487/BT
12/8/2025

DEPARTMENT OF BIOTECHNOLOGY

Guru Nanak Dev University, Amritsar
(Established by State Legislature Act No.21 of 1969)
Accredited at "A" grade level by NAAC and awarded
"University with Potential for Excellence" status by UGC

Subject : Result of Ph.D. Eligibility Test August-2025

S. No.	Roll No.	Name of candidate	Father's Name	Mother's Name	Category	Qualified/ Not qualified
1	89001	Agampreet Singh Dadial	Jasbir Singh Dadial	Manjit Kaur Dadial	General (O/S) Punjab	Not qualified
2	89002	Jagjit Kaur	Jagjiwan Singh	Jasbir Kaur	SC	Not qualified
3	89003	Prabhjot Kaur	Sukhdev Singh	Bhupinder Kaur	Backward Classes/OBC	Not qualified

12/8/2025
(Dr. P.K. Pati)
Prof. & Head

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GURU NANAK DEV UNIVERSITY, AMRITSAR

Ph.D Eligibility Test – August, 2025

August 8th, 2025

Subject: Biotechnology

Time : 10:30 am – 1:00 pm **Max Marks : 100**

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

Name: _____

_____ _____

Signature of the Candidate Signature of the Supervisor

Instructions to candidates

1. The question Paper –I will consist of 15 multiple choice questions of general aptitude and Paper-II will consist of 40 multiple choice subject specific questions (each carrying 1 mark) are to be attempted on the OMR sheet and 9 short answer type question out of 20 (each carrying 5 marks) to be attempted on answer sheet.

2. Please check that all the pages of the question paper and response sheet provided to you are in order and they are intact and well printed.

3. There is no negative marking.

4. Fill up the information required on this page correctly. Write down your roll number (in figures, in words and by shading the appropriate circles) signatures on the OMR sheet. In the response sheet, there is no need to fill up the columns for code and serial number.

5. Ensure that both the question paper and response sheet are duly stamped and the response sheet is signed by the supervisor.

6. Please use only black gel/sketch pen for filling up your choices on the response sheet. Shade the circles completely. You may make choices A, B, C or D for the questions that you wish to attempt.

7. Possession and use of mobile phones, pagers or any other gadget that could help you in attempting the question paper is strictly prohibited. Scientific calculator is allowed.

Paper – I

(General Aptitude)

Note : Attempt all the questions. Each question Carries 1 mark.

1. Two trains running in opposite directions cross a man standing on the platform in 27 seconds and 17 seconds respectively and they cross each other in 23 seconds. The ratio of their speeds is:

A)	1 : 3	B)	3 : 2
C)	3 : 4	D)	None of these

2. Pointing to a photograph of a boy Suresh said, "He is the son of the only son of my mother." How is Suresh related to that boy?

A)	Brother	B)	Uncle
C)	Cousin	D)	Father

3. A, P, R, X, S and Z are sitting in a row. S and Z are in the centre. A and P are at the ends. R is sitting to the left of A. Who is to the right of P ?

A)	A	B)	X
C)	S	D)	Z

4. **Statements:** Some actors are singers. All the singers are dancers.
Conclusions:
1. Some actors are dancers.
2. No singer is actor.

A)	Only (1) conclusion follows	B)	Only (2) conclusion follows
C)	Either (1) or (2) follows	D)	Neither (1) nor (2) follows

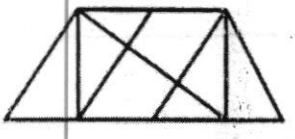
5. Look at this series: 664, 332, 340, 170, ____, 89, ... What number should fill the blank?

A)	85	B)	97
C)	109	D)	178

6. A father said to his son, "I was as old as you are at the present at the time of your birth". If the father's age is 38 years now, the son's age five years back was:

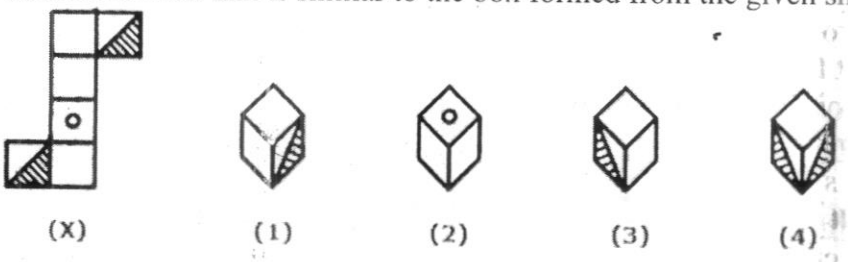
A)	14 years	B)	19 years
C)	33 years	D)	38 years

7. Find the number of triangles in the given figure.



A)	8	B)	10
C)	12	D)	14

8. Choose the box that is similar to the box formed from the given sheet of paper (X).



A)	1 and 3 only	B)	1 and 4 only
C)	2 and 4 only	D)	3 and 4 only

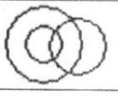
9. A bank offers 5% compound interest calculated on half-yearly basis. A customer deposits Rs. 1600 each on 1st January and 1st July of a year. At the end of the year, the amount he would have gained by way of interest is:

A)	Rs. 120	B)	Rs. 121
C)	Rs. 122	D)	Rs. 123

10. In one hour, a boat goes 11 km/hr along the stream and 5 km/hr against the stream. The speed of the boat in still water (in km/hr) is:

A)	3 km/hr	B)	5 km/hr
C)	8 km/hr	D)	9 km/hr

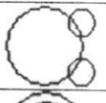
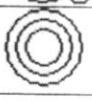
11. Which of the following diagrams indicates the best relation between Women, Mothers and Engineers ?

A)		B)	
C)		D)	

12. A can do a work in 15 days and B in 20 days. If they work on it together for 4 days, then the fraction of the work that is left is :

A)	1/41	B)	1/10
C)	8/15	D)	7/15

13. Which of the following diagrams indicates the best relation between Factory, Product and Machinery ?

A)		B)	
C)		D)	

14.	**Statements:** 1. The prices of petrol and diesel in the domestic market have remained unchanged for the past few months. 2. The crude oil prices in the international market have gone up substantially in the last few months.			
	A)	Statement I is the cause and statement II is its effect	B)	Statement II is the cause and statement I is its effect
	C)	Both the statements I and II are independent causes	D)	Both the statements I and II are effects of independent causes
15.	The length of a rectangle is halved, while its breadth is tripled. What is the percentage change in area?			
	A)	25% increase	B)	50% decrease
	C)	50% increase	D)	75% decrease

Paper – II

Subject: Biotechnology

Note: Attempt all the questions. Each question Carries 1 mark.

16.	**The antibiotic among the following which has a beta-lactam ring is**			
	A)	Streptomycin	B)	Tetracycline
	C)	Penicillin	D)	Gentamicin
17.	**The large (Klenow) fragment of E. coli DNA polymerase I contains which of the following activities?**			
	A)	Reverse transcriptase activity and nick translation activity	B)	Polymerase activity and 3'-5' exonuclease activity
	C)	Polymerase activity and nick translation activity	D)	5'-3' exonuclease activity
18.	**Ecological equivalent describes**			
	A)	group of species with comparable roles	B)	species that occupy the same niche in different geographical regions
	C)	diversity of habitats	D)	Social behaviors that enhance the fitness of other individuals in the population
19.	**Na+-K+ pump is example of**			
	A)	V-type ATPase	B)	P-type ATPase
	C)	F- type ATPase	D)	ABC transporter
20.	**The yolk plug is formed by protrusion of**			
	A)	Blastomere	B)	Ectodermal cells
	C)	Mesodermal cells	D)	Endodermal cells
21.	**Name the enzyme that catalyze the conversion of phosphophenol pyruvate (PEP) to pyruvate in glycolysis**			
	A)	PEP carboxylase	B)	Pyruvate carboxylase
	C)	Enolase	D)	Pyruvate kinase
22.	**Enormous diversity of protein molecules is due to**			
	A)	sequence of amino acids	B)	R- group of amino acids
	C)	peptide bond	D)	amino group of amino acids
23.	**The arthropod exoskeleton is composed of a**			
	A)	Mixture of several kinds of polysaccharides	B)	Mixture of several kinds of proteins
	C)	Single complex protein called arthropodin	D)	Mixture of layers of proteins and polysaccharide called chitin

24.	**Which of the following is the fermented food produced from cabbage?**			
	A)	Sauerkraut	B)	Kenkey
	C)	Gari	D)	Sufu
25.	**Which statement about brown fat is true?**			
	A)	It produces heat without producing ATP	B)	It insulates animals acclimatized to cold
	C)	It provides fuel for muscle cells	D)	It is found only in hibernators
26.	**The exine of mature pollen grain is composed chiefly of**			
	A)	lipids	B)	cellulose
	C)	pectocellulose	D)	sporopollenin
27.	**What is net production of ATP in glycolysis?**			
	A)	4 ATP	B)	2 ATP
	C)	6 ATP	D)	3 ATP
28.	***Escherichia coli* is used as an indicator organism to determine pollution of water with**			
	A)	heavy metals	B)	faecal matter
	C)	industrial effluents	D)	methyl mercury
29.	**Spliceosome, a complex of SnRNA, protein and pre-mRNA is found in**			
	A)	Eukaryotic cell	B)	Prokaryotic cell
	C)	both prokaryotic and eukaryotic cell	D)	Only in plant cell
30.	**In leguminous plants there exists a symbiotic association between the plants and the bacterium. Choose the correct statement from below:**			
	A)	the bacteria derive reduced N_2 from plant	B)	the bacteria supply reduced N_2 to plant and receive sugars from plant
	C)	the nodule is produced by the plant independent of bacteria	D)	the plant growth is inhibited by the factors produced by bacteria
31.	**The inner membrane of the mitochondria is very permeable to many solutes due to very high content of phospholipids called**			
	A)	Sphingomylein	B)	Sterols
	C)	Gangliosides	D)	Cardiolipin
32.	**Which of the following statements is incorrect?**			
	A)	T cell response is MHC- restricted	B)	MHC class I molecules are present on all nucleated cell
	C)	MHC class II molecules are present on all nucleated cells	D)	MHC class I and II are made up of two polypeptides

33.	**This mammalian tissue has no power of regeneration**			
	A)	Central nervous system	B)	Skin epidermis
	C)	Tendon	D)	Smooth muscles
34.	**Ozone saves the biosphere by absorbing these higher energy radiations**			
	A)	Infrared	B)	Ultravoilet
	C)	X- rays	D)	Gamma rays
35.	**In reference to the wild type genotype a silent mutation will have**			
	A)	Same genotype but different phenotype	B)	Different genotype but same phenotype
	C)	Same genotype and same phenotype	D)	None of the above
36.	**The rising phase of an action potential of a neuron is due to the**			
	A)	Closing of the K^+ channels	B)	Opening of chemically gated Na^+ channels
	C)	closing of voltage gated Ca^{2+} channels	D)	Opening of voltage gated Na^+ channels
37.	**Vessels and companion cells are the characteristic feature of**			
	A)	Gymnosperms	B)	Pteridophytes
	C)	Angiosperms	D)	Fungi
38.	**Most carbon dioxide in the blood is carried**			
	A)	in the cytoplasm of red blood cells	B)	as carbon dioxide dissolved in the plasma
	C)	in the plasma as bicarbonate	D)	in red blood cells bound to hemoglobin
39.	**The first extra embryonic membrane to make its appearance in the mammals is**			
	A)	Allantois	B)	Amnion
	C)	Yolk sac	D)	Serosa
40.	**In antibodies the complimentarily region is present in**			
	A)	variable region of heavy chain	B)	variable region of light chain
	C)	constant region of heavy and light chain	D)	variable region of heavy and light chain
41.	**Members of this group are not protostomes**			
	A)	Echinoderms	B)	Arthropods
	C)	Mollusks	D)	Annelids
42.	**The process by which substances are taken in to the cell from external environment and broken down by lysosome is called**			
	A)	Phagocytosis	B)	Heterophagy
	C)	Pinocytosis	D)	Autophagy

43.	**The greatest amount of free energy is available at which of the following levels**			
	A)	Tertiary consumers	B)	Secondary consumers
	C)	Decomposers	D)	Producers
44.	**Down's syndrome is characterized by**			
	A)	21 trisomy	B)	two X and one Y chromosome
	C)	19 trisomy	D)	only one X chromosome
45.	**In gene regulation, open reading frame (ORF) implies**			
	A)	intervening nucleotide sequence in between two genes	B)	a series of triplet codon not interrupted by a stop codon
	C)	a series of triplet codon than begins with a start codon and ends with a stop codon	D)	the exonic sequence of a gene that corresponds to the 5' UTR of the mRNA and thus does not code for the protein
46.	**How do eukaryotic ribosomes identify the start sites of proteins?**			
	A)	via their Shine- Dalgarno sequences	B)	by scanning from the 5'end of the mRNA for the first AUG.
	C)	The cap structure of a eukaryotic mRNA overlaps with the first AUG.	D)	The transcription start site of a eukaryotic mRNA overlaps with the translation start site
47.	**As a result of the oblique cleavage the symmetry of the animal will be**			
	A)	Radial	B)	Biradial
	C)	Spiral	D)	Bilateral
48.	**Fertilizin is produced by**			
	A)	Mature egg	B)	Acrosome
	C)	Polar bodies	D)	Immature egg
49.	**The maturation of anther and stigmas at different times in the same flower is known as**			
	A)	Herkogamy	B)	Cleistogamy
	C)	Chasmogamy	D)	Dichogamy
50.	**Which of the following is used to grow bacterial cultures continuously?**			
	A)	Hemostat	B)	Batch
	C)	Chemostat	D)	Petroff-Hausser chamber
51.	**Which one of the following statements is correct?**			
	A)	Coloured images can be obtained by transmission electron microscopy by fluorescent labelling of sample.	B)	Scanning electron microscope require sectioning of sample

	C)	Phase contrast microscope converts imperceptible phase change into perceptible phase change	D)	All of the above

52.	**The following are the Cryoprotectants EXCEPT:**			
	A)	Glycerol	B)	Mannitol
	C)	DMSO	D)	DPX

53.	**Stable structure of amphipathic compound in water is called?**			
	A)	Micelles	B)	Catherine
	C)	Lysosomes	D)	Chromocenters

54.	**Which is the most abundant biomolecule on Earth?**			
	A)	Carbohydrates	B)	Proteins
	C)	Lipids	D)	Chitin

55.	**A eukaryotic cell lacking active telomerase would**			
	A)	be unable to take up DNA from the surrounding solution	B)	be unable to identify and correct mismatched nucleotides
	C)	experience a gradual reduction of chromosomal length with each replication cycle	D)	have a greater potential to become cancerous

Note : Attempt any nine questions. Each question Carries 5 marks.

56.	What is an organiser? Describe its role.
57.	Describe induced breeding in fish.
58.	Why lymph node is called as a highly specialized secondary lymphoid organ? A.S.
59.	Ferns display a dominant sporophyte generation (with large leaves). Describe the major advance in anatomy that enables most ferns to grow much larger than mosses. PKP
60.	Write an explanation for the great success of the angiosperms in occupying terrestrial habitats. PKP

61.	What factors must be taken into account in using fungi to combat agricultural pests?	PKP
62.	Describe in detail the role of Brassinosteroids.	PKP
63.	Discuss the role of phytochromes in plant photoperiodism.	PKP
64.	Write a note on principle and working of scanning electron microscope.	PCM
65.	How is the gene expression regulated in prokaryotes?	AS
66.	What are key differences between C3, C4 and CAM photosynthesis pathways in plants?	NK
67.	Differentiate between allopatric and sympatric speciation.	MH
68.	What are chromosomal aberrations? Explain different types of the same.	AS
69.	Explain nucleosome model of organization of DNA.	PCM
70.	Describe synaptic transmission at neuromuscular junction.	AS
71.	Explain how a photon of light affects the membrane potential in a rod cell.	AS
72.	Describe group translocation method of uptake of sugars by bacteria and highlight its importance.	MH
73.	Explain endospore formation in bacteria and comment why they have extraordinary resistance against most of antibacterial factors.	MH
74.	What is the role of microbes in geochemical cycles? Describe either C or N cycle highlighting activities of important microorganism	MH
75.	Describe the process by which protein are targeting to the mitochondrial inner membrane.	AS.