



# Biomedical Quiz for Beginners in the Field

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**Abstract:** Fundamental knowledge of biomedical science, engineering, and technology, including insights into the complex real world phenomena, into the mechanisms behind the working of the biological systems and modern devices, advanced biomaterials and a wide range of environmental influences, are expected to affect learners' thought processes in a special way. Modern biomedical instruments provide data for disease forecasts. They monitor different stages of disease development from localized or regional spread to distant spread and during incubation, prodromal, illness, decline, and convalescence periods. This paper presents 150 multiple choice questions and answers relating to the biomedical field that eventually helps us to understand natural phenomena, biochemical concepts, principles and processes, design and development of modern medical devices, diagnostic tools, treatment techniques, advances in medication and constructive applications. The purpose is to generate curiosity among learners to know more about the biomedical field and to highlight its importance in the real world around them so that they can take informed decisions in the future. The paper will facilitate learner self-evaluation and knowledge development in the biomedical field through various facts and figures in the form of questions and answers. This questionnaire is intended to promote interest among wider audiences from science students to health activists, and it will set the stage for further tangible progress in capacity building essential to their future ability to use biomedical ideas effectively.

**Keywords:** Biomedical Science, Learning Through Quiz, Supplementary Material, Healthcare Applications, Question Bank, Reinforce Understanding

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## 1. Introduction

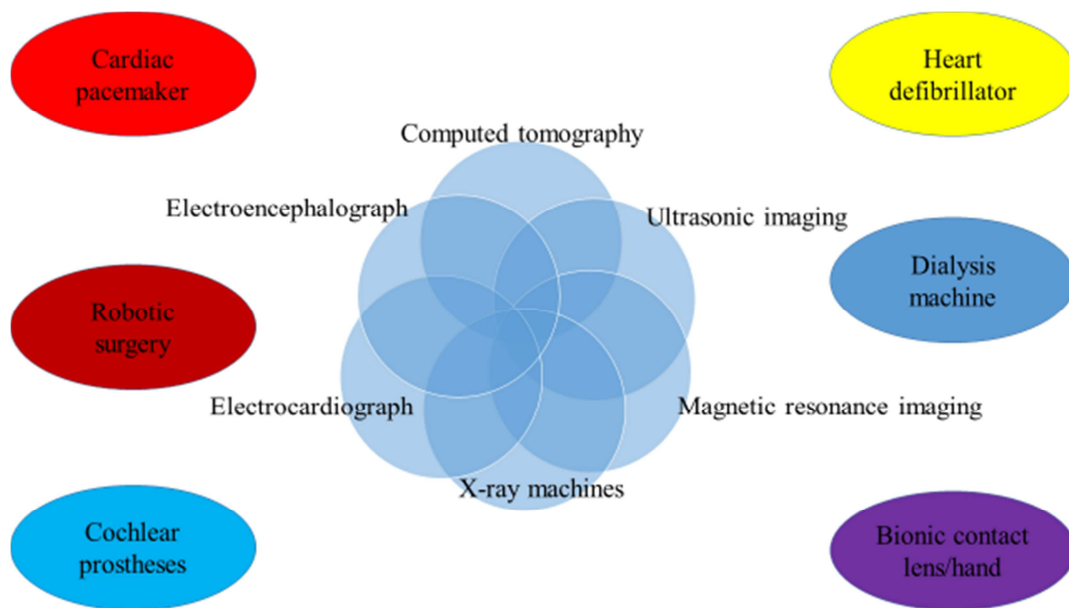
There has been a spate of studies in biomedical science and engineering fields for diagnostic or therapeutic healthcare purposes in the recent past. Earlier biomedical breakthroughs like the development of vaccines to immunize people against many diseases and discovery of penicillin to treat several illnesses immensely helped people to protect their health by providing effective treatment of infections. We have a team of scientists and engineers, experienced in elaborate exploration in conducting medical experiments and theoretical studies with serious attention to detail with the goal of improving the quality and effectiveness of patient care. Biomedical technology is changing rapidly with simplified procedures that require no downtime and are devoid of the several complications of conventional surgery or treatment procedures. The scope of biomedical field ranges from remote sensing systems to telemedicine, and from human body simulation to targeted drug delivery systems and genetically modified organisms. Biomedical

engineering combines medicine and engineering principles and concepts to improve the quality of health care through innovative medical devices and processes. Bionic body parts (arm, knees, feet, legs), artificial organs (prosthetic limbs, artificial joints), corrective microscopic surgery equipment, *in-vivo* imaging, dialysis machines, cardiac pacemaker, pulse oximeter, ventilator and procedures for injecting liquids into the spinal disc space are all a direct result of this interdisciplinary field of research. Recent advancements in the development of prosthetic implant materials, pharmaceutical drugs and medical devices, including magnetic resonance imaging and electroencephalography instruments have been the driving force for further research work that provides clear insight into the subject.

More recently, wearable gadgets such as smartwatches, fitness trackers, headgear and smart bands are in the marketplace incorporating fitness tracking and health-oriented features and different specifications. Today, synthetic organ technology is being used to provide custom-made organs. The rice grain-sized radio-frequency

identification (RFID) chips implanted under the skin can be programmed to execute different tasks. These intelligent implants can replace smart watches and bracelets. New scientific instruments and outputs, hardware and software development and research efforts of seasoned scientists have contributed significantly to the domain knowledge. The role of high-end anti-aging services and products in enhancing the quality of life reflect the technological imprint in the biomedical field. Further developments in biotechnology and instrumentation technology will improve the quality of instrument design from construction to calibration. Advanced neural prosthetic devices, robotic arms and so on will be available at affordable cost. High level of sophistication in

the crystal structure analysis allows the determination of complex structures found in biological systems. The design, manufacturing, supply, installation, testing and commissioning of various biomedical systems at different parts of the world and creating a new think tank to trigger, influence and innovate research activities in the field would certainly contribute to taking the global growth story forward. Selected instruments, devices, and biomedical applications are shown in Figure 1. There has been a rise in life expectancy of people because of improvements in hygiene, nutrition, diagnostic instruments, treatment methods and advancements in medicine.



**Figure 1.** Contributions of biomedical science, engineering, and technology to selected systems, equipment, and devices for clinical diagnosis, treatment, and rehabilitation practice.

A combination of study, exercises and learning style modifications work best in producing long-lasting effects. It is important to design multiple choice questions (MCQs) to assess the subject knowledge and to reinforce understanding of an undergraduate science student. Inspiring young minds through objective type questions helps in the cognitive development process, provide the competitive edge and promote scientific temper to fulfill the hopes and aspirations to achieve their potential. The basic idea of this biomedical quiz is to include learning beyond academic curriculum in a compact area and to encourage interdisciplinary and multidisciplinary learning without rigid boundaries between different disciplines to avoid compartmental attitude. The particular role of developing a questioning attitude is essential to create a vibrant scientific community with multiple level engagements. The topics covered in this paper include modern drug chemotherapy, underlying mechanisms of drug action, the relation of chemistry to medical diagnosis and pharmacology, medical instrumentation, biomolecules and biological systems, biomedical engineering, medical technology, biomedical modeling and matters of more general interest. The general knowledge questions on

problems of health and their causes in everyday life are interspersed with those of biomedical instruments or equipment more commonly used in different medical activities. The degree of difficulty varies from the basic general knowledge questions to very technical questions, and the complexity also varies widely. The MCQs listed here are designed to be objective with one definite answer, and it provides a broader, stimulating and an engaging perspective on the biomedical field. It can be administered on-line and takes less time to complete. Choosing the correct answer to these questions can be fun, an enjoyable and an enriching experience. It would lead to reflection of study habits, serve as a reminder to take action, promote the ability to solve problems and facilitate the healthy development of young minds. The dynamic and interdisciplinary nature of questions will keep the learner interested and motivated in active reading through mind mapping and real-world problem link method. The target audience is the active young participant who has the inner drive and a fierce determination to succeed in biomedical science-related disciplines. Those students who expect to pursue further study in biological sciences, biomedical engineering, medical technology and related

areas will benefit from this approach. The intention is to make the learner familiar with specific pieces of biomedical information about common diseases, specialist disorders or rare conditions, many medicines and treatment modalities, and biomedical instruments used in diagnosis, therapy, rehabilitation, and disease control. The quiz paper includes 150 attractive and straightforward MCQs relating to biomedical field and proposes to foster imagination in young students and develop an interest in biomedical science. The correct answers are listed at the end for the readers' convenience and benefit to check their progress. The incorrect answers given are expected to stimulate lateral thinking skills of learners and help readers ask the right questions about general biomedical theory and practice and find the right answers after extracting the essence by consulting another book. An elaborate reasoning and analyses of learners' thought processes on multiple levels in these MCQs would develop a sense of cerebral confidence in their trajectories along the axis of modern biomedical science. An academic inquiry into the other options in the biomedical field and several ways to find answers to these typical questions influence their scientific approach, conceptualization, and exchange of ideas, and develop that precious scientific spirit and skill to look at things in a different way. It is essential to explicitly draw attention to

certain key aspects of reigniting interest and having a considerable impact on scientific learning. Conceptual understanding and the use of techniques will help young students to take on critical biomedical issues and challenges later in life and perform better, and the ideas that are developed can provide a relatively good fit with the core innovation graph. There are some questions designed to test medical vocabulary, and the meaning of terms such as deflation syndrome or andropause helps students master the biomedical material at a later stage and develop both logical and symbolic aspects of the technical terms. It is an extended academic support for brain development in young learners through the prism of informal education analysis. These questions have been categorized into disease diagnosis, medical treatment, human biology and biomedical aspects. However, this is not rigid, and some questions may be included multiple categories. Answers can be found by clicking on the find/search command and writing the selected question number in the navigation pane to reflect that number highlighted in color.

## 2. Multiple Choice Questions

The readers can select the most appropriate answer from the four choices provided in each of the following:

### 2.1. Disease Diagnosis [1-6]

1. The type of stethoscope commonly used by most doctors is:
  - a) Acoustic stethoscope; b) Electronic stethoscope;
  - c) Recording stethoscope; d) Doppler stethoscope
2. Name the disease that is caused by iron-deficiency which can be corrected by routine iron supplements or prevented by ingesting foods that are naturally high in iron:
  - a) Scurvy; b) Rickets; c) Anemia; d) Beriberi
3. Which of the following sets contains only bacterial diseases?
  - a) Typhoid, Tuberculosis, Tetanus; b) Chicken pox, AIDS, Influenza;
  - c) Rabies, Jaundice, Leprosy; d) Cholera, Diphtheria, Whooping cough
4. Name the neurotransmitter thought to be a contributor to feelings of well-being and happiness:
  - a) Adrenaline; b) Cortisol; c) Norepinephrine; d) Serotonin
5. Diseases that are caused by the decreased ability of the body to repair its tissues are known as:
  - a) Immunological diseases; b) Degenerative diseases;
  - c) Infectious diseases; d) Congenital diseases
6. What are the diseases or disorders that occur due to work or working conditions called?
  - a) Lifestyle diseases; b) Infectious diseases; c) Occupational diseases; d) Tropical diseases
7. The widening of blood vessels is known as:
  - a) Vasoconstriction; b) Atherosclerosis; c) Vasodilation; d) Thrombosis
8. Name a common endocrine disorder, in which the body lacks sufficient thyroid hormone:
  - a) Hypotension; b) Hypoglycemia; c) Hypothyroidism; d) Hyperthyroidism
9. The deficiency of vitamin A, B and C cause the following diseases in that order:
  - a) Xerophthalmia, Beriberi, Scurvy; b) Pellagra, Goiter, Anemia;
  - c) Hypocobalaminemia, Ariboflavinosis, Rickets; d) Wilson's disease, Alzheimer's disease, Albright syndrome
10. Which of the following is a disease caused by worms?
  - a) Athlete's foot; b) Malaria; c) Elephantiasis; d) Amoebic dysentery
11. The following is a chromosomal disorder in humans:
  - a) Diabetes mellitus; b) Empty-nest syndrome; c) Sickle cell anemia; d) Down's syndrome
12. This technique is used to determine the sex of a fetus:
  - a) DNA fingerprinting; b) Autoradiography; c) Biopsy; d) Amniocentesis
13. A hypersensitivity disorder of the immune system to a particular irritant (food or pollen) causing symptoms like red eyes,

- itchiness, runny nose, eczema, or an asthma attack is called:
- Cheating disorder;
  - Allergy;
  - Hyperactivity disorder;
  - Histamine intolerance
14. The disease caused by deposits of plaque in the arteries is known as:
- Atherosclerosis;
  - Fluorosis;
  - Otosclerosis;
  - Sclerosis
15. AIDS is caused by the following:
- Bacteria;
  - Virus;
  - Fungus;
  - Protozoa
16. Which of the following is a group of waterborne diseases?
- Typhoid, Cholera, Amebiasis;
  - Polio, Diphtheria, Filariasis;
  - Malaria, Measles, Smallpox;
  - Tuberculosis, Influenza, Chickenpox
17. Which part of the body is affected by meningitis?
- Lungs and intestine;
  - Joints;
  - Spinal cord and brain;
  - Throat
18. Which of the following is a group of diseases caused by a virus?
- Smallpox, Chickenpox, Poliomyelitis;
  - Pneumonia, Mumps, Goiter;
  - Cholera, Typhoid, Diphtheria;
  - Plague, Tetanus, Hepatitis
19. The average number of heart beats per minute in a normal adult is in the range:
- 100-120;
  - 60-100;
  - 40-60;
  - 52-65
20. The following represent a set of vector-borne diseases:
- Plague, Dengue fever, Malaria;
  - Hepatitis, Cholera, Gastroenteritis;
  - Influenza, Tuberculosis, Measles;
  - Anthrax, Rabies, Swine flu
21. Tuberculosis is caused by the following:
- Mycobacterium;
  - Yersinia pestis;
  - Streptococcus;
  - Clostridium
22. The pair containing good and bad cholesterol respectively is the following:
- LDL and HDL;
  - HDL and LDL;
  - Statin and Squalene;
  - None of the above
23. Which part of your body is affected when you have encephalitis?
- Liver cells;
  - Brain;
  - Eyes;
  - Kidneys
24. Name the disease caused by iodine deficiency, in which the swelling of a specific gland is involved:
- Anemia;
  - Scurvy;
  - Goiter;
  - Osteomalacia
25. Measurements that indicate the healthy functioning of the body, including pulse rate, respiration rate, blood pressure and body temperature are known as:
- Vital signs;
  - Medical signs;
  - Eponymous signs;
  - Prognostic signs
26. Which part of the human body is associated with pyorrhea?
- Eyes;
  - Lungs;
  - Gums;
  - Liver
27. What is the term used to describe a condition of the severely deficient supply of oxygen to the body that often leads unconsciousness and death?
- Internal fixation;
  - Asphyxiation;
  - Oxygenation;
  - Oxidation
28. Which of the following diseases is caused by the deficiency of insulin?
- Diabetes;
  - Rickets;
  - Scurvy;
  - Anemia
29. A non-invasive technique to record electrical activity of the brain along the scalp using sensors is known as:
- Electrocardiography;
  - Electroencephalography;
  - Electrogram;
  - Electrojet
30. The following is a group of sexually transmitted diseases:
- Anthrax, Cholera, Diphtheria;
  - Syphilis, Gonorrhoea, Herpes;
  - Tetanus, Typhoid, Rabies;
  - Pneumonia, Plague, Mumps
31. What is the term used to describe the physiological or psychological dependence on a substance that is beyond voluntary control?
- Affliction;
  - Depression;
  - Distraction;
  - Addiction
32. Which part of the body is affected by pneumonia?
- Eyes;
  - Intestines;
  - Lungs;
  - Pancreas
33. A specific learning disability that affects reading and related language-based processing skills is known as:
- Dyscalculia;
  - Dysgraphia;
  - Dyslexia;
  - Dyspraxia
34. An emotional disorder associated with depression in which a person tends to overeat:
- Botulism;
  - Bulimia;
  - Cirrhosis;
  - Diarrhea
35. An ECG is a medical test that detects heart abnormalities by measuring the electrical activity generated as it contracts. What does ECG stand for?
- Emergency coordination group;
  - Electrocardiograph;
  - Electronic communication gateway;
  - Environmental chemistry group
36. This is one of the latest diseases that created news across the world:
- Acquired Immunodeficiency Syndrome (AIDS);
  - Coronary Artery Disease (CAD);

- c) Chronic Obstructive Pulmonary Disease (COPD); d) Ebola Virus Disease (EVD)
37. A group of medical symptoms that appear together and characterize a medical condition or specific disease is known as:  
a) Disorder; b) Condition; c) Syndrome; d) Ailment
38. The following is a set of common physical-health-related medical syndromes:  
a) Retired husband syndrome, Empty-nest syndrome, Puppy pregnancy syndrome;  
b) Alcohol withdrawal syndrome, Drug withdrawal syndrome, Sedative withdrawal syndrome;  
c) Fish odor syndrome, Exploding head syndrome, Busy life syndrome;  
d) Premenstrual syndrome, Toxic shock syndrome, Irritable bowel syndrome
39. The process of removing a sample tissue or mass of cells from patients' body for finding out the disease or a problem is known as:  
a) Autopsy; b) Biopsy; c) Epilepsy; d) Diagnostic test
40. What does ESR in biomedical science stand for?  
a) Electron spin resonance; b) Erythrocyte sedimentation rate;  
c) Equivalent series resistance; d) Emergency situation report
41. Which of the following is a group of psychiatric disorders?  
a) Amenorrhea, endocrine disorder, allergic rhinitis, cervical cancer;  
b) Diabetes, Obesity, Osteoporosis, Menopause;  
c) Eczema, Psoriasis, Cellulitis, Shingles;  
d) Bipolar disorder, Depressive disorder, Obsessive-compulsive disorder, Schizophrenia
42. The inability to fall asleep or hard to stay asleep is called:  
a) Ischemia; b) Insomnia; c) Impotence; d) Incontinence
43. Which of the following sets contains diseases with the genetic link?  
a) Down syndrome, Hemophilia, Sickle cell disease, Color blindness;  
b) Malaria, Gonorrhea, Flu, Tuberculosis;  
c) Liver cirrhosis, Dysentery, Gastritis, Piles;  
d) Hypertension, Vasculitis, Myocarditis, Stroke
44. Normal human body temperature in degrees Celsius is:  
a)  $37 \pm 0.5$ ; b)  $38.5 \pm 0.5$ ; c)  $35.6 \pm 0.5$ ; d)  $39 \pm 0.5$
45. The following is a list of common vision defects:  
a) Laryngitis, Tonsillitis, Epiglottitis;  
b) Cataracts, Glaucoma, Retinitis;  
c) Vertigo, Vestibular neuritis, Herpes zoster otitis;  
d) Astigmatism, Myopia, Hyperopia
46. Secondary disease, disorder or condition that arises as a consequence of a primary disease is known as:  
a) Mutation; b) Complication; c) Malady; d) Ailment
47. What does the medical term BMI stand for?  
a) Body mind intellect; b) Body mass index; c) Biomedical informatics; d) Big mouth idiot
48. The following pair belongs to the category of airborne diseases:  
a) Encephalitis, Dengue; b) Jaundice, Cholera;  
c) Influenza, Conjunctivitis; d) Rabies, Anthrax
49. What is the common name for infectious diseases of animals such as Ebola virus disease, rabies, influenza that can naturally be transmitted to humans?  
a) Vectorborne diseases; b) Zoonosis;  
c) Waterborne diseases; d) Vehicle transmission diseases
50. The following is a set of modern lifestyle diseases:  
a) Allergic rhinitis, Heatstroke, Frostbite, Lung cancer;  
b) Spinal injuries, Burns, Electrical injuries, Hypothermia;  
c) Heart disease, Arteriosclerosis, Type II diabetes, Obesity;  
d) Coma, Delusions, Dementia, Insomnia
51. What is the medical term used for cessation of blood circulation and breathing?  
a) Persistent vegetative state; b) Brain death; c) Clinical death; d) Whole brain death
52. The following is a condition of blood poisoning due to the presence of pathogens or their toxins that are a serious, life-threatening infection:  
a) Stomatitis; b) Thrombosis; c) Thrombocytosis; d) Septicemia
53. What is the medical technology that measures brain activity by detecting associated changes in blood flow?  
a) Functional nuclear magnetic resonance; b) Structural nuclear magnetic resonance;  
c) Computerized axial tomography; d) Ultrasound scan

54. Burns that damage all layers of skin and blood vessels and nerves are known as:  
 a) First-degree burn; b) Second-degree burn; c) Third-degree burn; d) Superficial burn
55. A tumor that is not cancerous and usually does not spread is called:  
 a) Benign; b) Malignant; c) Hyperplasia; d) Atrophy
56. A condition in which the blood is pumped through the body at an abnormally low pressure is known as:  
 a) Hypertension; b) Hypotension; c) Hypoglycemia; d) Hypoxia
57. What is the medical term used to describe the period between exposure to infection and appearance of symptoms?  
 a) Quarantine period; b) Menstrual period; c) Incubation period; d) Postpartum period
58. Substances that cause blood vessels to narrow or open to facilitate decrease or increase the flow of blood are known as:  
 a) Embolism and effusion; b) Vasoconstrictor and vasodilator;  
 c) Coagulant and anticoagulant; d) Hemophilia and fibromyalgia
59. The four types of stones found in the human body are in the following set:  
 a) Emerald, Ruby, Sapphire, Topaz;  
 b) Limestone, Sandstone, Marble, Quartz;  
 c) Granite, Slate, Soapstone, Fossil-stone;  
 d) Kidney stones, Gallstones, Bezoars, Otoliths
60. The medical term used to describe the spread of a malignant tumor from its original to other locations in the body is:  
 a) Nephritis; b) Metastasis; c) Edema; d) Systemic inflammatory response syndrome
61. Symptoms and signs of abnormal function of structurally normal organs or tissues are known as:  
 a) Structural disorder; b) Functional disorder; c) Idiopathic disorder; d) Malnutrition
62. What does PMS in medical science stand for?  
 a) Premenstrual syndrome, Post-menopausal syndrome, Psychotic mood shift;  
 b) Performance management system, Project management system, Physiologic monitoring system;  
 c) Preventive maintenance service, Preventive medicine services, Perfect mail service;  
 d) Power monitoring system, Post-market surveillance, Planned maintenance system
63. Medical diagnostic investigations using mainstream instruments involve the following set:  
 a) Endoscopy, Electrocardiography, MRI, X-rays;  
 b) Biopsy, Blood tests, Antibody tests, Blood pressure measurement;  
 c) Brain scans, Cystoscopy, Pap smear, Allergy shots;  
 d) Amniocentesis, Autopsy, Thyroid scans, Cholesterol test
64. Name the medical instrument used by doctors to measure blood pressure:  
 a) Barometer; b) Thermometer; c) Sphygmomanometer; d) Reflex hammer
65. The set of common eating disorders that are currently recognized is:  
 a) Alcohol use disorder, Social anxiety disorder, False hope syndrome;  
 b) Selective eating disorder, Compulsive overeating, Unspecified eating disorder;  
 c) Anorexia nervosa, Bulimia nervosa, Binge eating disorder;  
 d) Sleep apnea, Restless leg syndrome, Narcolepsy
66. OCD in medical science stands for the following:  
 a) Obsessive compulsive disorder; b) Optimal coherent decomposition;  
 c) Operational concept document; d) Ocean chemistry division
67. The five most common types of kidney stones found in the human body are:  
 a) Calcium oxalate stones, Calcium phosphate stones, Uric acid stones, Struvite stones, Cysteine stones;  
 b) Opal, Pearl, Spinel, Diamond, Aquamarine;  
 c) Ruby, Sapphire, Topaz, Jade, Quartz;  
 d) Amethyst, Citrine, Turquoise, Peridot, Garnet

## 2.2. Medical Treatment [7-12]

68. Two examples of the main blood thinners -anticoagulants that lengthen the time to form a clot and antiplatelet drugs that prevent platelets from clumping together are:  
 a) Dextrin and coumarin; b) Cyanohydrin and ninhydrin;  
 c) Heparin and aspirin; d) Tranexamic acid and norethisterone
69. The selective removal of unwanted or excess of mercury and thallium metal ions caused by metal poisoning from the body involves the use of the following chelating ligand:  
 a) British Anti-Lewisite (BAL); b) Ethylenediamine tetraacetic acid (EDTA);  
 c) Macrocyclic cryptand; d) Desferrioxamine
70. This set represents the three names of artificial sugars that are much sweeter, but not absorbed by our body system:  
 a) Aspartame, sucralose & saccharin; b) Mannose, galactose & dextrose;

- c) Beet sugar, cane sugar & date sugar; d) Sorbitol, mannitol & ethyl maltol
71. The most used metal-based anticancer drug is:  
a) Cyclophosphamide; b) Gleevec; c) Taxol; d) Cisplatin
72. The set representing the antibiotic drug class:  
a) Tetracyclines, Penicillin, Metronidazole, Quinolones;  
b) Cyproheptadine, Allegra, Zyrtec, Livostin, Loratadine;  
c) Albendazole, Mebendazole, Pyrantel, Ivermectin;  
d) Ibuprofen, Lansoprazole, Ketoprofen, Diclofenac
73. Which of the following drugs is administered in typhoid?  
a) Penicillin; b) Ciprofloxacin; c) Tetracycline; d) Sulfonamide
74. Which is the blood group that a universal donor has?  
a) O; b) A; c) B; d) AB
75. The term 'broad-spectrum antibiotic' refers to that which:  
a) Acts against a wide range of disease-causing bacteria;  
b) Acts on all the microorganisms;  
c) Acts on both pathogens and hosts;  
d) All of the above
76. Which of the following groups contains generic names of the antiviral drugs?  
a) Clotrimazole, Ketoconazole, Amphotericin; b) Gemifloxacin, Amoxicillin, Cefadroxil;  
c) Acyclovir, Amantadine, Valacyclovir; d) Dimercaprol, Thiamine, Atropine
77. The surgical restoration of the hymen is known as:  
a) Vaginoplasty; b) Rhinoplasty; c) Angioplasty; d) Hymenoplasty
78. The following is the set of vaccine-preventable infectious diseases:  
a) Measles, Mumps, Polio, Smallpox; b) Chicken pox, HIV, Hepatitis C, Ross River;  
c) Tuberculosis, Tetanus, Hookworm disease, Schistosomiasis; d) Malaria, Dengue fever, Chikungunya, Leishmaniasis
79. Which of the following is eliminated by an antibiotic?  
a) Microorganisms; b) Virus; c) Bacteria; d) Fungus
80. Identify the group containing the three most common approaches adopted in the treatment of cancer:  
a) Immunotherapy, Gene therapy, Antibody therapy;  
b) Surgery, Radiation therapy, Chemotherapy;  
c) Chelation therapy, Combination therapy, Palliative therapy;  
d) Heat therapy, Sound therapy, Light therapy
81. The following is a typical example of an artificial organ:  
a) Dialysis machine; b) Cardiac pacemaker; c) Ventilator; d) Conductivity meter
82. Spontaneous or induced removal of an embryo or fetus from the uterus before it reaches the stage when it can survive outside the womb is known as:  
a) Absorption; b) Adsorption; c) Abortion; d) Conception
83. The following is a list of common alternative therapies:  
a) Homeopathy, Ayurveda, Acupressure, Physiotherapy;  
b) Massage, Exercise, Diet, Sleep;  
c) Snake massage therapy, Leech therapy, Regression therapy, Urine therapy;  
d) Cognitive therapy, Complimentary therapy, Fish therapy, Stone therapy
84. What is the machine designed to move breathable air into and out of the lungs mechanically called?  
a) Medical intensive care unit; b) Life-support system;  
c) Oxygen supply system; d) Medical ventilator
85. Some of the most common birth delivery types include the following:  
a) Vaginal, Cesarean, Induction; b) Home, Natural, C-section;  
c) Chiropractor, Reflexology, Birthing tub; d) Forest, Bus, Train
86. A medical treatment that will relieve symptoms and does not cure underlying life-threatening disease is known as:  
a) Tertiary care; b) Primary care; c) Secondary care; d) Palliative care
87. The following drug is widely used as an injectable anticoagulant:  
a) Ephedrine; b) Tranexamic Acid; c) Salbutamol; d) Heparin
88. A beneficial effect produced by a drug or treatment, which is not due to its properties, but attributed to the patient's belief is known as:  
a) Side effect; b) Placebo effect; c) Testing effect; d) Negativity effect
89. The surgical removal of a part of the body is called:  
a) Resection; b) Rejection; c) Resuscitation; d) Rupture

90. The following class of drugs blocks the release of substances in response to an allergen:  
 a) Histamines; b) Antihistamines; c) Decongestants; d) Bronchodilators
91. The first aid box (FAB) must include the following items:  
 a) Safety pins, scissors, dressings, antibacterial ointment;  
 b) Adhesive tape, tweezers, thermometer, triangular cloth;  
 c) First aid manual, alcohol, soap, water;  
 d) Both a and b
92. The technique of using harmless shock waves to break kidney stones into fragments is known as:  
 a) Colonoscopy; b) Lithotripsy; c) Pap test; d) Mammography
93. The three main categories of anesthesia to ensure that patients remain free of pain during surgery or other procedures are:  
 a) Local, Regional, General;  
 b) Spinal, Epidural, Strong;  
 c) Sedative, Weak, Muscle relaxant;  
 d) Intoxicant, Hypnotic, Psychotic
94. The surgical removal of the uterus of a woman is known as:  
 a) Vaginectomy; b) Hysterectomy; c) Vasectomy; d) Vulvectomy
95. ERT in medical terminology is an abbreviation for:  
 a) Emergency response team; b) Energy reduction technique;  
 c) Estrogen replacement therapy; d) Environmental remediation technologies
96. Assisted reproductive technologies include the following:  
 a) Ultrasound, CT scans, Endoscopy, Magnetic resonance imaging;  
 b) Biopsy, X-ray, Lipid profile, Electrocardiogram;  
 c) Blood test, Ovulation test, Blood pressure, Chromosome tests;  
 d) In vitro fertilization (IVF), Zygote intrafallopian transfer (ZIFT), Gamete intrafallopian transfer (GIFT), Intracytoplasmic sperm injection (ICSI)
97. What does the abbreviation NSAID normally in the medical field stand for?  
 a) Non-steroidal anti-inflammatory drug;  
 b) National students against impaired driving;  
 c) Not sold after initial dosage; d) None of the above
98. The first aid treatment for snake bite on the arm or leg involves the following sequential steps:  
 a) Wipe the venom away from the wound, cover with dressing, and keep the person under observation;  
 b) Allow the person to walk, obstruct the blood flow with bandage, cover the wound with a cloth, and get medical assistance;  
 c) Kill the snake, reassure the person, open the wound, flush the wound with water, and take the person to hospital;  
 d) Apply constrictive bandage on the heart side, wash the wound with soap and water, cover with a sterilized dressing, and obtain medical aid

### 2.3. Human Biology [13-16]

99. The major energy currency molecule of the cell is:  
 a) Disodium phosphate; b) Glucose-1-phosphate;  
 c) Triphenyl phosphate; d) Adenosine triphosphate
100. Name the hormone that helps people fall asleep:  
 a) Serotonin; b) Progesterone; c) Melatonin; d) Oxytocin
101. The following fat-soluble vitamin is essential for absorption of calcium and also for the absorption of iron, magnesium, zinc and phosphates:  
 a) Vitamin D; b) Vitamin C; c) Vitamin E; d) Vitamin A
102. This hormone is known as the feel good hormone:  
 a) Oxytocin; b) Thyroxine; c) Insulin; d) Secretin
103. The three omega-3 fatty acids found in plant and fish oils and involved in human physiology are:  
 a) Linolenic acid, calendic acid and  $\gamma$ -linolenic acid;  
 b)  $\alpha$ -linolenic acid, eicosapentaenoic acid, and docosahexaenoic acid;  
 c) Carbonic acid, formic acid, and lactic acid;  
 d) Oleic acid, elaidic acid and gondoic acid
104. This most common carbohydrate compound is the major nutrient for energy in cells:  
 a) Lactose; b) Glucose; c) Ribose; d) Erythrose
105. Which water-soluble vitamin has a key role in the normal functioning of the brain and nervous system and has a



- structure in which a metal is at the center of a Corrin ring?  
a) Vitamin A; b) Vitamin B-2; c) Vitamin B-12; d) Vitamin K
106. How many pairs of chromosomes are found in human cells?  
a) 22; b) 23; c) 24; d) 25
107. The teeth and bones of the human body, mainly consist of the following chemical substance:  
a) Calcium phosphate; b) Calcium silicate; c) Calcium sulfate; d) Calcium carbonate
108. Hemoglobin contains the following metal as its active center:  
a) Aluminum; b) Iron; c) Copper; d) Magnesium
109. Which of the following glands secrete hormones necessary for the development of the human body?  
a) Pituitary gland; b) Thyroid gland; c) Exocrine gland; d) Sweat gland
110. The sex of each child is normally determined by the chromosome of:  
a) Male; b) Female; c) Both male and female; d) None of the above
111. Which of the following fluids formed in the stomach helps in digestion of food in humans?  
a) Hydrochloric acid; b) Gastric acid; c) Sulfuric acid; d) Nitric acid
112. The vitamin that helps in maintaining healthy blood clotting is:  
a) Vitamin K; b) Vitamin B; c) Vitamin B<sub>12</sub>; d) Vitamin D
113. DNA has the following nucleic acid structure:  
a) Single-helix; b) Double-helix; c) Multi-helix; d) Non-helical
114. What is the maximum limit of sound beyond which a person can become deaf?  
a) 60 dB; b) 50 dB; c) 70 dB; d) 120 dB
115. Which of the following is a set containing parts of the human brain?  
a) Cerebellum, cerebrum, corpus callosum; b) Ureter, urethra, urinary bladder;  
c) Artery, vein, valve, pericardium; d) Alveoli, bronchus, diaphragm
116. Which part of the human body filters fifty gallons of blood every day?  
a) Brain; b) Heart; c) Kidney; d) Muscle
117. People with the following blood group are considered to be universal recipients:  
a) AB group; b) O group; c) A group; d) B group
118. What is the single most important component of body weight and represents nearly 60% of the total weight?  
a) Muscle; b) Bone; c) Water; d) Skin
119. The following group represents parasitic worms in the human body:  
a) Hookworm, tapeworm, roundworm; b) Ringworm, threadworm, earthworm;  
c) Cabbageworm, fireworm, pinworm; d) Bloodworm, fish-worm, bookworm
120. The spinal cord is the part of the following systems in our body:  
a) Central nervous system and skeletal systems; b) Circulatory and respiratory system;  
c) Cardiovascular and endocrine systems; d) Renal and excretory systems
121. The following set contains the names of four ductless glands present in the human body:  
a) Exocrine, Sweat, Mammary, Prostate; b) Thyroid, Pituitary, Pancreas, Testis;  
c) Sublingual, Esophageal, Broncho-pulmonary, Olfactory; d) Gangland, Gland, Lumbar, Pyloric
122. What are large Y-shaped proteins produced by plasma cells that are used by the immune system to identify and neutralize and counteract the activities and the poisons produced by pathogens?  
a) Antigens; b) Antibodies; c) Antibiotics; d) Antidiuretics
123. The branch of medicine that deals with the care of women during pregnancy, childbirth, and the recuperative period following delivery is known as:  
a) Pediatrics; b) Gynecology; c) Geriatrics; d) Obstetrics
124. What is an organized profile of a person's chromosomes of a cell arranged by size and shape called?  
a) Autosome; b) Karyotype; c) Mutation; d) Duplication
125. A liquid containing antibody produced by a woman shortly after giving birth is known as:  
a) Colostrum; b) Serum; c) Sputum; d) Saliva
126. The following is a set of human body fluids:  
a) Blood Serum, Gastric acid, Albumin, Nectar;  
b) Pus, Tears, Water, Gelatin, Latex;  
c) Amniotic fluid, Breast milk, Semen, Mucus;  
d) Sebum, Sweat, Resin, Gum
127. The common blood components include the following:  
a) Albumin, Cholesterol, Glucose, Urea; b) Plasma, Platelets, WBCs, RBCs;  
c) Calcium, Creatinine, Catecholamine, Nitrite; d) Uric acid, Metanephrene, Sugar, Protein
128. The left hemisphere of the brain is responsible for the following different functions:

- a) Planning, Cognition, Perception, Aesthetics, Happiness, Positive thoughts;
- b) Emotions, Mood, Sleep, Appetite, Motivation, Reward process;
- c) Both a and b;
- d) Science, Strategy, Shapes, Stories, Pictures, Observation

#### 2.4. Biomedical Aspects [17- 30]

129. The following is the latest enzyme action model:  
 a) Working model; b) Induced-fit model; c) Structural model; d) Mathematical model
130. The following is the set of contraceptive methods:  
 a) Vasectomy, Tubectomy, Diaphragm;  
 b) Hysterectomy, Mastectomy, Lumpectomy;  
 c) Stapedectomy, Oophorectomy, Laminectomy;  
 d) Otoplasty, Rhinoplasty, Abdominoplasty
131. The following is a set of fat-soluble vitamins:  
 a) Thiamin, Riboflavin, Niacin; b) Vitamin B complex, C;  
 c) Vitamin A, D, E, K; d) Folate, Vitamin B<sub>12</sub>, Biotin
132. The following is a pair of disaccharides:  
 a) Maltose and lactose; b) Glucose and fructose;  
 c) Starch and cellulose; d) Galactose and glycogen
133. Which of the following gasses, when present in sufficient concentration in the atmosphere, can cause a headache, breathing difficulty and even death in humans?  
 a) O<sub>3</sub>; b) CO<sub>2</sub>; c) CO; d) H<sub>2</sub>S
134. The practice of intentionally ending the life of a patient suffering from an incurable disease or in an irreversible coma to relieve him of pain and suffering is known as:  
 a) Euthanasia; b) Paronomasia; c) Dysplasia; d) Antonomasia
135. Semen for the purpose of future fertilization and pregnancy is stored in:  
 a) Liquid oxygen; b) Liquid nitrogen; c) Liquid carbon dioxide; d) Dry ice
136. What does the abbreviation CPR in medicine normally stand for?  
 a) Cardiopulmonary resuscitation; b) Computerized patient record;  
 c) Code of professional responsibility; d) Cost performance report
137. Which gas forms about 21% of the atmosphere and essential for the survival of human beings?  
 a) Nitrogen; b) Carbon dioxide; c) Oxygen; d) Sulfur dioxide
138. What do you call the thermal-treatment process that destroys pathogenic microorganisms in certain foods and beverages?  
 a) Vaporization; b) Irradiation; c) Optimization; d) Pasteurization
139. The following is a list of common organs that can be donated:  
 a) Cornea, Lungs, Heart, Liver, Kidneys; b) Testicles, Ovaries, Uterus, Parathyroid;  
 c) Skeleton, Spinal cord, Teeth, Tongue; d) Skin, Eardrum, Brain, Penis
140. A United Nations agency to coordinate international healthcare activities and to help governments improve health services is known as:  
 a) White House Office; b) World Health Organization;  
 c) Global Health Association; d) International Health Organization
141. The following set consists of four main categories of causes of death in forensic medicine:  
 a) Natural, Accidental, Homicide, Suicide; b) Physical, Mental, Social, Spiritual;  
 c) Fatality, Starvation, Martyrdom, Poisoning; d) Instant, Prolonged, Merciful, Eternal
142. A drug that is not protected by the trademark of a company is called:  
 a) Patented drug; b) Generic drug; c) Brand name drug; d) Psychosomatic drug
143. The normal range of body mass index in an adult is:  
 a) 18.5 - 24.9; b) 25 -30; c) 30 - 45; d) 15 - 18.5
144. What is the term used in medical services for additional consultation with another physician?  
 a) Pathology diagnosis; b) Quality control; c) Second opinion; d) First opinion
145. This product is not available on the market, and all promising products have serious side effects:  
 a) Synthetic blood; b) Synthetic bones; c) Prosthetic hands; d) Electronic skin
146. Adulteration in edible oils that can pose serious risk to health can be tested quantitatively by:  
 a) Coulometry, Conductometry, Potentiometry;  
 b) Volumetric method, Gravimetric method, Electroanalytical method;  
 c) Acid value, Iodine value, Saponification value;

- d) Instrumental techniques, Electrogravimetry, Titre value
147. The normal shelf-life of human blood as stored in blood banks is in the range:  
a) 35-42 days; b) 45-60 days; c) 60-72 days; d) 21-33 days
148. People have the following basic seven types of intelligence:  
a) Emotional, Spiritual, Communication, Understanding, Passion, Financial and Courage Quotients;  
b) Verbal-Linguistic, musical, Logical-mathematical, Visual-spatial, Bodily-kinesthetic, intrapersonal and interpersonal intelligence;  
c) Naturalistic, Existential, Genius, Very Gifted, Superior, High average, and Average intelligence;  
d) Technical, Experience, People, Learning agility, Motivational, Intelligence, and Location quotients
149. What is the biomedical term used for a drug delivery device to produce aerosols to administer medication by respiratory route?  
a) Defibrillator; b) Ventilator; c) Nebulizer; d) Vaporizer
150. This type of smoking is 3-4 times more toxic per gram of particulate matter:  
a) Active smoking; b) Passive smoking;  
c) Third-hand smoking; d) Smokeless tobacco smoking

### 3. Conclusions

The development of biomedical technologies related to healthcare services is extremely crucial in the 21st century. It is the responsibility of each science student to be updated with biomedical facts and figures, to know the techniques of healthcare with recent advancements, to be able to provide first-aid to the injured or the sick and thus to ensure the security of the people. The active-learning items help students achieve long-term retention of the material just like powerful natural bio-active ingredients provide long-term multiple health benefits. It is essential to strive to make the method of gaining knowledge of science more interesting to help young minds to develop necessary critical and creative thinking skills. Advanced science should focus on their educational journey, including educational processes, programs, and practices, and help catalyze better performance later in their life. There are drastic changes in the learning style of tech-savvy younger generation, including self-learning, non-linear learning, use of open resources, and high-impact learning materials available on many websites. The broad objective of empowering the students with MCQs is to keep their motivation level high, enhance self-confidence and gain knowledge in the subject matter that results in long-term retention. They are good for assessing factual knowledge of learners, and they are objective in nature, eliminating the personal factor. Most online assessment programs or e-learning courses use this mode as they can be marked and scored electronically in learning management systems. This type of questionnaire will be useful in conducting corporate quiz show on the television, writing quiz books, competitive examinations, and specialized intensive skill development programs and to have an open quiz as a radio program. One can use this questionnaire at the starting point for developing their question bank models that reflect the current understanding of fundamental facts, concepts, theories, models, principles, properties and phenomena and map new and innovative subject questions of different possible types within the broad field. The educational benefits of correctly structured MCQs include continuation of the learning process by proper analysis of incorrect answers given. This questionnaire with

its new features can be used as 'learn and test supplementary model' to become familiar with fundamental skills, precise terms, core principles, key concepts of biomedical field and to develop the culture of seeking intellectual inputs guided by these questions. From the biomedical education evaluation perspective, low score (0-74) indicates a need for improvement (lowest quality), moderate score (75-119) indicates an average performance (average quality), and high score (120-150) suggests a better knowledge (best quality) in the biomedical area. Such questionnaires [31-33] can make an evaluation of self-knowledge about the particular subject easier, and a high score is a validation that the readers are on the right learning track which will inspire them to learn more to act and impact. The readers interested in obtaining further scientific information can select ten questions as the daily dose and follow the cross reference flexible learning approach to understanding different biomedical aspects.

Professional researchers focus on subtle and sophisticated details of the main principles of working of the human body and developing advanced diagnostic techniques or novel treatment strategies. The scope for expanding biomedical-related research is immense, and it has many potential applications from handheld diagnostic devices to remote controlled robotic surgical techniques, from herbal green tea decoction containing flavonoids to textiles incorporating wearable healthcare tools or feature-rich fitness trackers. The focus on the broad range of investigations from neural systems and engineering to biomaterials and bioinstrumentation contributes to the progressive development in the biomedical arena. All these can make a huge difference in the quality of healthy life, biomedical research infrastructure, and medical field services. The study of different branches of biology and medical science provides invaluable insights into the causes of diseases, symptoms, solutions to various medical problems (diseases, conditions, disorders), and preventive measures in enhancing the quality of life. Monoclonal antibody generation, cloning, and molecular biology techniques, developments in model organisms, advances in proteomics and the human genome projects have been contributing to an overall development of biomedical technology. The substitute for human skin, artificial corneas and kidney, telemedicine and remote

surgery are the latest discoveries in biomedical science and engineering. The contribution of biomedical instruments, three-dimensional medical imaging technology, image-guided computer-assisted surgery, and robotic surgery, endoscopic fetal/brain surgery, the design of the artificial protein structure and minimally invasive endoscopic surgical treatments will enhance the quality of medical care. A very prominent global trend is customizing healthcare products and services, and educational programs to address personal preferences at an individual level.

It is now clear that complete understanding of the fundamental concepts, application of models, prototypes, and processes, an inspired vision and thoughtful problem-solving approaches demonstrate the importance of biomedical field in various life-centric contexts. The recent advances in medical imaging, intelligent control, and robotic surgery, computational biology and bioinformatics, health data and modeling, and molecular dynamics simulation provided insights into specialized functions and mechanisms of complex biological systems. Synthetic metal, polymer, ceramic and semiconductor biomaterials have applications in drug delivery devices, intraocular and dental implants, bone replacements and orthopedic fixations, heart valves and skin substitutes, vascular grafts and hip replacements, biosensors and implantable microelectrodes, multisensory systems, and deep brain stimulation. Major technological breakthroughs in the medical and industrial spheres are expected shortly, and the prospects of biomedical engineering look bright in the light of these advancements. The detailed study of the toxic effects of different genetically modified products has to be conducted, and their medical benefits have to be critically evaluated. Some of the recent biomedical research areas include bio-molecular engineering and environmental toxicology, biomedical signal processing, bioinformatics data analysis, computational neuroscience, cardiovascular engineering, bio-microelectromechanical systems and nanotechnology, modern biomaterials and nanobiomaterials, tissue engineering and artificial organs, medical electronics, technologies for chronic diseases, outreach and health tracking devices, sterile services management, mechanobiology and neuroimaging and nanomedicine. Recent biomedical breakthroughs and discoveries such as heart transplant from a cadaver, skull transplant using a plastic tailor-made 3D-printed piece, arm system that controls movements, electronic skin and bionic eye, and electrosurgical unit prove that there is ample scope for further clinical research and development in the field and a bright career for the interested and inclined young minds. There is a need to evolve effective medical service mechanisms including adequate public health system equipped to deal with emergencies and create health centers that would provide multiple health care services from physical ailments to psychological disorders, and other related services from forensic department to legal advice agencies under one roof. Recent advancements in genetic engineering and genomics

are creating biological weapons using engineered 'superbugs' for destructive applications such as sabotage activities or new types of conflicts. We have to consider dedicated service seriously in the interest of delivering healthcare to the people at the bottom of the pyramid and efforts must be made to create sustainable systems including the availability of feature-packed devices or products at low cost in healthcare organizations. Young learners having an inclination towards biomedical field can proceed further by systematic and orderly practice and develop new competencies by their ability to learn and extend imaginative thinking. Those who strive to achieve a goal of a rewarding career in various institutions of study or a modern industrial organization can certainly look forward as there are plenty of opportunities to discover secrets of nature, find out-of-the-box solutions to medical problems and develop a broad range of life-enhancing as well as life-saving technologies.

#### *Answers to Questions:*

1. a 2. c 3. a 4. d 5. b 6. c 7. c 8. c 9. a 10. c 11. d 12. d 13. b 14. a 15. b
16. a 17. c 18. a 19. b 20. a 21. a 22. b 23. b 24. c 25. a 26. c 27. b 28. a 29. b 30. b
31. d 32. c 33. c 34. b 35. b 36. d 37. c 38. d 39. b 40. b 41. d 42. b 43. a 44. a 45. d
46. b 47. b 48. c 49. b 50. c 51. c 52. d 53. a 54. c 55. a 56. b 57. c 58. b 59. d 60. b
61. b 62. a 63. a 64. c 65. c 66. a 67. a 68. c 69. a 70. a 71. d 72. a 73. b 74. a 75. a
76. c 77. d 78. a 79. c 80. b 81. b 82. c 83. a 84. d 85. a 86. d 87. d 88. b 89. a 90. b
91. d 92. b 93. a 94. b 95. c 96. d 97. a 98. d 99. d 100. c 101. a 102. a 103. b 104. b 105. c
106. b 107. a 108. b 109. a 110. a 111. b 112. a 113. b 114. d 115. a
116. c 117. a 118. c 119. a 120. a 121. b 122. b 123. d 124. b 125. a
126. c 127. b 128. a 129. b 130. a 131. c 132. a 133. c 134. a 135. b
136. a 137. c 138. d 139. a 140. b 141. a 142. b 143. a 144. c 145. a
146. c 147. a 148. b 149. c 150. b

## Appendix

### *Additional Model Questions*

Some college students may prefer to skip some questions of the main quiz the first time they encounter them or in different contexts of experiential learning processes. The supplementary questions given below may be inserted at various points as unfamiliar question substitutes for a more balanced consideration of each classified topic. The appendix allows the young learner into the biomedical question box to facilitate extended learning experience, thereby enabling them to ask informed questions of science and developing content using comparative study with greater analysis capability.

1. A group of dentists and dermatologists respectively are known as:
  - a) Obstruction and delusion; b) Balance and shush; c) Keg and curse; d) Wince and rash

2. The fear of public speaking is called:
  - a) Glossophobia; b) Arachnophobia; c) Agoraphobia; d) Pathophobia
3. The following are the parts of the human digestive system:
  - a) Esophagus, colon, rectum; b) Eosinophil, erythrocyte, platelet;
  - c) Amygdala, hypothalamus, meninges; d) Cochlea, perilymph, utricle
4. A type of medication that is effective against vomiting and nausea is called:
  - a) Antipyretic; b) Anthelmintic; c) Antiemetic; d) Antitussive
5. The chemical name of vitamin E is:
  - a) Retinol; b) Calciferol; c) Tocopherol; d) Lumisterol
6. What does DNA in medical terminology stand for?
  - a) Daily news analysis; b) Deoxyribose nucleic acid;
  - c) Dynamic network analysis; d) Digital network architecture
7. The following is a set containing only recreational drugs:
  - a) Nicotine, expectorant, antifungal; b) sedatives, tranquilizers, antivirals;
  - c) Cannabis, cocaine, opium; d) Anesthetic, analgesic, antifungal
8. The human nervous system parts include the following:
  - a) Parasympathetic, sympathetic, excretory, circulatory systems;
  - b) Respiratory, innate immunity, adaptive immunity, filtration systems;
  - c) Auditory, sensory, gustatory, olfactory systems;
  - d) Autonomic, central, peripheral, cranial systems
9. The Nobel Prize, regarded as the most prestigious award, is given in the fields of literature, physics, chemistry, peace, literature, economics and -----
  - a) Engineering; b) Mathematics; c) Biology; d) Medicine or physiology
10. A medical procedure with the aim of alteration or restoring the form of the body is known as:
  - a) Plastic surgery; b) Bariatric surgery; c) Liposuction; d) Rhinoplasty

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

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