2003
PY: Pharmaceutical Science

Duration: Three Hours
Maximum Marks: 150

Q. 1-30 carry one mark each

Q.1 Colchicine is biogenetically derived from one of the following
   a) Tyrosine and Phenylalanine   b) Tryptophan and phenylalanine
   c) Ornithine and Tryptophan   d) Ornithine and phenylalanine

Q.2 the diagnostic character for the microscopically identification of Kurchi bark is
   a) Fibers with Y-shaped pits   b) Horse shoe shaped stone cells
   c) steroids containing calcium oxalate crystals   d) Stratified cork

Q.3 it is possible to initiate the development of complete plants from callus cell
   Cultures by suitable manipulation of the medium with respect to
   a) Minerals   b) vitamins   c) Carbohydrates   d) hormones

Q.4 Polyplody is defined as
   a) Addition of one chromosome   b) Multification of entire chromosome set
   c) Submicroscopic change in DNA material   d) Gross structural change

Q.5 the starting material for the synthesis of ALPRAZOLAM is
   a) 3-amino-5-bromoactophenone   b) 2-amino-5-chloroactophenone
   c) 2-amino-5-chlorobenzophenone   d) 3-amino-5-chlorobenzophenone

Q.6 Simplification of Morphinan system gave one BENZOMORPHAN derivative
   a) Pentazocin   b) Pethidine   c) Levorphanol   d) Buprenorphine

Q.7 a metabolite of SPIRONOLACTONE is
   a) Aldosterone   b) Canrenone   c) Corticosterone   d) Pregnenolone

Q.8 the IUPAC name for NAPROXEN is
   a) (S)-2-(6-ethoxy-2-naphthyl)-acetic acid   b) (S)-2-(6-methoxy-2-naphthyl)-acetic acid
   c) (S)-2-(6-ethoxy-2-naphthyl)-propionic acid   d) (S)-2-(6-methoxy-2-naphthyl)-propionic acid

Q.9 The metabolic function of Riboflavin involves the following
   a) FMN and FAD   b) NADP and NADPH   c) AMP and ATP   d) Retin and retinine

Q.10 X-ray spectral lines Kα doublet arises from transition of electrons from
   a) M shell to K shell   b) L shell to K shell   c) L shell to M shell   d) M shell to K shell

Q.11 The method of expressing magnetic field strength
   a) Cycles/sec   b) Pulses/sec   c) Debye units   d) Gauss

Q.12 A solvent used in NMR
   a) Chloroform   b) Acetone   c) Carbon tetrachloride   d) Methanol

Q.13 a widely accepted detector electrode for pH measurement is
   a) Platinum wire   b) Glass electrode   c) Ag-AgCl electrode   d) Lanthanum fluoride

Q.14 Commercial production of citric acid is carried out by the microbial culture of
   a) Fusarium moniliformi   b) Rhizopus nigrican   c) Aspergillus Niger   d) Candida utilis

Q.15 For thermophilic micro-organisms, the minimum growth temperature required is
   a) 20°C   b) 37°C   c) 45°C   d) 65°C

Q.16 Obligatory anaerobes
   a) Can tolerate oxygen and grow better in its presence   b) Do not tolerate oxygen
   and die in its presence   c) Can grow in oxygen levels below normal   d) can grow in
   Presence of atmospheric oxygen

Q.17 Plasmid is a
a) Macromolecule involved in the protein synthesis b) Circular piece of duplex DNA
c) A hybrid DNA that is formed by joining pieces of DNA d) Endogenous substance
secreted by one type of cell

Q.18 Lactose intolerance is because of the lack of
a) Acid phosphates b) Lactate dehydrogenase
c) Galactose-1-phosphate-uridyl transferase d) Amylase

Q.19 Synthesis of UREA takes place exclusive in
a) Kidney b) Liver c) Gall bladder d) urinary bladder

Q.20 A term which describes a cofactor that is finally bound to an enzyme
a) Holoenzyme b) Prosthetic c) Coenzyme d) Transferase

Q.21 How many parts of 10 % ointment be mixed with 2 parts of 15 % ointment to get
12% ointment?
a) 2 b) 3 c) 5 d) 6

Q.22 the correct non-ionic surfactant used as a penetration enhancer in the preparation of
mucoadhasives
a) Oleic acid b) Tween-80 c) Glycerol d) Propylene glycol

Q.23 one of the ex-officio member of the Pharmacy Council of India is:
a) Director General of Health Services b) Government Analyst
c) Registrar of the State Pharmacy Council d) Director General of veterinary Research Institute

Q.24 the Schedule in Drugs and Cosmetics Act that deals with the requirements and
guidelines for clinical trials, import and manufacture of new drugs is
a) Schedule ‘O’ b) Schedule ‘M’ c) Schedule ‘F’ d) Schedule ‘Y’

Q.25 A retardant material that forms a hydrophilic matrix in the formulation of matrix tablets is
a) H.P.M.C b) C.A.P c) Polyethylene d) Carnauba wax

Q.26 A drug which causes pink to brownish skin pigmentation within a weeks of the
initiation of the therapy is
a) Itraconazole b) Clofazimine c) Lomefloxacin d) Neomycin

Q.27 The risk of Digitalis toxicity is significantly increased by concomitant administration of
a) Triamterene b) Lidocaine c) Captopril d) Hydrochlorothiazide

Q.28 an agent used in Prinzmetal angina has spasmolytic action which increases
coronary blood supply is
a) Nitroglycerine b) Nifedipine c) Timolol d) Isosorbide mononitrate

Q.29 An organism which has been implicated as a possible cause of chronic gastritis and
peptic ulcer is
a) Campylobacter jejini b) Escherichia c) Helicobacter pylori d) Giardia lamblia

Q.30 a 5HT1D receptor agonist useful in migraine is
a) Sumatriptan b) Ketanserin c) Ergotamine d) Methysergide

Q.31-90 carry two marks each.
Q.31 At present, different species of Papaver such as P. bracteatum and P. orientale are
being cultivated instead of P. somniferum because they contain
a) More morphine b) Less morphine c) Only codeine d) Only thebaine

Q.32 Guggulipid, a resin is
a) A hypolipidmic agent obtained from cotton plants containing multifunctional
compound gossypol b) A lipid obtained from Arectium lappa, Asteraceae and
traditionally used for the treatment of dermatoses c) Cathartic glucoresin obtained
from Ipomoea orizabensis and used since ancient time d) A hypolipidmic agent
obtained from *Commiphora mukul* consisting of a mixture of sterols including Z-pregna-(20)-dien-3,16-dione

**Q.33** In nitrofurantoin synthesis, 5-nitrofururaldehyde diacetate is treated with one of the following intermediate in the presence of CH$_3$COOH + H$_2$SO$_4$ + C$_2$H$_5$OH

a) Hydantoin  
b) 1,5-diamino hydantoin  
c) 1,3-diaminohydantoin  
d) 1-aminohydantoin

**Q.34** 4-hydroxy-3-hydroxymethyl benzaldehyde is treated with acetic anhydride and then kept with ether solvent, t-butyl cyanide and acetic acid for 10 days. Resulting compound is reduced with LiAlH$_4$ in tetrahydrofuran? The final product is

a) Isopeneraline  
b) Dobutamine  
c) Salbutamol  
d) Orisprenalin

**Q.35** 2-iminothiazolidine is treated with phenyloxiran to get a drug used in round worm infection

a) Piperazine  
b) Tetramisoe  
c) Thiabendazole  
d) Levamisole

**Q.36** Thiamine hydrochloride on treatment with alkaline potassium ferricyanide gives

a) Thymochrome with fluorescence  
b) Oxythiamine with golden yellow color  
c) Neopyrithiamine with blue fluorescence  
d) Tiochrome with blue fluorescence

**Q.37** A new drug delivery system which is composed of phospholipids that spontaneously form a multicellular concentric bilayer vesicle with layers of aqueous media separating the lipid layer

a) Prodrugs  
b) Liposome  
c) Osmotic pump  
d) Nanoparticles

**Q.38** unless otherwise stated in the individual monographs of the pharmacopoeia, in the disintegration test for enteric coating tablets, first dissolution is carried out in

a) 0.1 M HCl  
b) Phosphate buffer  
c) Water  
d) 0.1 M H$_2$SO$_4$

**Q.39** what is the proportion of NaCl required to render a 1.5% solution of drug isotonic with blood plasma? The freezing point of 1% w/v solution of drug is -0.122°C and that of NaCl is -0.576°C.

a) 0.65%  
b) 0.585%  
c) 0.9%  
d) 0.5%

**Q.40** IR Spectra appear as dips in the curve rather than maxima as in UV-Visible spectra because it is a plot of

a) % Absorbance against Wave number  
b) % Transmittance against Concentration  
c) % Absorbance against Concentration  
d) % Transmittance against Wave number

**Q.41** ESR is applied to only those substances showing paramagnetism which is due to the magnetic moment of

a) Neutrons  
b) Protons  
c) Paired electrons  
d) Unpaired electrons

**Q.42** Rotation of electrons about the proton generates a secondary magnetic field which may oppose the applied magnetic field. The proton is said to be

a) Shielded  
b) Shifted  
c) Hydrogen bonded  
d) Deshielded

**Q.43** The analyte is used in the form of a solution in flame photometry because

a) Evaporation  
b) Condensation  
c) Nebulization  
d) Precipitation

**Q.44** The mechanism of antiparasitic action of Mebendazole and Thiabendazole involves

a) Stimulation of acetylcholine receptors at neuromuscular junctions  
b) Inhibition of dihydrofolate reductase  
c) Interference with microtubule synthesis and assembly  
d) Block thiamine transport

**Q.45** Isoniazid is a primary antitubercular agent that

a) Requires pyridoxine supplementation  
b) Causes ocular complications that are reversible if the drug is discontinued  
c) Is ototoxic and nephrotoxic  
d) should never used due to hepatotoxic potential

**Q.46** Decreased risk of arthrosclerosis is associated with increase in
a) Very low density lipoproteins  
b) Low density lipoproteins  
c) Cholesterol  
d) High density lipoproteins  

Q.47 the mechanism of action of paclitaxel is  
a) Binds to DNA through intercalation between specific bases and block the synthesis of new RNA or DNA strand scission  
b) Mitotic spindle poison through the enhancement of tubulin polymerization  
c) Competitive partial agonist-inhibitor of estrogen and binds to estrogen receptors  
d) S-Phase specific antimetabolite that is converted by deoxykinase to the 5'-mononucleotide  

Q.48 Lycopodium spore method can be find out percentage purity of crude drugs which contain  
a) Multilayered tissues or cells  
b) Well defined particles which can be counted  
c) Oil globules  
d) Characteristic particles of thickness, the length of which can be measured  

Q.49 the microscopic character of flower buds of *Eugenia caryophyllus* is  
a) Collenchymatous parenchyma containing in its outer part numerous ellipsoidal schizolysogenous oil glands  
b) Small translucent endosperm containing aleurone grains  
c) Wide parenchymatous starchy cortex, the endosperms containing volatile oil  
d) Outer surface consisting of external perisperm, rough, dark brown with reticulate furrows  

Q.50 in Protein biosynthesis, each amino acid  
a) Recognizes its own codon by a direct interaction with the m-RNA template  
b) Is added in its proper place to a growing peptide chain through the “adapter” function of t-RNA  
c) Is first attached to an anticodon specific for amino acid  
d) Undergoes fidelity translation which is assured by the presence of traces of DNA on the ribosome  

Q.51 Rabies’ Antiserum I.P. is  
a) A freeze dried preparation containing antitoxin globulin  
b) A preparation containing specific globulin or its derivatives obtained by purification of hyper immune serum of healthy horses  
c) A sterile preparation containing antitoxic globulin  
d) A sterile preparation containing antitoxic globulins obtained by purification of hyper immune serum horses  

Q.52-58 are multiple selection items, P, Q, R, S are the options. Two of these options are correct. Choose the correct combination from among a, b, c, and d.  

Q.52 Total ash value in case of crude drugs signifies  
P) Organic content of the drug  
Q) Mineral matter in the drug  
R) Addition of extraneous matter such as sand  
S) Woody matter in the drug  
a) R, S  
b) Q, R  
c) P, Q  
d) P, S  

Q.53 the compounds listed below contain σ, π and n electrons  
P) Acetaldehyde  
Q) Butadiene  
R) Formaldehyde  
S) Benzene  
a) P, S  
b) Q, R  
c) P, R  
d) Q, S  

Q.54 a 60 year old patient presents with glaucoma. Therapy should include  
P) Topical atropine  
Q) Topical pilocarpine  
R) Oral acetazolamide  
S) Oral pilocarpine  
a) P, Q  
b) Q, R  
c) R, S  
d) P, S  

Q.55 Measurement of particle size in pharmaceutical Aerosol is by  
P) Cascade impactor  
Q) Light scatter decay  
R) Karl-Fisher method  
S) IR spectrophotometer  
a) P, Q  
b) Q, R  
c) R, S  
d) P, S  

Q.56 the common attributes of ascorbic acid, an antiscorbutic vitamin are  
P) Exist in nature in both reduced and oxidized form and in a state of reversible
equilibrium Q) has a keto-enol system in the molecules R) has an aldehyde group since it-gives positive Schiff’s reaction S) Salt forming properties are due to the presence of free carboxyl group

a) P, R  b) Q, R  c) R, S  d) P, Q

Q.57 Two properties of radiopharmaceuticals are

P) Slow localization in target tissue Q) Very long half-life to provide enough exposure to get imaging information R) Short half-life to minimize radiation exposure yet long enough to get imaging information S) Rapid localization in target tissue and quick clearance from non-target organs

a) P, Q  b) Q, R  c) R, S  d) P, S

Q.58 Two correct statements connecting vitamin D are

P) The active molecule 1, 25-dihydroxy cholecalciferol binds to intracellular receptor proteins Q) Cholecalciferol is found in vegetables R) 1, 25-dihydroxy-D3 is the most potent vitamin D metabolite S) It is required in the diet of individuals exposed to sunlight

a) P, S  b) P, R  c) R, S  d) Q, S

Q. 59-65 are “Matching” exercises. Match Group I with Group II.

Choose the correct combinations from among the alternatives a, b, c, and d.

Q.59 Group I

Tablet additives

P) Binder

Q) Insoluble lubricant

R) Film coating material

S) Directing compression diluents

Examples

1) Acacia

2) Light mineral oil

3) Hydroxy ethyl cellulose

4) Microcrystalline cellulose

a) P-2,Q-1,R-3,S-4  b) P-3,Q-2,R-1,S-4  c) P-4,Q-3,R-2,S-1  d) P-1,Q-2,R-3,S-4

Q.60 Group I

IR detectors

P) Thermocouple

Q) Pyroelectric Detector

R) Golay cells

S) Thermistor

Composition

1) Oxides of Mn, Co and Ni

2) Bi-Sb

3) Xenon

4) Triglycerin sulphate

a) P-4,Q-2,R-3,S-1  b) P-3,Q-1,R-4,S-2  c) P-1,Q-3,R-2,S-4  d) P-2Q-4,R-3,S-1

Q.61 Group I

Alkaloid

P) Conine

Q) Papaverine

R) Anabasine

S) Reserpine

Ring System

1) Isoquinoline

2) Pyridine-Piperidine

3) Yohimbane

4) Piperidine

a) P-2,Q-3,R-1,S-4  b) P-4,Q-3,R-2,S-1  c) P-4,Q-1,R-2,S-3  d) P-2,Q-4,R-3,S-1

Q.62 Group I

Immunoglobulin (Ig)

P) Ig G

Q) Ig A

R) Ig M

S) Ig E

Actions

1) Agglutinating and cytolytic

2) Antiallergic

3) Neutralises toxin

4) Antimicrobial

a) P-4Q-3,R-2 S-1  b) P-3,Q-4,R-1,S-2  c) P-2,Q-3,R-4,S-1  d) P-2,Q-1,R-4,S-3
Q.63  Group I  Group II
Antibiotics  Microorganism used in the I.P. assay
P) Streptomycin  1) Bacillus cereus
Q) Erythromycin  2) Staphylococcus epidermidis
R) Gentamycin  3) Klebsiella pneumoniae
S) Tetracycline  4) Micrococcus luteus
a) P-4, Q-3, R-2, S-1  b) P-3, Q-4, R-2, S-1  c) P-1, Q-2, R-3, S-4  d) P-3, Q-4, R-1, S-2

Q.64  Group I  Group II
Synthetic estrogenic drugs  Methods of synthesis
P) Ethinyl estradiol  1) 4, 4’-Dimethoxy benzophenone is treated with 4-Methoxy benzoyl chloride + Mg, resulting product is treated with PTS followed by Cl₂ + CCl₄
Q) Dienestrol  2) Deoxyanisoin is alkylated and product subjected to Grignard reaction, the resulting tertiary alcohol is dehydrated and demethylated with alcoholic KOH
R) Chlorotrianisine  3) By Pinacol reduction of p-hydroxy propiophenone and subsequent removal of water
S) Stilboestrol  4) from estrone by the action of potassium acetylde
a) P-4, Q-3, R-1, S-2  b) P-4, Q-1, R-3, S-2  c) P-1, Q-4, R-2, S-3  d) P-3, Q-1, R-4, S-2

Q.65  Group I  Group II
Immunosuppressant  Mechanism of action
P) Azathioprine  1) Destroys proliferating lymphoid cells
Q) Tacrolimus  2) Prodrug transformed to mercaptopurine which on further conversion inhibits purine metabolism
R) Glucocorticoids  3) Inhibits the cytoplasmic phosphatase Calcineurin
S) Cyclophosphamide  4) Interferes with the cell cycle of activated lymphoid cells
a) P-3, Q-2, R-1, S-4  b) P-2, Q-3, R-4, S-1  c) P-2, Q-1, R-3, S-4  d) P-4, Q-2, R-3, S-1

Data for Q.66-90 are based on the statement/problem. Choose the correct answer for each question from among the options a, b, c, and d. Data for Q.66-68: Leaves of Digitalis purpurea were subjected to morphological, microscopical and chemical screening.

Q.66  Morphological character with respect to the leaf is
a) Ovate lanceolate with entire margin  b) Ovate lanceolate with crenate margin
c) Linear lanceolate with serrate margin  d) Linear lanceolate with sinuate margin

Q.67  Morphological character of trichome is
a) Unicellular, warty  b) multicellular, uniseriate with 2-7 cells  c) multicellular, uniseriate with 10-14 cells  d) multicellular, multiseriate with 10-14 cells

Q.68  The drug gives positive
a) Borntrager’s test  b) Muroxide test  c) Legal’s test  d) Thaleoquin test

Data for Q.69-70: In a synthetic procedure 5-chloro-2, 4-diamino sulfomyl aniline is treated with P to obtain 7-amino sulfomyl-6-chloro-3-chloro-methyl-2H-1, 2, 4-benzthiadiazine 1:1 dioxide. Subsequently it is refluxed with C₆H₅-CH₂-SH + NaOH + DMF to yield Y.

Q.69  Select the reagent P
a) Chloroacetyldehyde  b) Formaldehyde  c) Formic acid  d) Acetaldehyde

Q.70  The final product Y is
a) 3-benzyl methyl-6-chloro-2H-1,2,4-benzothiadiazine-7-sulphonamide 1,1-dioxide  b) 3-benzyl thiomethyl-6-chloro-2H-1,2,4-benzothiadiazine-7-sulphonamide 1,1-dioxide

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c) 3-benzyl methyl-5-chloro-2H-1,2,3-benzothiadiazine-7-sulphonamide 1,1-dioxide
d) 3-benzyl methyl-5-chloro-2H-1,2,3-benzothiadiazine-7-sulphonamide 1,1-dioxide

Data for Q.71-73: Proguanil is synthesized by diazotization of p-chloroaniline and treating with
dicynamide to yield p-chlorophenyldicynamide which is converted to proguanil is metabolized to a
trazine derivative which is an active metabolite.

Q.71. what is the reagent used for diazotization?
   a) NaNO₂ + dilute HCl  b) KNO₃ + dilute H₂SO₄  c) Zn + dilute H₂SO₄  d) Tin + H₂SO₄

Q.72. Name of the aliphatic amine used
   a) Dimethylamine  b) Isopropylamine  c) Isobutylamine  d) Diethylamine

Q.73. Name of the metabolite
   a) Thioguanil  b) Diguanil  c) Cycloguanil  d) P-chlorophenyl biguanide

Data for Q.74-76: Calculate the λₘₐₓ for the following compounds. Base value for Benzaldehyde in
ethanol is 250 nm

Q.74. λₘₐₓ of p-bromobenzaldehyde in nm is
   a) 265  b) 255  c) 275  d) 260

Q.75. λₘₐₓ of p-hydroxybenzaldehyde in nm is
   a) 253  b) 275  c) 261  d) 270

Q.76. λₘₐₓ of o-chlorobenzaldehyde in nm is
   a) 275  b) 265  c) 255  d) 250

Data for Q.77-78: In an assay of folic acid I.P., a weighed quantity is dissolved in 0.1 M NaOH
solution and subsequently treated with Zn and HCl. The resulting product obtained when folic acid
is mixed with ammonium sulphamate, kept for two minutes and a reagent is added to get final
colored product whose absorbance is measured.

Q.77. Select the product obtained when folic acid is heated with Zn + HCl
   a) Benzoic acid  b) P-aminobenzoic acid  c) Glutamic acid  d) Succinic acid

Q.78. Select the reagent used for the development of color
   a) N-1-naphthyl ethylene diamine dihydrochloride  b) Ninhydrin reagent
c) P-dimethylamino benzaldehyde  d) Phloroglucinol

Data for Q.79-80: Parkinsonism is a common neurological movement disorder. Signs include
rigidity of skeletal muscles, akinesia, flat facies and tremors at the rest. Both L-DOPA and
Carbidopa are used.

Q.79. Carbidopa is used because
   a) It crosses blood brain barrier  b) It inhibits aromatic L-amino acid decarboxylase
c) It inhibits MAO type A  d) It inhibits MAO type B

Q.80. Select the specific unwanted effect of L-DOPA
   a) Dementia  b) Hypertension  c) Dyskinesia  d) Exitotoxicity

Data for Q.81-82: The decomposition of a drug in aqueous acid solution was found to follow first
order reaction. The initial concentration was found to be 0.056 M. the concentration after a period
of 12 hours was 4.10 x 10⁻² moles/litre. The reaction rate constant is 0.02599 hr⁻¹.

Q.81. What is the quantity of the drug remaining under composed after 8 hours?
   a) 0.455 moles/litre  b) 0.25 moles/litre  c) 0.0455 moles/litre  d) 0.10 moles/litre

Q.82. What is the amount of drug deteriorated during the period of 24 hours?
   a) 0.26 moles/litre  b) 0.0026 moles/litre  c) 0.03 moles/litre  d) 0.053 moles/litre

Data for Q.83-85: In a formulation development laboratory, you have to formulate an oral dosage
form containing olive oil, vitamin A and water.

Q.83. Suggest a suitable dosage form
Q.84 Suggest a suitable substance to be incorporated into the formulation
   a) Glycerin       b) Acacia       c) Cetrimide      d) Alcohol

Q.85 Select one of the appropriate labeling directions
   a) Keep in the refrigerator  b) No preservatives added
      c) Schedule ‘G’ drug      d) Shake well before use

Data for Q.86-87: Successive solvent extraction of crude drug with petroleum ether, benzene, chloroform, ethyl alcohol and water was performed. Quantitative chemical testing of petroleum ether extract gave positive Keller-Kiliani and Salkowski’s reactions. Ethyl alcohol and aqueous extract gave positive FeCl₃ reaction and aqueous extract gave foamy solution.

Q.86 what constituents are present in the petroleum ether/benzene extracts?
   a) Plant sterols       b) Tropane alkaloids   c) Sesquiterpenoids  d) Purines

Q.87 what constituents are present in the ethyl alcohol and aqueous extracts?
   a) Plant lipids  b) Anthraquinone glycosides  c) Alkaloids  d) Plant phenol and saponins

Data for Q.88-90: A business-executive while playing tennis complained of chest pain and was brought to emergency room. He has history of mild hypertension and elevated blood cholesterol. ECG changes confirmed the diagnosis of myocardial infarction. The decision is made to open his occluded artery by using thrombolytic agent and also aspirin later.

Q.88 the thrombolytic agent used is
   a) Heparin       b) Warfarin       c) Anistrplase    d) Vitamin K

Q.89 Mechanism of action of aspirin is
   a) Inhibits vitamin K absorption  b) Antithrombin activity
      c) Inhibits metabolism of heparin  d) Inhibits platelet aggregation

Q.90 Mechanism of action of antithrombic agent is
   a) Conversion of plasminogen to plasmin  b) Activation of clotting factors
      c) Inhibit Platelet function    d) Agonist of vitamin K

Answer Key-2003

1. a    18.c   35.d    52.b   69.a   86.a
2. b    19.b   36.d    53.c   70.b   87.d
3. d    20.c   37.b    54.b   71.a   88.c
4. b    21.b   38.a    55.a   72.b   89.d
5. c    22.b   39.b    56.d   73.c   90.a
6. a    23.a   40.d    57.c   74.a
7. b    24.d   41.d    58.b   75.b
8. d    25.a   42.a    59.d   76.d
9. a    26.b   43.c    60.d   77.b
10.b   27.d   44.c    61.c   78.a
11.d   28.a   45.a    62.b   79.b
12.c   29.c   46.d    63.b   80.b
13.b   30.a   47.b    64.a   81.c
14.c   31.d   48.b    65.b   82.a
15.d   32.d   49.a    66.b   83.c
16.b   33.d   50.b    67.b   84.b
17.b   34.c   51.b    68.c   85.d