Sr. No. 10074

Bijender Singh
21/9/13

Singh
21/9/1

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PHDURS-EE–2013
Microbiology

Code **B**

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)

Question No.	Questions
1.	Which of the following bacteria lack a cell wall and are therefore resistant to penicillin ? (1) Cyanobacteria (2) Mycoplasmas (3) Bdellovibrios (4) Spirochetes
2.	Flagella move the cell by (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
3.	Which of the following may contain fimbriae ? (1) Gram-positive bacteria (2) Gram-negative bacteria (3) Both (1) and (2) (4) None of these
4.	Peptidoglycan accounts for .... of the dry weight of cell wall in many gram positive bacteria (1) 50% or more (2) About 10% (3) 11%+0.22% (4) About 20%
5.	Peptidoglycan is also known as (1) N-acetyl muramic acid (2) murein mucopeptide (3) N-acetylglucosamine (4) mesodiaminopimetic acid
6.	The last step in synthesis of peptidoglycan is (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

Question No.	Questions
7.	Which of the following is not true about peptidoglycan ?
	(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
8.	Gram positive cells have a
	(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
9.	Teichoic acids are typically found in
	(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
10.	The cell walls of Gram positive bacteria contain two modified sugar, viz. N-acetylgucosamine (NAG) and N-acetylmuramic acid (NAM). They are covalently linked by
	(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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11.	The oldest eukaryotic organisms are considered to be : (1) Diplomonads like Giardia (2) Archaea (3) Fungi (4) Animals
12.	The phospholipids present in cytoplasm membrane of the archaeo-bacteria is (1) Phosphoglycerides (2) Polyisoprenoid (3) Polyisoprenoid branched chain lipids (4) None of the above
13.	Which were the investigators lived at the same time ? (1) Koch and Pasteur (2) Darwin and Woese (3) A.V. Leeuenhoek and Ricketts (4) Berg and Hooke
14.	The unifying feature of the archaea that distinguishes them from the bacteria is (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
15.	Who discovered the bacteria that cause cholera ? (1) Pierre Berthelot (2) Robert Koch (3) Louis Pasteur (4) Rudolf Virchow

Question No.	Questions
16.	The idea of selective toxicity was first proposed by (1) Antony van Leeuwenhoek (2) Paul Ehrlich (3) Louis Pasteur (4) Alexander Fleming
17.	Archeal cells usually do not contain peptidoglycan, rather contain pseudo-peptidoglycan which is mainly composed of (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
18.	The binomial name of a microbe is composed of (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
19.	Which of the following structures is the smallest ? (1) Viriod (2) Hydrogen atom (3) Bacterium (4) Mitochondrion
20.	Which of the following may account for the small size of the cells ? (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

Question No.	Questions
21.	The term bioinformatics was coined by (1) J D Watson (2) Margaret Dayhoff (3) Pauline Hogeweg (4) Frederic Sanger
22.	Margaret Dayhoff developed the first protein sequence database called (1) SWISS PROT (2) PDB (3) Atlas of protein sequence and structure (4) Protein sequence databank
23.	NCBI was established in (1) 1988 (2) 1989 (3) 1990 (4) 1991
24.	A compound that has desirable properties to become a drug is called (1) lead (2) find (3) fit drug (4) fit compound
25.	The process of finding relative location of genes on a chromosome is called (1) gene tracing (2) genome mapping (3) genome walking (4) chromosome walking
26.	Proteomics is the study of (1) set of proteins (2) set of proteins in a specific region of the cell (3) entire set of expressed proteins in a cell (4) none of these

Question No.	Questions
27.	The computational methodology that tries to find the best matching between two molecule, a receptor and ligand is called (1) molecular matching (2) molecular docking (3) molecular fitting (4) molecule affinity checking
28.	Application of bioinformatics include (1) data storage and management (2) drug designing (3) understand relationships between organisms (4) all of the above
29.	Literature databases include (1) MEDLINE and PubMED (2) MEDLINE and PDB (3) PubMED and PDB (4) MEDLINE and PDS
30.	The first secondary database developed was (1) PRINTS (2) PROSITE (3) PDB (4) PIR
31.	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

Question No.	Questions
32.	The template for PCR is (1) RNA (2) single stranded DNA (3) double stranded DNA (4) none of these
33.	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
34.	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
35.	The value of a correlation is reported by a researcher to r = –0.5. Which of the following statements is correct ? (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
36.	One use of a regression line is (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

Question No.	Questions
37.	Which of the following relationships between absorbance and % transmittance is incorrect ? (1) $A = \log_{10} 100 / \%T$ (2) $A = 2 - \log_{10} \% \, T$ (3) $A = \log_{10} 1 / T$ (4) All are correct
38.	The growth of an organism on glucose is described by the following Monod model parameters $\mu m = 0.5$ h-1 and $Ks = 0.1$ g.1-1, if the concentration of glucose in the feed is 10 g.1-1 and the dilution rate is set to 0.4 h-1, then the steady state concentration of glucose in the effluent will be (1) 0 g.1^{-1} (2) 0.5 g.1^{-1} (3) 1.0 g.1^{-1} (4) 10 g.1^{-1}
39.	Bioinformatics is the application of computer technology and statistical techniques to the study of biological information. Bioinformatics can (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
40.	Which is a true statement ? (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

Question No.	Questions
41.	Which of the following characteristic of the Rotavirus was important for the construction of the Rotashield vaccine ? (1) The possession of a segmented RNA genome (2) A limited number of capsule types (3) The ability of monkey Rotavirus strains to cause illness (diarrhoea) in human beings (4) The ability of the Rotavirus to be transmitted faster
42.	The nature of the poliovirus given for oral vaccination (satin vaccine) as part of the eradication programme is (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
43.	Which of the following is true regarding anthrax ? (1) Anthrax is caused by a virus (2) Anthrax is highly contagious (3) Inhalation anthrax and cutaneous anthrax are caused by separate strains of Bacillus anthracis (4) Inhalation Anthrax requires infection with a large number of spores
44.	The "A" subunit of diphtheria toxin (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

Question No.	Questions
45.	Which of the following disease is caused by DNA viruses ? (1) Poliomyelitis (2) Yellow fever (3) Measles (4) Small pox
46.	Which of the following is common in the disease caused by *Coryne-bacterium diphtheriae* and *Bacillus anthracis* ? (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
47.	In the human disease cholera, what is it that actually ends up killing the victim ? (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
48.	The PCR/sequencing approach to rRNA is most likely to give information about (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

Question No.	Questions
49.	The efficiency of amplification in PCR in later cycles is reduced due to (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
50.	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
51.	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
52.	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
53.	Lens antigens of the eye are (1) cross-reacting antigens (2) sequestrated antigens (3) neoantigens (4) none of these

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

Question No.	Questions
58.	Which of the following is correct for isoantigens ? (1) They are antigens found in all members of different species (2) They are antigens found in some members of a species (3) They are antigens found in all members of a species (4) They are antigens found in some members of different species
59.	Numerous antibodies can be prepared, against one antigen, each binds to unique epitopes. How is this antibody diversity generated ? (1) By rearrangements of the DNA encoding the variable regions the heavy and light chains (2) By the combination of different heavy and light chains that form the antigen binding site (3) Antibody proteins can physically change their shape to bind different epitopes (4) Both (1) and (2)
60.	Which is not an antigen-presenting cell (or APC) ? (1) B cell (2) Polymorphonuclear leukocyte (or PMN) (3) Dendritic cell (4) All of the above
61.	When composite transposons are formed (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

Question No.	Questions
62.	The expression of gene X (which has promoter Px) is to be monitored. A gene fusion construction for carrying this work will (1) have Px 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 Px (4) give the same information as from a microarray
63.	When the fermentation of fructose results in the bitter product mannitol, the fermentation is sometime termed as (1) mannkic (2) mannitic (3) amertume (4) none of these
64.	Gassiness resulting from the liberation of carbon dioxide by hetero fermentative lactics is called (1) pousse (2) amertume (3) mannitic (4) none of these
65.	*S. patorianns* can cause (1) cloudiness in beer (2) ester like taste in beer (3) stringent taste in beer (4) bitter taste
66.	The *Candida* 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

Question No.	Questions
67.	Cycloserine may be isolated from the cultures of (1) *S. orchidaceus* (2) *S. lavendulae* (3) *S. garyphalus* (4) *All of these*
68.	It is mandatory that cultures and fermentation residues be sterilized before discard in case of *Eremothecium ashbyii* and *Ashbya gossypii* because they are (1) plant pathogens (2) human pathogens (3) plant mutants (4) none of these
69.	The biotin level in obtaining L-gluatmic acid by fermentation using *Micrococcus glutamicus* 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
70.	The sugar concentration of molasses used in fermentation should be (1) 10-18% (2) 20-30% (3) 4-5% (4) 30-38%
71.	Which of the following theory is supported by the genomic sequence of the obligate intracellular parasite *Rickettsia prowazekii* ? (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

Question No.	Questions
72.	The physical nature of genomes is studied under (1) structural genomics (2) comparative genomics (3) proteo genomics (4) functional genomics
73.	The species of bacteria, which possesses 250 genes for lipid biosynthesis is (1) *M. genitalium* (2) *M. tuberculosis* (3) *E.coli* (4) *H.Influenza*
74.	Which type of genomics studies the transcripts and proteins expressed by a genome ? (1) Comparative genomics (2) Structural genomics (3) Proteo genomics (4) Functional genomics
75.	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 (1) southern blot (2) cloning library (3) DNA microarrays (4) northern blot
76.	Which of the following organisms has the smallest genome ? (1) *H. influenzae* (2) *M.genitalium* (3) *M. tuberculosis* (4) None of these

Question No.	Questions
77.	Why *Deinococcus radiodurans* is able to survive massive exposure to radiation ? (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
78.	Which of the following is used for determining the location of specific genes within the genome ? (1) Genomics (2) Annotation (3) Cloning (4) Proteomics
79.	The main difference between a self-transmissible and a mobilizable plasmid is that the self-transmissible plasmid (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
80.	Which of the following statement(s) is/are true in regards to F+ x F– mating events ? (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

Question No.	Questions
81.	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
82.	A spore differs from an actively replicating bacterium in that the spore (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
83.	The ability of *Vibrio fischeri* to produce bioluminescence chemicals only when a certain population density has been reached is an example of (1) Liebig's law of the minimum (2) Shelford's law of tolerance (3) Quorum sensing (4) Heisenberg's principle of uncertainty
84.	A culture broth tube was very turbid at the surface but clear throughout the rest of the tube indicating that the (1) organisms are aerobes (2) organism should be grown in an anaerobic chamber (3) organism cannot produce superoxide dismutase and/or catalse (4) organism cannot tolerate oxygen

Question No.	Questions
85.	Generation time is (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)
86.	*Pseudomonas pseudoflava* can grow as (1) chemo-lithotrophs (2) chemo-organotrophs (3) both (1) and (2) (4) none of these
87.	The combination of low levels of NaCl, $NaNO_3$ (sodium nitrate), and slightly acid pH can prevent multiplication and toxin formation of (1) *Salmonella* (2) *S. aureus* (3) *C. botulinum* (4) all of these
88.	Allosteric enzymes are (1) larger than simple enzyme (2) smaller than simple enzyme (3) larger and more complex than simple enzyme (4) smaller than simple enzyme but not complex
89.	Isozymes or iso enzymes are those enzyme which (1) have same structure forms (2) have different structural forms but identical catalytic properties (3) catalyses oxidation reactions (4) none of these

Question No.	Questions
90.	Enzymes can (1) not pass through semipermeable membrane (2) pass through semipermeable membrane (3) dissolve semipermeable membrane (4) none of these
91.	Which of the following has Chinese letter arrangement ? (1) *Bacillus anthracis* (2) *Mycobacterium tuberculosis* (3) *Clostridium tetani* (4) *Corynebacterium diphtheria*
92.	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
93.	Generation time of *Escherichia coli* is (1) 20 minutes (2) 20 hours (3) 20 days (4) 200 hours
94.	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

Question No.	Questions
95.	Lag phase is also known as (1) period of initial adjustment (2) transitional period (3) generation time (4) none of these
96.	Which of the following is used to grow bacterial cultures continuously ? (1) Chemostat (2) Coulter Counter (3) Hemostat (4) Petroff-Hausser chamber
97.	The equation used to obtain bacterial population by binary fission is (1) $N = N_o 2^n$ (2) $\log N/N_o = (0.3010)n$ (3) $\log(N/N_o) = n\log 2$ (4) All of these
98.	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
99.	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

Question No.	Questions
100.	The reproduction by budding occur in (1) *Rhodopseudomonas acidophila* (2) *Hyphomicrobium vulgare* (3) *Bacillus subtilis* (4) *Both (1) and (2)*