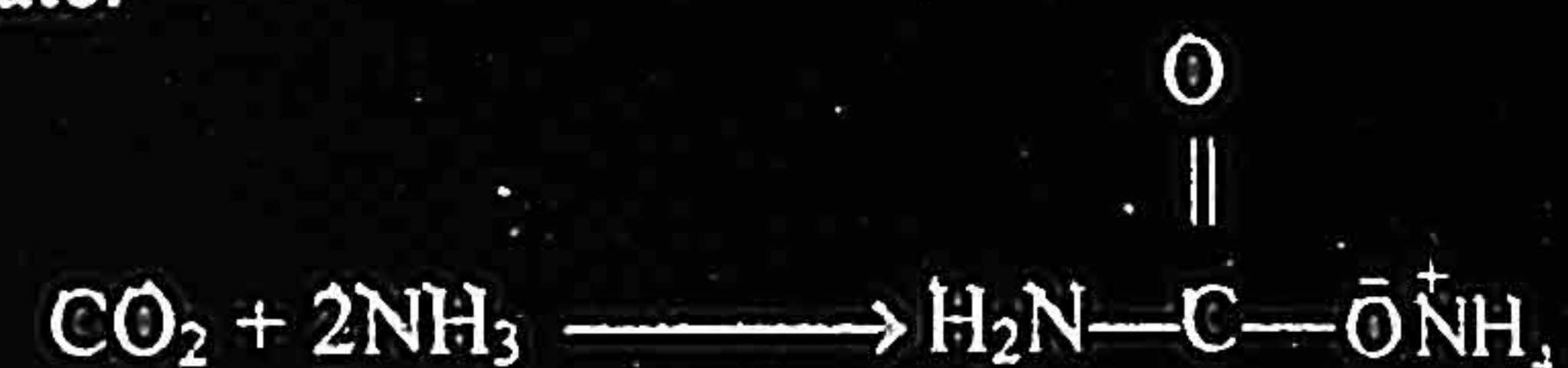
(iv) **Cooling Zone**

This is the last stage in the kiln where the charge is cooled up to 150-200°C.

Q: 23 Write equations for preparation of ammonium carbamate from ammonia.

Ans: Preparation of Ammonium Carbamate

Gaseous CO_2 is mixed with ammonia in the volumetric ratio of 1:2 in a reactor to produce ammonium carbamate.



Q: 24 Give reactions taking place in first 24 hours in setting of cement.

Ans: Reactions Taking Place in First 24 Hours

A short time after the cement is mixed with water tri-calcium aluminate absorbs water (hydration) and forms a colloidal gel of the composition, $3Ca \cdot Al_2O_3 \cdot 6H_2O$, (hydrated tricalcium aluminate)

This gel starts crystallizing slowly, reacts with gypsum ($CaSO_4 \cdot 2H_2O$) to form the crystals of calcium sulpho-aluminate ($3Ca \cdot Al_2O_3 \cdot 3CaSO_4 \cdot 2H_2O$)

Q: 25 How di-ammonium hydrogen phosphate is prepared? Give its composition.

Ans: Manufacturing:

Diammonium phosphate is prepared by continuous process under following conditions

- (i) Anhydrous ammonia
- (ii) Pure phosphoric acid
- (iii) 60-70 °C
- (iv) pH 5.8-6.0

Chemical reaction

(v) The reaction is as follows

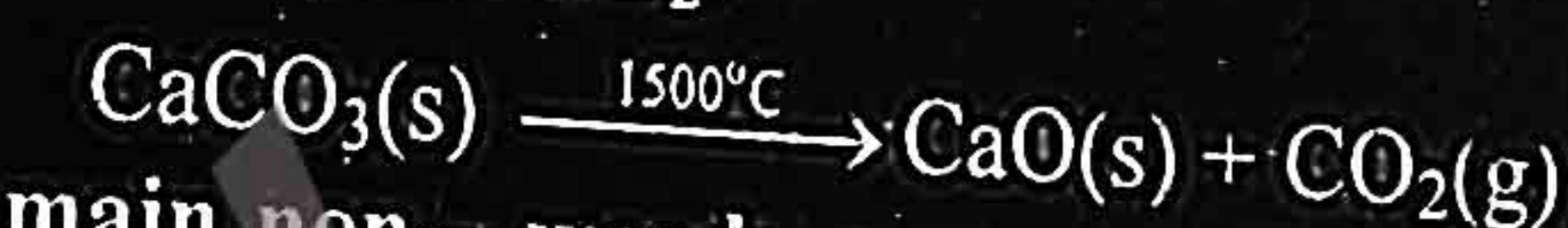


- The given reaction is exothermic
- The heat of reaction vaporizes water from the liquor and the crystals of diammonium phosphate are taken out.



Q: 26 What do you know about decomposition zone of Rotary Kiln?

Ans: Decomposition Zone (Moderate temperature zone)
In this zone the temperature goes upto 1500°C, In this zone the limestone ($CaCO_3$) decomposes into lime (CaO) and CO_2 .



Q: 27 What are the four main non-woody raw materials used in the production of pulp and paper?

- Ans:**
- (i) Wheat straw
 - (ii) Rice straw
 - (iii) Bagasse
 - (iv) Bamboo

Q: 28 How will you prepare diammonium phosphate from ammonia? Also indicate the percentage of N_2 and P_2O_5 present in this fertilizer.

Ans: DIAMMONIUM PHOSPHATE $(NH_4)_2HPO_4$

- It contains about 75% plant nutrients.
- It is deemed suitable for use either alone or in mixed with other fertilizers.

% of Nitrogen

It contains 16% nitrogen.

% of P_2O_5

It contains 48% P_2O_5

For preparation see Q: 25

Q: 29 Enlist steps involved in the manufacturing of urea.

Ans: Manufacturing

The following steps are involved in the manufacture of urea.

- (i) Preparation of Hydrogen gas
- (ii) Preparation of Ammonia
- (iii) Preparation of Ammonium Carbamate
- (iv) Preparation of Urea / Dehydration of Ammonium Carbamate
- (v) Concentration of Urea Solution
- (vi) Prilling

Q: 30 Name four argillaceous materials used for the manufacturing of cement.

Ans: Argillaceous Material:

- (i) Clay
- (ii) Shale
- (iii) Slate
- (iv) Blast furnace slag

These are all sources of Acidic Components i.e. Aluminates and silicates.

Q: 31 Pulp formed by digestion is washed at pulp washing stage. Why is it essential?

Ans: Pulp Washing

The cooked material from the blow tank is washed thoroughly with water by using 80 mesh sieve to remove the following

- (i) Black liquor ----- contaminate the pulp
- (ii) Lignin ----- aromatic polymer and makes the paper brittle
- (iii) Coloured compounds

After washing the material is thickened and stored in high density storage towers.

Pulp contains residual lignin which makes the pulp coloured. Such pulp is not suitable for printing and writing papers. In order to get bright white pulp, the wood pulp is subjected to bleaching.

**SHORT QUESTIONS**

(From past paper 2005-2011)

(Lahore + Gujranwala Board)

- (1) Write any four essential qualities of good fertilizer. (GRW 2005)
- (2) Discuss digestion process in the manufacturing of paper. (LHR 2007)
- (3) Name the macro – nutrient elements. How much they are required? (GRW 2007+LHR 2009)
- (4) What is role of gypsum in cement industry? (LHR 2008)
- (5) What is the composition of lime and silica in good cement? (LHR 2008)
- (6) What are the different zones in the rotary kiln? Give their temperature ranges. (LHR 2008)
- (7) Write equations for preparation of:
 - (a) ammonium carbamate from ammonia. (GRW 2008)
- (8) Give reactions taking place in first 24 hours in setting of cement. (GRW 2008)
- (9) How di-ammonium hydrogen phosphate is prepared? Give its composition. (LHR 2009)
- (10) What do you know about decomposition zone of Rotary Kiln? (GRW 2009)
- (11) What are the four main non – woody raw materials used in the production of pulp and paper? (GRW 2009)
- (12) How paper industry can be made progressive in Pakistan? How much paper is consumed annually in our country? (LHR 2010)
- (13) How will you prepare diammonium phosphate from ammonia? Also indicate the percentage of N_2 and P_2O_5 present in this fertilizer. (GRW 2010)
- (14) Classify elements essential for plant growth. (LHR 2011)
- (15) Enlist steps involved in the manufacturing of urea. (LHR 2011)
- (16) Write a note on diammonium phosphate. (LHR 2011)
- (17) Ammonium nitrate is a useful fertilizer for many crops except paddy rice, why? (GRW 2011)
- (18) Name four argillaceous materials used for the manufacturing of cement. (GRW 2011)
- (19) Pulp formed by digestion is washed at pulp washing stage. Why is it essential? (GRW 2011)

MULTIPLE CHOICE QUESTIONS

(From Past Papers 2008-2011)

(Faisalabad + Sargodha + Rawalpindi Board)

- (1) What are Macronutrients? Give their names. (FSD 2009)
- (2) What is the importance of phosphorus for the plants. (FSD 2009)
- (3) Describe digester in paper and pulp industry. (FSD 2009)
- (4) What are fertilizers? Why are they needed? (FSD 2009)
- (5) Write reactions taking place in first 24 hours during setting of cement? (FSD 2010)
- (6) Brief about prilling of urea. (FSD 2011)
- (7) Give different zones in the rotary kiln and their temperature ranges. (FSD 2011)
- (8) Give an idea about clinker. (FSD 2011)
- (9) What is digester in paper industry? Which type of process is used in paper manufacture in our country? (SGD 2009)
- (10) Describe the reactions taking place during setting of cement in first 24 hours? (SGD 2009)



- (11) Name commonly used bleaching agents in paper manufacture. (SGD 2010)
- (12) What do you mean by dry cleaning in paper manufacture? (RWP 2008)
- (13) Define paper. Give important raw material for the manufacture of paper. (RWP 2009)
- (14) Why nitrogen is important for plants? (RWP 2010)
- (15) How digestion process is carried out in paper industry? (RWP 2011)
- (16) Give important raw materials for manufacture of paper. (RWP 2011)

SHORT QUESTIONS

(From Past Papers 2008-2011)

(Multan + Bahawalpur + D.G. Khan Board)

- (1) Mention the importance of potassium fertilizers. (MTN 2008)
- (2) Name commonly use bleaching agents in paper manufacture? (MTN 2008)
- (3) What are Fertilizers? Differentiate between Micronutrients and Macronutrients. (MTN 2008)
- (4) How digestion process in carried out in paper industry? (MTN 2008)
- (5) What are Fertilizers? (MTN 2009)
- (6) Define (i) Micro nutrients (ii) Macro nutrients (MTN 2009)
- (7) What reactions take place in the setting of cement form 1 to 7 days? (MTN 2009)
- (8) Name the first four components of paper making machine. (MTN 2009)
- (9) What are Macronutrients? Write their names. (MTN 2009)
- (10) Mention three important raw materials for the manufacturing of Cement. (MTN 2009)
- (11) What is Manure? (MTN 2010)
- (12) Describe paper and name two woody raw materials used in the production of paper? (MTN 2011)
- (13) Give chemical changes that take place during first 24 hours of setting of cement. (MTN 2011)
- (14) Name two woody and two non woody raw material used for the production of pulp and paper. (BWP 2008)
- (15) Explain reactions taking place in first 24 Hours in setting of cement. (BWP 2008)
- (16) What are the main non-woody raw materials used in the production of pulp and paper? Write at least four materials. (BWP 2009)
- (17) Give four essential qualities of a good fertilizer. (BWP 2009)
- (18) What are the principal methods of Chemical Pulping used for the production of paper? Which one is best and why? (BWP 2009)
- (19) What is Leachate? (BWP 2010)
- (20) What are uses of fertilizers? (BWP 2011)
- (21) Describe process that carried out during digestion to paper maintenance (DGK 2009)
- (22) Write first four components of paper making machine. (DGK 2009)
- (23) What is the importance of phosphorous for the plants? (DGK 2010)
- (24) Ammonia act as a fertilizers. Comment. (DGK 2010)
- (25) Which different pulping process are being used for the production of paper. Write the one used in Pakistan and why? (DGK 2011)
- (26) List the four stages for the manufacturing of urea. (DGK 2011)
- (27) Draw flow sheet diagram for the manufacture of cement. (DGK 2011)