

**[SET-1]**

**Pharmaceutics**

1. Simple Syrup USP which contains.....% w/w of sucrose.  
**Ans:-** a) 33.3 %      b) 66.7%      c) 70 %      d) 85 %
2. Elixirs do not require, addition of preservatives, if alcohol quantity is more than-----  
**Ans:-** a) 5 %      b) 10%      c) 20%      d) 40%
3. Which compound solubility is more  
**Ans:-** a) Ethyl alcohol      b) Benzoic acid      c) Chloroform      d) Diaxone
4. The part of prescription contains the direction of prescriber of pharmacist regarding the type and compounding of dosage form is called as.....  
**Ans:-** a) Superscription      b) Inscription      c) Subscription      d) None
5. How many gm. of solid require to prepare 520 ml of 1 in 800 solution  
**Ans:-** a) 1.53      b) 0.65      c) 1      d) None
6. Find out the **proof spirit** of an elixir containing 30 % v/v alcohol.  
**Ans:-** a) 52.59      b) 17.11      c) 60      d) 15
7. Which is not an ingredient of effervescent powder  
**Ans:-** a) Sodium bicarbonate      b) Aluminium sulfate      c) Citric acid      d) Tartaric acid
8. What is the HLB value for is SPAN 20 (Sorbitan monolaurate) is  
**Ans:-** a) 4.3      b) 8.6      c) 15.0      d) 16.7
9. The displacement value for medicaments for Zinc oxide  
**Ans:-** a) 1.4      b) 2.0      c) 3.6      d) 5
10. One fl.drachm is.....ml  
**Ans:** a) 4      b) 30      c) 60      d) 10
- Physical Pharmaceutics**
11. Which following equipment is used to determine the total surface area of Powder ?  
**Ans-** a) Coulter counter      b) Sorptometer      c) Andreason pipette      d) Shear box
12. For good flow property, the angle of repose should be  
**Ans:-** a) 0°      b) Less than 30°      c) 30-40°      d) Greater than 40°
13. According to Stokes equation, the sedimentation rate is inversely proportional to-----  
**Ans:** a) viscosity of the medium      b) Diameter of the particle      c) Density of the particle      d) All
14. The ratio of specific viscosity to mass concentration of the polymer is.....  
**Ans:** a) Kinetic viscosity      b) Relative viscosity      c) reduced viscosity      d) intrinsic viscosity
15. Liquid paraffin includes  
**Ans:-** a) Plastic flow      b) Pseudoplastic flow      c) Newtonian flow      d) Dilatant flow
16. Plastic flow is generally exhibited by  
**Ans:-** a) Gellies      b) Lotions      c) Colloids      d) Concentrated solid suspension
- 17) The effect of valence of an electrolyte on the double layer repulsive forces is explained by  
**Ans:-** a) DLVO theory      b) Hofmeister series      c) Schulze hardy rule      d) Donnan membrane effect
- 18) The shelf life of drug (first order kinetics) is represented by  
**Ans:-** a) 1/K      b) log K      c) 0.693/K      d) 0.1050/K
- 19) Which of the following equations is used for predicting the shelf life of a drug product  
**Ans:-** a) Michaelis-Menten method      b) Arrhenius equation  
            c) Hixson-Crowell method      d) Henderson-Hasselbatch equation
- 20) The Process of separation of colloidal particles from those of molecular dimension found in true liquid is -----  
**Ans:-** a) Ultrafiltration      b) Dialysis      c) Electrophoresis      d) osmosis

**[SET-1]**

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**Pharmaceutical Technology**

21. Which coating is require to prevent moisture penetration into tablet core.

**Ans;** a) Sub coating      b) Seal Coating      c) Syruping      d) Smoothing

22. Poyl vinyl acetate pthalate is the example of.....polymer

**Ans :-** a) sugar coating      b) Film coating      c) Enteric      d) a & b

23. The primary emulsion of peppermint where ratio of oil:water:gum is

**Ans:-** -a) 4:2:1      b) 3:2:1      c) 2:2:1      d) 1:2:1

24-Which one is stable polymorphic form of Cocoa butter

**Ans:-** a) Alpha      b) Beta      c) Beta prime      d) Gamma

25. Which ingredient is used for conditioning hair tonic .

**Ans:** a) Cetyl trimethylammonium chloride b) Dimethicone c) Acetylated lanolin d) HPMC

26. Which ingredients used for film forming agent for nail polish.

**Ans:** a) Nitrocellulose b) Ethyl acetate c) Dibutyl phthalate d) Titanium dioxide

27. What is the hardness ratio (Dry glycerin: Dry gelatin) for soft-shell is

**Ans ::** a) 0.4/1      b) 0.6/1      c) 0.8/1      d) 0. 1/1

28. Which is antimicrobial agents for parenterals products.

**Ans:** a) Benzyl alcohol      b) Chlorobutanol      c) Thimerosal      d) All

29 Which USP glass type is manly for Water attack test

**Ans:** a) Highly -resistant borosilicate glass b) Treated with soda-lime glass

c) Sodalime glass      d) General purpose glass

30) What is the name of defect of tablet coating ,if internal stressing the film exceed the tensile strength of the film

**Ans:** a) Picking      b) Cracking      c) Bridging      d) Blistering

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**PHARMACUTICS**

1-One teaspoonful is how much ml ?

**Ans:** a)0.06 ml            b)4 ml            c)8 ml            d )16 ml            [   ]

2-Which of the following of humectant used in mothwash

**Ans:-**a) Glycerine            b)Tween 20            c) Span 20            d) SLS            [   ]

3-Which of the following is used soothing agent for douches

**Ans:** a) Sodium chloride            b)Boric acid            c) Glycerine            d) Cresol            [   ]

4- The percentage of alcohol in iodine tincture.

**Ans:** a) 5 %            b) 20%            c) 30%            d)50%            [   ]

5-Which one is the electrolyte used for flocculating agents for suspension

**Ans:**a)Bentonite            b)Potassium phosphate            c) Carbowax            d)Tween 20            [   ]

6-Cleansing cream is which type of emulsion

**Ans:** a) O/W            b)W/O            c) micro emulsion            d) multiple            [   ]

7- Shavingcream is which type of emulsion

**Ans:** a) O/W            b)W/O            c) Micro emulsion            d) Multiple            [   ]

8- Which of the following is not gelling agent

**Ans:** a)a)Sodium alginate            b) HPMC            c) Bentonite            d)Sorbitol            [   ]

9-Which of the following is reducing agent for explosive powder

**Ans:-** a)Potassium permangate            b)Potassium dichromate            c) Silver nitrate            d) Tannic acid            [   ]

10-An agent which relives or prevents itching

**Ans:-** a) Antipyretic            b)Antipruetic            c) Carminative            d) Cathartic            [   ]

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**PHYSICAL PHARMACEUTICS**

- 11-The surface tension of liquid is----- at critical temperature  
Ans: a) Zero      b) One      c) Negative      d)Maximum      [   ]
- 12-As temperature increases, the surface tension:  
**Ans:** a) Remains constant b) Increases      c) Decreases d) First increases then decreases      [   ]
- 13-Wetting ability of vehicle can be detected by observing the  
**Ans:**a)Critical angle    b)Angle of repose    c)contact angle    d) Interfacial angle      [   ]
- 14-Electrolytes are added to .....the zeta potential  
**Ans:**a) Decreases    b)increases    c)Reverse    d) Maintain equilibrium      [   ]
- 15-β-cyclodextrin increases the solubility of poorly soluble drug by:  
**Ans:** a) Co solvency b) Solubilisation    c) Inclusion Complexation    d) Chemical modification [   ]
- 16-Plastic flow is generally  
**Ans:** a) Gellies    b) Lotions    c) Conc.Suspension      d) Colloids      [   ]
- 17-What is the IP storage condition of cool temperatre  
**Ans:** a) 8-25°C    b) 30-40°C    c) NMT8°C      d) Above 40°C      [   ]
- 18-The crystalline state of Iodine  
**Ans:-** a)Cubic    b)Hexagonal    c)Rhombic    d)Triclinic      [   ]
- 19- Identify the propellent by  
**Ans:** a) Cascade impactor    b)Karl Fischer method c) Coulter current    d)Pscynometer      [   ]
- 20- Which of the following is colligative property  
Ans:    a)Osmotic pressure                      b)Dissociation of the solute  
          c)Solubility of solute                d) Hydroxy ion (OH-) concentration

**PHARMACEUTICAL TECHNOLOGY**

21. What is the disintegration timing for Enteric coated tablet

Ans: a) 30 mins b) 60 mins c) 2hr d) 3 hr [ ]

22. Which tablets disintegrations test is not required

Ans: a) Chewable tablets b) Soluble tablets c) Controlled release tablets d) a and c [ ]

23. Identify the propellant by

Ans: a) Cascade impactor b) Karl Fischer method c) Coulter current d) Pycnometer [ ]

24. Which one is sequestering agent

Ans: a) Lecithin b) Disodium EDTA c) Phenyl mercuric nitrate d) Chlorocresol [ ]

25. The Quality control of semisolid

Ans: a) Pyrogen test b) LAL test c) Friability test d) Consistency test [ ]

26. Dielectric constant for water

Ans: a) 80 b) 50 c) 30 d) 20 [ ]

27. The approximate filling capacity of empty capsule size 0 is.....ml

Ans: a) 0.75 b) 0.55 c) 0.4 d) 0.3 [ ]

28. The approximate particle size spray drying and spray congealing ..... $\mu\text{m}$

Ans: a) 35-5000 b) 1-5000 c) 600-5000 d) 600 [ ]

29. The instrument strong Cobb is determine

Ans: a) Friability b) Hardness c) consistency d) Moisture content [ ]

30. Which of the following is anti-dandruff agent

Ans: a) Selenium sulphide b) Cetomacrogol c) PVPK-30 d) Kieselguhr [ ]

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**PHARMACUTICS**

1-How many parts of 10% ointment be mixed with 2 parts of 15% ointment to get 12% ointment?

**Ans:** a) 2 b) 3 c) 5 d) 6 [ ]

2- Sigma blade mixer is commonly used for [ ]

**Ans:-**a) Wet granulation b) Dry granulation c) Powder Mixing d) Crude fiber Mixing

3-Fluid energy mill works on principle:

**Ans:** a) Cutting g b) Compression c) Impact d) Impact and Attrition [ ]

4- For thermolabile material, mill used is.

**Ans:** a) Rod mill b) Cutting mill c) Fluid energy mill d) none [ ]

5-The HLB value for Detergent is

**Ans:**a) 1-3 b)3-6 c) 7-9 d)13-15 [ ]

6- which one is not the identification test of emulsion

**Ans:** a) Dilution test b) Dye test c) Leakage test d) Electrical conductivity test [ ]

7- Vanishing cream is which type of emulsion

**Ans:** a) O/W b)W/O c) Micro emulsion d) Multiple [ ]

8- Which of the following is anti oxidizing agent for oily system

**Ans:** a) Sodium metabisulfite b) Thiourea c) Ascorbic acid d) Propyl gallate [ ]

9-Which of the following is wax softener which can be used in ear drop

**Ans:-** a) Hydrogen peroxide b) Phenol c) Silver nitrate d) Boric acid [ ]

10-Which of the following dosage form are usually alcoholic and oily liquid preparation

**Ans:-** a) Elixir b) Liniment c) Mouth wash d) Gargles [ ]

**PHYSICAL PHARMACEUTICS**

11-Zeta potential used in colloids for

Ans: a) Partice Size b) Particle Shape c) Stability d) Thickness of the Solution [ ]

12-Flowability of powder is also expressed as

Ans: a) Angke of repose b) Dustability c) coefficient of friction d) All [ ]

13-Consistency of oral emulsion is measured by

Ans:a) Cup and Bob viscometer b) Brookfield viscometer c) Penetrometer d) None [ ]

14- Degradation of suspension follows :

Ans:a) Zero b)First c)nonlinear d) All [ ]

15- Rheology of Antifungal ointment should be [ ]

Ans: a) Plastic b) Dilatent c) psudeo plastic d) All

16-Increase in solubility of a drug in water in the process of additives is known as

Ans: a) Dissolution b) co solvency c) Solubilization d) Hydrotropy [ ]

17- The Phenomenon of increasing the solubility of non-polar drugs by addition of surfactants ..

Ans: a) Surface Solubilization b) Micellar Solubilization [ ]  
c)Polar Solubilization d) Polar Solubilization

18- Flocculated suspension have..... Sedimentation volume than deflocculated suspension

Ans:- a) Higher b)Equal c) Lower d)Zero [ ]

19- An ideal suspension ,the sedimentation volume should have [ ]

Ans: a) Zero b)One c) Minus one d) More than 1

20- For the proper wetting agent of solids by liquids,the contact angle should be nearly

Ans: a) Zero b) 90 ° c) 180° d) 270° [ ]

**PHARMACEUTICAL TECHNOLOGY**

21. Which cream is used to correct excessive oiliness of the skin [ ]

Ans: a) Bleaching cream b) Astringent cream c) Acid cream d) Foundation cream

22- Rate of drug bioavailability is most rapid in [ ]

Ans: a) Tablets b) Hard gelatin capsule c) Controlled release product d) Solution

23- Drying of soft shell capsule is done by : drying [ ]

Ans: a) Truck drying b) Fluidized bed drying c) Vacuum drying d) Microwave

24- Which one is penetration enhancer

Ans: a) DMSO b) PEG c) Ethanol d) All [ ]

25- Targeted delivery system is [ ]

Ans: a) Site non specific b) Site specific system c) Localized system d) None

26- Dose dumping is problem with [ ]

Ans: a) Compressed Tablets b) Suppositories c) Soft gelatin d) Controlled release

27- Delayed release system is

Ans: a) Enteric coated tablets b) Orally disintegrating tablets  
c) Sugar coated tablets d) None [ ]

28- Suitability character of TDDS is

Ans: a) Dose b) Molecular weight c) Hydrophobicity d) All [ ]

29- Bloom strength is parameter for:

Ans:- a) Viscosity b) Gel strength of gelatin c) Both a and b d) none [ ]

30- Filled materials in HGC are

Ans: a) Pellet b) Beads c) Mini tablets d) All [ ]

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**PHARMACEUTICAL  
TECHNOLOGY**

1. Which equipment is used for tablet granulation [ ]

Ans: a) Zansi      b) Hepa filter      c) Chilsonator      d) Accelcota

2. Separation of tablets of two or more distinct layer is [ ]

Ans :- a) Capping      b) Picking      c) Lamination      d) Orange peel effect

3. Limit for disintegration time for effervescent tablet is \_\_\_\_\_ mins [ ]

Ans:- a) 3      b) 5      c) 15      d) 30

4. Nominal barrel diameter of BB tooling in rotary tablet press is ..... [ ]

Ans:- a) 0.25      b) 0.75 inch      c) 1.5 inch      d) 1.75 inch

5. Rotosort is an equipment used for [ ]

Ans: a) To separate un filled capsule      b) To fix the cap and body of the capsule after filling  
c) To separate the improper tablet      d) To adjust the required compression for tablets

6. Sealing of the capsule is achieved by heating at [ ] Ans: a) 100 b)

7. Which of the following is not the principle problem area exist in plastic container [ ]

Ans : a) Leaching      b) Hardness      c) Permeation      d) sorption

8. Powdered glass test is not for which types containers [ ]

Ans: a) Type- I      b) Type-II      c) Type-III      d) Type- IV

9. Formaldehyde in manicure preparations are used as

Ans: a) Base coating material      b) Plasticizer      c) Enamel remover      d) Nail hardener

10) Dibutylphthalate in nail lacquer preparation is used

Ans: a) Film former      b) Solvent      c) Plasticizer      d) Resin

**PHARMACEUTICS**

11. One grain is ..... mg [    ]  
**Ans;:** a) 30        b) 60        c) 90        d) 120
12. Drying is essential for..... [    ]  
**Ans :-** a) Crystallization    b) Evaporation    c) Mixing        d) Distillation
13. Migration of salt allow solute doesn't occurs in case of [    ]  
**Ans:-** - a) Freeze drying    b) Spray dryer    c) Tray dryer    d) Vaccum dryer
- 14- Which is not a unit of crystals [    ]  
**Ans:-** a) Atom        b) Ion        c) Molecule        d) Particle
15. Leaching by immersion of crude material is also known as [    ]  
**Ans:** a) Expression    b) Infusion        c) Maceration        d) Percolation
16. Which material is not used for fluid energy mill [    ]  
**Ans:** a) Friable    b) Abrasive        c) Soft        d) Soft and sticky
17. Mechanism not used for solid –solid mixing [    ]  
**Ans :** a) Connective        b) Shear Mixing        c) Diffusional    d) Trumbling
18. Which types of equipment gives pores on evaporation [    ]  
**Ans:** a) Film evaporator        b) Multiple effect evaporator  
      c) Evaporating Pan        d) Vaccim evaporator
- 19 .Separation of liquid by distillation is based on [    ]  
**Ans:** a ) Boiling pint b) vapour pressure c) Miscibility d) Viscosity
- 20) Which is not a filter aid [    ]  
**Ans:** a) Keiselgur    b) Asbestos        c) Charcoal        d) All
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**PHYSICAL PHARMACEUTICS**

21. Which is the best description of blood [ ]

Ans: a) Sol      b) Foam      c) Solution      d) Aerosol

22. The scattering of light by coarse and colloidal dispersed system is known as [ ]

Ans :- a) Contrast matching      b) DLVO theory      c) Tyndall effect      d) Creaming

23. The ideal suspension has sedimentation volume [ ]

Ans:- a) Zero      b) One      c) Greater than 1      d) Lower than one

24- Cake formation is characterising feature of [ ]

Ans:- a) Flocculated suspension      b) de flocculated suspension  
c) Thixotropic suspension      d) Structured suspension

25. Rapid increase in solubility of surfactant solution alcohol above a definite temperature

Ans: a) Cloud point      b) Kraft Point      c) CMC      d) Triple point [ ]

26. Unit of relative viscosity is

Ans: a) Poise      b) Centipoise      c) Dyne.sec/cm<sup>2</sup>      d) Dimension less [ ]

27. Creep test is applied to evaluate the viscoelastic property of [ ]

Ans : a) Suspension      b) Emulsion      c) Ointment      d) Lotion

28. Surface tension is a/an [ ]

Ans: a) Capacity factor      b) Extensive factor      c) Intensive Factor      d) Tolerance Factor

29. The rate constant of first order reaction depends on [ ]

Ans: a) Temperature      b) Time      c) Concentration of reactant      d) Concentration of product

30) Heckel's plot is between [ ]

Ans: a) Density and Applied pressure      b) Shear stress and Rate of shear  
c) Temperature<sup>-1</sup> and log K      d) Rate of shear and viscosity

**PHARMACEUTICS**

1. One pint is ..... ml [    ]  
**Ans:** a) 250      b) 300      c) 150      d) 450
2. How much taxable alcohol would be in 2 gallon of 50% alcohol ? [    ]  
**Ans :-** a) 1      b) 25      c) 1.753      d) 4
3. HLB value of o/w emulsifier is [    ]  
**Ans:-** a) 3-6      b) 7-9      c) 8-18      d) 13-15
- 4- What is the % concentration of chlorocresol for liquid dosage form [    ]  
**Ans:-** a) 0.1-0.2      b) 0.25      c) 0.001-0.002      d) 0.1
5. Macrogol-4000 is used for [    ]  
**Ans:** a) Emulsion base      b) Water soluble      c) Hydrocarbon      d) Absorption base
6. Which method is suitable for ointment, mixing occurs the melting point of ingredient  
**Ans:** a) Trituration      b) Fusion      c) Emulsification      d) Chemical
7. Emollient cream is which type of emulsion [    ]  
**Ans :** a) W/O      b) O/W      c) W/O/W      d) O/W/O
8. What is the category of cetrimide has [    ]  
**Ans:** a) Antiseptic      b) Antiemetic      c) Anodyne      d) Antifungal
9. When the action and duration of action of one drug is diminished by other drug, the phenomenon is called as [    ]  
**Ans:** a) Synergism      b) Antagonism      c) Hypersensitivity      d) Tolerance
- 10) Which is the evaluation test for parental products [    ]  
**Ans:** a) Safety test      b) Pyrogen test      c) Sham test      d) All
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**PHYSICAL PHARMACEUTICS**

11. The type of flow for sedimentation is given by [ ]

**Ans: a)** Faraday's Number b) Poiseuille Number c) Reynolds Number d) Dropper Number

12. The value of carr's index for a powder having excellent flow is [ ]

**Ans :-** a) 15 % b) 18 % c) 25 % d) More than 25 %

13. The change in state from solid to directly gas is known as [ ]

**Ans:-** a) Fusion b) Boiling c) Sublimation d) Evaporation

14- The critical point of pure substance is [ ]

**Ans:-** a) The highest temperature and pressure for which liquid and vapour can exist

b) The point at which the saturated liquid and saturated vapour curves meet

c) The point where vapour pressure has its largest possible value

d) All of the above

15. The Stoke's law cannot be used if the Reynolds number is more than

**Ans:** a) Zero b) 0.2 c) 1.0 d) 2.0 [ ]

16. Mercury displacement method is to determine the

**Ans:** a) Granule diameter b) Granule density c) Granule area d) Granule Volume [ ]

17. Pseudoplastic flow generally exhibited by [ ]

**Ans :** a) Viscous Paste b) solution of mucilage and gum c) Gellies d) Lotion

18. Unit of Spreading coefficient is [ ]

**Ans:** a) ml b) Dyne/cm c) lb d) Dimension less quantity

19. Density of structured vehicles can be increased by [ ]

**Ans:** a) Suspending agent b) Wetting agent c) Water d) Glycerin

20) Desferoxamine can be categorized as [ ]

**Ans:** a) Chelate b) Ligand c) Inclusion complex d) organic molecular complex

**PHARMACEUTICAL TECHNOLOGY**

21. The cohesive strength of crosslinking of gelatin is determined by [ ]

**Ans:** a) Bloom strength b) Gel strength c) Tensile strength d) Both a and b

22. Accogel machine is used to [ ]

**Ans :-** a) Encapsulate the drug b) Capsule weight Machine

c) Encapsulate free flowing material d) Fill Powder

23. Dusting and polishing [ ]

**Ans:-** a) Roto sort b) Rotoweigh c) Rotofill d) Erweka KEA

24. Cab-o-sil is used as [ ]

**Ans:-** a) Anti adherent b) Disintegrant c) Lubricant d) Glidant

25. Which solvents show low dielectric constant

**Ans:** a) Carbon tetra chloride b) Benzene c) Toluene d) Water [ ]

26. Quality control test for Lipstick

**Ans:** a) Shade test b) Breakage load point c) Melting point d) Both b & c [ ]

27. Which alkali reductant used in depilatories [ ]

**Ans :** a) Stronium sulphate b) Calcium thioglycollate

c) Titanium dioxide d) Light calcium carbonate

28. Which ingredient is used for Mascara [ ]

**Ans:** a) Triethanolamine stearate b) Stearic acid c) Disodium EDTA d) Lecithin

29. Improper distribution of colour is called as [ ]

**Ans:** a) Mottling b) Orange Peel effect c) Cracking d) Lamination

30) The merit of plastic [ ]

**Ans:** a) Provides superior barrier for moisture b) Soft and flexible

c) Highly resistant of heat d) More chemical compatibility with patient

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**[SET-1 to 5]**

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**SET-1**

1- d,      2-c      3- b,      4.-c      5-b,      6-a,      7-b      8-b      9-d      10-a  
11-b,      12-b,      13-d,      14-c,      15-c,      16-d,      17-c,      18-d,      19-b,      20-a  
21-a,      22-c,      23-c,      24-d,      25-c,      26-a,      27-c,      28-d,      29-b,      30-b

**SET-2**

1-b ,      2-a ,      3-c,      4-d,      5- b,      6-b,      7-a      8-d      9-d,      10- b,  
11-a      12-c ,      13-c,      14-a,      15-a,      16-c ,      17-c,      18-c,      19-a,      20-a  
21-d.      22-d      23-a,      24-b,      25-d,      26-a,      27-a,      28-d,      29-b,      30-d

**SET-3**

1-b      2-c      3-d      4-c      5- d      6- c      7- a      8- d      9- a      10-b  
11- c      12-d      13-b      14-a      15-a      16-d      17- b      18- a      19- a      20-a  
21-a      22-d      23-c      24-d      25-b      26-d      27-a      28-d      29-c      30-d

**SET-4**

1-c      2-c      3-b      4-b      5-b      6-c      7-b      8-b      9-d      10-c  
11 b      12 a      13 a      14 d      15 b      16 d      17 d      18 d      19 b      20 d  
21 a      22 c      23 b      24 b      25 b      26 d      27 c      28 c      29 a      30 a

**SET5**

1-d      2 a      3 b      4 d      5b      6 b      7 b      8 a      9 b      10 d  
11-b      12 a      13 c      14 d      15 b      16b      17 b      18 b      19 d      20 b  
21-d      22 d      23 c      24 d      25 a      26d      27 a      28 a      29 a      30 c

