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21/9/13

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PHDURS-EE-2013
Microbiology

Code **A**

Time : 1¼ hours

Max. Marks : 100

Total Questions : 100

Candidate's Name _____ Date of Birth _____

Father's Name _____ Mother's Name _____

Roll No. _____ (in figure) _____ (in words)

Date of Examination : _____

(Signature of the candidate)

(Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION / INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. All questions are compulsory and carry equal marks.
2. All the candidates **MUST** return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such candidate will not be evaluated.
3. In case there is any discrepancy in any question(s) in the Question Booklet, the same may be brought to the notice of the Controller of Examinations **in writing within two hours** after the test is over. No such complaint(s) will be entertained thereafter.
4. The candidate **MUST NOT** do any rough work **OR** writings in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers **SHOULD NOT** be ticked in the Question book-let.
5. Use **Black OR Blue BALL POINT PEN** only in the OMR Answer-Sheet.
6. For each correct answer, the candidate will get full credit. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer. There will be no negative marking.
7. **BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC., WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.**

100%

Question No.	Questions
1.	<p>The oldest eukaryotic organisms are considered to be :</p> <p>(1) Diplomonads like Giardia (2) Archaea (3) Fungi (4) Animals</p>
2.	<p>The phospholipids present in cytoplasm membrane of the archaeo-bacteria is</p> <p>(1) Phosphoglycerides (2) Polyisoprenoid (3) Polyisoprenoid branched chain lipids (4) None of the above</p>
3.	<p>Which were the investigators lived at the same time ?</p> <p>(1) Koch and Pasteur (2) Darwin and Woese (3) A.V. Leeuwenhoek and Ricketts (4) Berg and Hooke</p>
4.	<p>The unifying feature of the archaea that distinguishes them from the bacteria is</p> <p>(1) habitats which are extreme environments with regard to acidity (2) absence of a nuclear membrane temperature (3) presence of a cell wall containing a characteristic outer membrane (4) cytoplasmic ribosomes that are 70S</p>
5.	<p>Who discovered the bacteria that cause cholera ?</p> <p>(1) Pierre Berthelot (2) Robert Koch (3) Louis Pasteur (4) Rudolf Virchow</p>

Question No.	Questions
6.	<p>The idea of selective toxicity was first proposed by</p> <p>(1) Antony van Leeuwenhoek (2) Paul Ehrlich (3) Louis Pasteur (4) Alexander Fleming</p>
7.	<p>Archeal cells usually do not contain peptidoglycan, rather contain pseudo-peptidoglycan which is mainly composed of</p> <p>(1) N-acetylmuramic acid and L-amino acids (2) N-acetylmuramic acid and D-amino acids (3) N-acetyltalosaminuronic acid and D-amino acids (4) N-acetyltalosaminuronic acid and L-amino acids</p>
8.	<p>The binomial name of a microbe is composed of</p> <p>(1) its kingdom and genus names (2) its genus name and a species modifier (3) its family and class names (4) its genus and species names</p>
9.	<p>Which of the following structures is the smallest ?</p> <p>(1) Viriod (2) Hydrogen atom (3) Bacterium (4) Mitochondrion</p>
10.	<p>Which of the following may account for the small size of the cells ?</p> <p>(1) The rate of diffusion (2) The surface area/volume ratio (3) The number of mRNAs that can be produced by the nucleus (4) All of the above</p>

Question No.	Questions
11.	<p>Which of the following bacteria lack a cell wall and are therefore resistant to penicillin ?</p> <p>(1) Cyanobacteria (2) Mycoplasmas (3) Bdellovibrios (4) Spirochetes</p>
12.	<p>Flagella move the cell by</p> <p>(1) many flagella beating in a synchronous, whip-like motion (2) an individual flagellum beating in a whip-like motion (3) spinning like a propeller (4) attaching to nearby particles and contracting</p>
13.	<p>Which of the following may contain fimbriae ?</p> <p>(1) Gram-positive bacteria (2) Gram-negative bacteria (3) Both (1) and (2) (4) None of these</p>
14.	<p>Peptidoglycan accounts for of the dry weight of cell wall in many gram positive bacteria</p> <p>(1) 50% or more (2) About 10% (3) 11%+0.22% (4) About 20%</p>
15.	<p>Peptidoglycan is also known as</p> <p>(1) N-acetyl muramic acid (2) murein mucopeptide (3) N-acetylglucosamine (4) mesodiaminopimetic acid</p>
16.	<p>The last step in synthesis of peptidoglycan is</p> <p>(1) attachment of a peptide to muramic acid (2) attaching two amino acids to form a cross-link (3) attachment of a portion of peptidoglycan to a membrane lipid (4) binding of penicillin to a membrane protein</p>

Question No.	Questions
17.	<p>Which of the following is not true about peptidoglycan ?</p> <ol style="list-style-type: none">(1) It is a polymer consisting of N-acetyl glucosamine, N-acetyl muramic acid and amino acids (alanine, lysine, etc.)(2) It is present in prokaryotic cell wall(3) It occurs in the form of a bag shaped macro molecule surrounding the cytoplasm membrane(4) None of the above
18.	<p>Gram positive cells have a</p> <ol style="list-style-type: none">(1) second outer membrane that helps to retain the crystal violet stain(2) multiple layer of peptidoglycan that helps to retain the crystal violet stain(3) thick capsule that traps the crystal violet stain(4) periplasmic space that traps the crystal violet
19.	<p>Teichoic acids are typically found in</p> <ol style="list-style-type: none">(1) cell walls of gram positive bacteria(2) outer membranes of gram positive bacteria(3) cell walls of gram negative bacteria(4) outer membranes of gram negative bacteria
20.	<p>The cell walls of Gram positive bacteria contain two modified sugar, viz. N-acetylglucosamine (NAG) and N-acetylmuramic acid (NAM). They are covalently linked by</p> <ol style="list-style-type: none">(1) α-1,4-glycosidic bond(2) β-1,6-glycosidic bond(3) α-1,6-glycosidic bond(4) β-1,4-glycosidic bond

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21.	Which of the following has Chinese letter arrangement ? (1) <i>Bacillus anthracis</i> (2) <i>Mycobacterium tuberculosis</i> (3) <i>Clostridium tetani</i> (4) <i>Corynebacterium diphtheria</i>
22.	Which of the following is not the characteristic of a growth curve ? (1) Shows development of microbial population under relatively stable environmental conditions (2) Plotted with logarithmic numbers (3) Graphs numbers of microbes versus time (4) Each growth curve consists of four distinct phases
23.	Generation time of <i>Escherichia coli</i> is (1) 20 minutes (2) 20 hours (3) 20 days (4) 200 hours
24.	Nutrient content and biological structures are considered as (1) implicit factor for microbial growth (2) intrinsic factor for microbial growth (3) processing factor (4) none of the above
25.	Lag phase is also known as (1) period of initial adjustment (2) transitional period (3) generation time (4) none of these

Question No.	Questions
26.	Which of the following is used to grow bacterial cultures continuously ? (1) Chemostat (2) Coulter Counter (3) Hemostat (4) Petroff-Hausser chamber
27.	The equation used to obtain bacterial population by binary fission is (1) $N = N_0 2^n$ (2) $\log N/N_0 = (0.3010)n$ (3) $\log(N/N_0) = n \log 2$ (4) All of these
28.	An organism has an optimal growth rate when the hydrogen ion concentration is very high. This organism is (1) osmotolerant (2) acidophile (3) neutrophile (4) aerotolerant anaerobe
29.	Which of the following procedures uses a photocell to measure absorbance of a culture to regulate the flow of culture media ? (1) Coulter Counter (2) Hemostat (3) Petroff-Hausser chamber (4) Trubidostat
30.	The reproduction by budding occur in (1) <i>Rhodopseudomonas acidophila</i> (2) <i>Hyphomicrobium vulgare</i> (3) <i>Bacillus subtilis</i> (4) Both (1) and (2)
31.	Starvation proteins are produced by a culture during which of the following segments of the growth curve ? (1) Lag phase (2) Exponential phase (3) Stationary phase (4) Death phase

Question No.	Questions
32.	<p>A spore differs from an actively replicating bacterium in that the spore</p> <ol style="list-style-type: none"> (1) is produced during a process involving asymmetric division (2) is able to withstand more extreme conditions than the replicating cell (3) is metabolically inactive (4) all of the above
33.	<p>The ability of <i>Vibrio fischeri</i> to produce bioluminescence chemicals only when a certain population density has been reached is an example of</p> <ol style="list-style-type: none"> (1) Liebig's law of the minimum (2) Shelford's law of tolerance (3) Quorum sensing (4) Heisenberg's principle of uncertainty
34.	<p>A culture broth tube was very turbid at the surface but clear throughout the rest of the tube indicating that the</p> <ol style="list-style-type: none"> (1) organisms are aerobes (2) organism should be grown in an anaerobic chamber (3) organism cannot produce superoxide dismutase and/or catalase (4) organism cannot tolerate oxygen
35.	<p>Generation time is</p> <ol style="list-style-type: none"> (1) time required for the population to double (2) time required for the initial adjustment (3) obtained by expression t/n, where t = time interval, n = number of generation (4) both (1) and (3)

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36.	<p><i>Pseudomonas pseudoflava</i> can grow as</p> <p>(1) chemo-lithotrophs (2) chemo-organotrophs</p> <p>(3) both (1) and (2) (4) none of these</p>
37.	<p>The combination of low levels of NaCl, NaNO₃ (sodium nitrate), and slightly acid pH can prevent multiplication and toxin formation of</p> <p>(1) <i>Salmonella</i> (2) <i>S.aureus</i></p> <p>(3) <i>C.botulinum</i> (4) all of these</p>
38.	<p>Allosteric enzymes are</p> <p>(1) larger than simple enzyme</p> <p>(2) smaller than simple enzyme</p> <p>(3) larger and more complex than simple enzyme</p> <p>(4) smaller than simple enzyme but not complex</p>
39.	<p>Isozymes or iso enzymes are those enzyme which</p> <p>(1) have same structure forms</p> <p>(2) have different structural forms but identical catalytic properties</p> <p>(3) catalyses oxidation reactions</p> <p>(4) none of these</p>
40.	<p>Enzymes can</p> <p>(1) not pass through semipermeable membrane</p> <p>(2) pass through semipermeable membrane</p> <p>(3) dissolve semipermeable membrane</p> <p>(4) none of these</p>

Question No.	Questions
41.	<p>Which of the following theory is supported by the genomic sequence of the obligate intracellular parasite <i>Rickettsia prowazekii</i> ?</p> <p>(1) Parasitic bacteria have very large genomes (2) Parasites have a definite genomic sequence similar to viruses (3) Mitochondria have evolved from endosymbiotic bacteria (4) All bacteria evolved from viruses</p>
42.	<p>The physical nature of genomes is studied under</p> <p>(1) structural genomics (2) comparative genomics (3) proteo genomics (4) functional genomics</p>
43.	<p>The species of bacteria, which possesses 250 genes for lipid biosynthesis is</p> <p>(1) <i>M. genitalium</i> (2) <i>M. tuberculosis</i> (3) <i>E.coli</i> (4) <i>H.Influenza</i></p>
44.	<p>Which type of genomics studies the transcripts and proteins expressed by a genome ?</p> <p>(1) Comparative genomics (2) Structural genomics (3) Proteo genomics (4) Functional genomics</p>
45.	<p>The word, used for the small solid supports onto which are spotted hundreds of thousands of tiny drops of DNA that can be used to screen expression, is</p> <p>(1) southern blot (2) cloning library (3) DNA microarrays (4) northern blot</p>

Question No.	Questions
46.	<p>Which of the following organisms has the smallest genome ?</p> <p>(1) <i>H. influenzae</i> (2) <i>M. genitalium</i> (3) <i>M. tuberculosis</i> (4) None of these</p>
47.	<p>Why <i>Deinococcus radiodurans</i> is able to survive massive exposure to radiation ?</p> <p>(1) Because it produces a thick shell which acts as a shield from the radiation (2) Because it has unique DNA repair mechanisms (3) Because its cell wall contains radioactive elements (4) Because it has many copies of genes encoding DNA repair</p>
48.	<p>Which of the following is used for determining the location of specific genes within the genome ?</p> <p>(1) Genomics (2) Annotation (3) Cloning (4) Proteomics</p>
49.	<p>The main difference between a self-transmissible and a mobilizable plasmid is that the self-transmissible plasmid</p> <p>(1) transfers both strands of the plasmid DNA (2) carries genes encoding the mating apparatus (3) transfers antibiotic resistance genes (4) usually has a transposon inserted into it</p>

Question No.	Questions
50.	<p>Which of the following statement(s) is/are true in regards to $F^+ \times F^-$ mating events ?</p> <ol style="list-style-type: none"> (1) DNA is transferred from F^- to F^+ cells (2) DNA is transferred from F^+ to F^- cells (3) No DNA is transferred because F^- cells are unable to perform conjugation (4) No DNA is transferred because F^+ cells are unable to perform conjugation
51.	<p>When composite transposons are formed</p> <ol style="list-style-type: none"> (1) A small deletion occurs in the transposase gene of an IS element (2) A small deletion occurs in the transposase gene of an IS element and plasmid is integrated (3) An IS element integrates with another IS element with the help of a plasmid (4) Two IS elements integrate into a chromosome with only a small distance separating them
52.	<p>The expression of gene X (which has promoter P_x) is to be monitored. A gene fusion construction for carrying this work will</p> <ol style="list-style-type: none"> (1) have P_x but not the rest of the X coding region (2) have the promoter of lacZ or some other reporter gene (3) allow to monitor the expression of all genes with a promoter similar in sequence to P_x (4) give the same information as from a microarray

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53.	When the fermentation of fructose results in the bitter product mannitol, the fermentation is sometime termed as (1) mannikic (2) mannitic (3) amertume (4) none of these
54.	Gassiness resulting from the liberation of carbon dioxide by hetero fermentative lactics is called (1) pousse (2) amertume (3) mannitic (4) none of these
55.	<i>S. patorians</i> can cause (1) cloudiness in beer (2) ester like taste in beer (3) stringent taste in beer (4) bitter taste
56.	The <i>Candida</i> species require fermentation equipment lined with plastic because they are extremely sensitive to (1) traces of cobalt (2) traces of nickel (3) traces of iron (4) none of these
57.	Cycloserine may be isolated from the cultures of (1) <i>S. orchidaceus</i> (2) <i>S. lavendulae</i> (3) <i>S. garyphalus</i> (4) All of these
58.	It is mandatory that cultures and fermentation residues be sterilized before discard in case of <i>Eremothecium ashbyii</i> and <i>Ashbya gossypii</i> because they are (1) plant pathogens (2) human pathogens (3) plant mutants (4) none of these

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59.	The biotin level in obtaining L-glutamic acid by fermentation using <i>Micrococcus glutamicus</i> is critical because (1) too low level prevents growths, hence L-glutamic acid production (2) too high level prevents L-glutamic acid production (3) both (1) and (2) (4) none of the above
60.	The sugar concentration of molasses used in fermentation should be (1) 10-18% (2) 20-30% (3) 4-5% (4) 30-38%
61.	Which of the following lymphokine(s) is secreted by delayed-type-hypersensitivity cells ? (1) Macrophage stimulating factor (2) Migration inhibiting factor (3) Macrophage activating factor (4) All of the above
62.	Which of the following is an example of autoimmune disease ? (1) Rheumatoid arthritis (2) Systemic lupus erythematosus (3) Polyarteritis nodosa (4) All of the above
63.	Lens antigens of the eye are (1) cross-reacting antigens (2) sequestered antigens (3) neoantigens (4) none of these

Question No.	Questions
64.	<p>In which of the following cell mediated immunity (CMI) participates ?</p> <p>(1) Delayed hypersensitivity reaction</p> <p>(2) Graft versus host reaction</p> <p>(3) Allograft rejection</p> <p>(4) All of the above</p>
65.	<p>Negative phase is observed in</p> <p>(1) secondary humoral response</p> <p>(2) primary humoral response</p> <p>(3) both (1) and (2)</p> <p>(4) none of the above</p>
66.	<p>Which of the following is correct for CD8 T cells ?</p> <p>(1) CD8 T cells only recognize virus-infected cells</p> <p>(2) CD8 T cell receptor recognizes epitopes that are also commonly recognized by B cells</p> <p>(3) In the thymus, CD8 T cells undergo positive selection only, whereas CD4 T cells undergo negative selection only</p> <p>(4) CD8 T cells can kill individual virus-infected cells in a contact dependent fashion</p>
67.	<p>Passive immunization is done for</p> <p>(1) tuberculosis (2) diphtheria</p> <p>(3) enteric fever (4) all of these</p>

Question No.	Questions
68.	<p>Which of the following is correct for isoantigens ?</p> <p>(1) They are antigens found in all members of different species</p> <p>(2) They are antigens found in some members of a species</p> <p>(3) They are antigens found in all members of a species</p> <p>(4) They are antigens found in some members of different species</p>
69.	<p>Numerous antibodies can be prepared, against one antigen, each binds to unique epitopes. How is this antibody diversity generated ?</p> <p>(1) By rearrangements of the DNA encoding the variable regions the heavy and light chains</p> <p>(2) By the combination of different heavy and light chains that form the antigen binding site</p> <p>(3) Antibody proteins can physically change their shape to bind different epitopes</p> <p>(4) Both (1) and (2)</p>
70.	<p>Which is not an antigen-presenting cell (or APC) ?</p> <p>(1) B cell</p> <p>(2) Polymorphonuclear leukocyte (or PMN)</p> <p>(3) Dendritic cell</p> <p>(4) All of the above</p>
71.	<p>Which of the following characteristic of the Rotavirus was important for the construction of the Rotashield vaccine ?</p> <p>(1) The possession of a segmented RNA genome</p> <p>(2) A limited number of capsule types</p> <p>(3) The ability of monkey Rotavirus strains to cause illness (diarrhoea) in human beings</p> <p>(4) The ability of the Rotavirus to be transmitted faster</p>

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72.	<p>The nature of the poliovirus given for oral vaccination (satin vaccine) as part of the eradication programme is</p> <p>(1) heat killed virus (2) live attenuated strains of all three immunological types (3) small dosage of wild-type live viruses (4) formalin-inactivated viruses</p>
73.	<p>Which of the following is true regarding anthrax ?</p> <p>(1) Anthrax is caused by a virus (2) Anthrax is highly contagious (3) Inhalation anthrax and cutaneous anthrax are caused by separate strains of <i>Bacillus anthracis</i> (4) Inhalation Anthrax requires infection with a large number of spores</p>
74.	<p>The "A" subunit of diphtheria toxin</p> <p>(1) binds host cell receptors found on heart cells (2) cause ADP ribosylation of a factor involved in protein synthesis (3) forms cAMP that leads to fluid accumulation (4) lysis macrophages with the release of cytokines</p>
75.	<p>Which of the following disease is caused by DNA viruses ?</p> <p>(1) Poliomyelitis (2) Yellow fever (3) Measles (4) Small pox</p>

Question No.	Questions
76.	<p>Which of the following is common in the disease caused by <i>Coryne-bacterium diphtheriae</i> and <i>Bacillus anthracis</i> ?</p> <p>(1) Both organisms are gram-positive spore formers (2) Diphtheria toxin and edema toxin are ADP ribosylating toxins (3) The most serious disease symptoms are the direct result of toxin action (4) Both organisms cause skin and respiratory tract infections</p>
77.	<p>In the human disease cholera, what is it that actually ends up killing the victim ?</p> <p>(1) Faulty carrier proteins (2) Dehydration and loss of nutrients (3) Too little water in the food stream (4) The toxin produced by the bacterium</p>
78.	<p>The PCR/sequencing approach to rRNA is most likely to give information about</p> <p>(1) the species to which the bacteria are most closely related (2) morphology of the bacterium (3) the type of energy metabolism the bacterium has (4) whether the bacterium is motile</p>
79.	<p>The efficiency of amplification in PCR.in later cycles is reduced due to</p> <p>(1) reduction in substrate concentration (2) insufficient enzyme and time to synthesize mass quantity of DNA (3) build up of PCR product which competes with primers for hybrid formation (4) all of these</p>

Question No.	Questions
80.	RNA populations can also be used as PCR templates after reverse transcription into (1) c DNA (2) t RNA (3) m DNA (4) r RNA
81.	The cloning step in PCR/sequencing analysis of microbial communities is necessary for (1) the amplification process (2) preventing contamination by outside DNA (3) separating the different rRNA gene sequences in the mixture (4) none of these
82.	The template for PCR is (1) RNA (2) single stranded DNA (3) double stranded DNA (4) none of these
83.	In DNA sequencing, the primer (1) specifies where the sequence ends (2) specifies where the sequence begins (3) both (1) and (2) (4) generates variety of different sized fragments
84.	Which of the following would indicate that a dataset is not bell-shaped ? (1) The range is equal to 5 standard deviations (2) The range is larger than the interquartile range (3) The mean is much smaller than the median (4) There are no outliers

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85.	<p>The value of a correlation is reported by a researcher to $r = -0.5$. Which of the following statements is correct ?</p> <p>(1) The x-variable explains 25% of the variability in the y-variable (2) The x-variable explains -25% of the variability in the y-variable (3) The x-variable explains 50% of the variability in the y-variable (4) The x-variable explains -50% of the variability in the y-variable</p>
86.	<p>One use of a regression line is</p> <p>(1) To determine if any x-values are outliers (2) To determine if any y-values are outliers (3) To determine if a change in x causes a change in y (4) To estimate if a change in y for a one-unit change in x</p>
87.	<p>Which of the following relationships between absorbance and % transmittance is incorrect ?</p> <p>(1) $A = \log_{10} 100 / \%T$ (2) $A = 2 - \log_{10} \% T$ (3) $A = \log_{10} 1 / T$ (4) All are correct</p>
88.	<p>The growth of an organism on glucose is described by the following Monod model parameters $\mu_m = 0.5 \text{ h}^{-1}$ and $K_s = 0.1 \text{ g.l}^{-1}$, if the concentration of glucose in the feed is 10 g.l^{-1} and the dilution rate is set to 0.4 h^{-1}, then the steady state concentration of glucose in the effluent will be</p> <p>(1) 0 g.l^{-1} (2) 0.5 g.l^{-1} (3) 1.0 g.l^{-1} (4) 10 g.l^{-1}</p>

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89.	Bioinformatics is the application of computer technology and statistical techniques to the study of biological information. Bioinformatics can <ul style="list-style-type: none"> (1) Compare our genome to that of a monkey (2) Depend on computer technology (3) Assist genomics and proteomics and match up genes with proteins (4) All of these are correct
90.	Which is a true statement ? <ul style="list-style-type: none"> (1) Genomics has now moved on to functional and comparative genomics (2) Genomics shows that we are related to other organisms and it would be slow going without bioinformatics (3) Genomics is related to the field of proteomics (4) All of these are correct
91.	The term bioinformatics was coined by <ul style="list-style-type: none"> <li style="width: 50%;">(1) J D Watson <li style="width: 50%;">(2) Margaret Dayhoff <li style="width: 50%;">(3) Pauline Hogeweg <li style="width: 50%;">(4) Frederic Sanger
92.	Margaret Dayhoff developed the first protein sequence database called <ul style="list-style-type: none"> (1) SWISS PROT (2) PDB (3) Atlas of protein sequence and structure (4) Protein sequence databank
93.	NCBI was established in <ul style="list-style-type: none"> <li style="width: 50%;">(1) 1988 <li style="width: 50%;">(2) 1989 <li style="width: 50%;">(3) 1990 <li style="width: 50%;">(4) 1991

Question No.	Questions
99.	Literature databases include (1) MEDLINE and PubMed (2) MEDLINE and PDB (3) PubMed and PDB (4) MEDLINE and PDS
100.	The first secondary database developed was (1) PRINTS (2) PROSITE (3) PDB (4) PIR