



Subject: Genetics-I  
PAPER: A (Principles of Genetics)

TIME ALLOWED: 1 hr.  
MAX. MARKS: 14

**NOTE:** Part-I is compulsory. Part-I will be collected after one hour. Please mention your roll number on this page.

**PART I**

Q.1 Fill in the blanks with appropriate words. 7

- Any chromosome which is directly involved in the determination of sex is called-----.
- A cross between an organism and one of its parents is called-----.
- is a phenomenon in which heterozygote have a phenotype that is more extreme than either homozygous genotype.
- The ----- is the functional unit of heredity residing at a specific point along a chromosome.
- ABO blood group in human was first discovered by ----- and -----.
- A group of signs or symptoms that occurs together and characterizes a disease or abnormality is called-----.
- is a chromosomal aberration in which both members of a chromosome pair are missing.

Q.2 Encircle the correct answer in each case. 7

- Mendel did his Pea plant experiments in  
i. 1998      ii. 1982      iii. 1822      iv. 1857
- What is the probability of an AB gamete from an AaBb individuals?  
i. 0.1      ii. 0.25      iii. 0.75      iv. 0.75
- Klinefelter syndrome is a genetic condition that is due to the extra copy of chromosome.  
i. 21      ii. X      iii. Y      iv. 18
- The transfer of chromosome parts between non-homologous chromosomes.  
i. Translation      ii. Translocation      iii. Inversion      iv. Deletion
- A stage in meiotic prophase I when the synapsed homologous chromosomes split producing a group of four chromatids called tetrad.  
i. Pachytene      ii. Zygotene      iii. Diplotene      iv. Leptotene
- A mutant microorganism which requires a substance for growth that can be synthesized by wild type strains is called  
i. Prototroph      ii. Auxotroph      iii. Heterotroph      iv. Eutroph
- The period of cell cycle during which the genetic material is replicated is known as  
i. G<sub>1</sub> phase      ii. G<sub>2</sub> phase      iii. S-phase      iv. T-phase



# UNIVERSITY OF THE PUNJAB

B.A. / B.Sc. Part - I  
Annual Examination - 2018

Roll No. ....

**Subject: Genetics-I**  
**PAPER: A (Principles of Genetics)**

**TIME ALLOWED: 2 hrs.**  
**MAX. MARKS: 21**

## PART II

Attempt any three questions from part II. Time allocated for Part II is two hours. All questions carry equal marks.

- Q.3 a) Briefly explain the prophase-I of meiosis-I. 4  
b) Differentiate between monohybrid and dihybrid cross. 3
- Q.4 a) Briefly explain the phenomenon of non-disjunction. 3  
b) What is meant by coupling and repulsion phase in linkage? 4
- Q.5 a) Contrast test cross and back cross with examples. 4  
b) Write short note on X-linked recessive inheritance. 3
- Q.6 a) Write concise note on Pleiotropy. 3  
b) Briefly explain Mendel's second law of inheritance. 4
- Q.7 a) Describe multiple allele with reference to ABO blood group. 5  
b) How are chromosome named on the basis of centromere placement. 2



## B.A. / B.Sc. Part - I Annual Examination - 2018

Subject: Genetics-I  
PAPER: B (Biometry and Quantitative Genetics)

TIME ALLOWED: 1 hr.  
MAX. MARKS: 14

### USE SEPARATE ANSWER SHEET FOR PART-I AND PART-II.

**NOTE:** All question carry equal marks. Q. 1 and Q. 2 are compulsory for all students and should be on separate sheet with space for roll number and name clearly mentioned. Time for Part-I (Q. 1 & Q. 2) will be of one hour. Attempt three questions from Part-II. Time allowed for Part-II is 2 hrs. Provide Chi Square table to students. .

PART I		
Q1 and Q2 are compulsory		
Q-1	Select the BEST answer:	07
1.	A qualitative characteristics like religion , nationality, sex is called ----- (a) variable (b) attributes (c) frequency (d) none of these	
2.	A summary measure that is computed from only a sample of the population is called: (a) a parameter (b) a population (c) a discrete variable (d) a statistic	
3.	What is the range of the data below? 40, 35, 35, 25, 45 (a) 20 (b) 25 (c) 35 (d) 40	
4.	If the standard deviation of a population is 9, the population variance is: (a) 3 (b) 9 (c) 21 (d) 81	
5.	Given below the four sets of observations. Which set has the minimum variation? (a) 46, 48, 50, 52, 54 (b) 30, 40, 50, 60, 70 (c) 40, 50, 60, 70, 80 (d) 48, 49, 50, 51, 52	
6.	Which of the following statistics is not a measure of central tendency? (a) mean (b) median (c) mode (d) range	
7.	If a Three-child family is selected at random, what is the probability of there being three boys in the family? (a) 0 (b) 0.125 (c) 0.50 (d) 1.0	
Q-2 (A)	Define the following a) Independent events b) Class limits c) Histogram d) Genotypic frequency e) Bimodal distribution	05
(B)	Which of the following genotype frequencies of AA, Aa, and aa, respectively, satisfy the Hardy-Weinberg principle? (a) 0.25, 0.50, 0.25 (b) 0.36, 0.55, 0.09 (c) 0.49, 0.42, 0.09 (d) 0.64, 0.27, 0.09 (e) 0.29, 0.42, 0.29	02



# UNIVERSITY OF THE PUNJAB

**B.A. / B.Sc. Part - I**  
**Annual Examination - 2018**

Roll No. ....

**Subject: Genetics-I**  
**PAPER: B (Biometry and Quantitative Genetics)**

**TIME ALLOWED: 2 hrs.**  
**MAX. MARKS: 21**

PART II																		
Attempt any three questions																		
Q-3 (A)	Differentiate between Sample and Population?	01																
(B)	Define the term "variable" and describe different types of variables:	03																
(C)	The following table shows the frequency distribution of the diameters (in millimeters) of 50 bottles. Find the Mean of the data. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Diameter</td> <td>35-39</td> <td>40-44</td> <td>45-49</td> <td>50-54</td> <td>55-60</td> </tr> <tr> <td>Frequency</td> <td>6</td> <td>12</td> <td>15</td> <td>8</td> <td>3</td> </tr> </table>	Diameter	35-39	40-44	45-49	50-54	55-60	Frequency	6	12	15	8	3	03				
Diameter	35-39	40-44	45-49	50-54	55-60													
Frequency	6	12	15	8	3													
Q-4 (A)	How Standard Deviation differs from Standard Error?	03																
(B)	In hospital, the number of patients diagnosed with disease are as below, by age group. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Age</td> <td>20-29</td> <td>30-39</td> <td>40-49</td> <td>50-59</td> <td>60-69</td> <td>70-79</td> <td>80-89</td> </tr> <tr> <td>Frequency</td> <td>4</td> <td>44</td> <td>124</td> <td>124</td> <td>48</td> <td>25</td> <td>4</td> </tr> </table> Calculate the standard deviation and standard error of the data	Age	20-29	30-39	40-49	50-59	60-69	70-79	80-89	Frequency	4	44	124	124	48	25	4	04
Age	20-29	30-39	40-49	50-59	60-69	70-79	80-89											
Frequency	4	44	124	124	48	25	4											
Q-5 (A)	How is the goodness-of-fit chi-square test used to analyze genetic crosses?	03																
(B)	Are the progeny numbers below consistent with the results expected from selfing a plant presumed to be a dihybrid of two independently assorting genes, H/h; R/r? (H = hairy leaves; h = smooth leaves; R = round ovary; r = elongated ovary.)  <table style="margin-left: auto; margin-right: auto;"> <tr> <td><b>Phenotype</b></td> <td><b>Number</b></td> </tr> <tr> <td>Hair, round</td> <td>178</td> </tr> <tr> <td>Hairy, elongated</td> <td>62</td> </tr> <tr> <td>Smooth, round</td> <td>56</td> </tr> <tr> <td>Smooth, elongated</td> <td>24</td> </tr> </table>	<b>Phenotype</b>	<b>Number</b>	Hair, round	178	Hairy, elongated	62	Smooth, round	56	Smooth, elongated	24	04						
<b>Phenotype</b>	<b>Number</b>																	
Hair, round	178																	
Hairy, elongated	62																	
Smooth, round	56																	
Smooth, elongated	24																	
Q-6 (A)	The following genotypes were observed in a population:  <table style="margin-left: auto; margin-right: auto;"> <tr> <td><b>Genotype</b></td> <td><b>Number</b></td> </tr> <tr> <td>HH</td> <td>40</td> </tr> <tr> <td>Hh</td> <td>45</td> </tr> <tr> <td>hh</td> <td>50</td> </tr> </table> Calculate the observed genotypic and allelic frequencies for this population.	<b>Genotype</b>	<b>Number</b>	HH	40	Hh	45	hh	50	04								
<b>Genotype</b>	<b>Number</b>																	
HH	40																	
Hh	45																	
hh	50																	
(B)	What are the processes that cause changes in the kind and amount of genetic variation in populations?	03																
Q-7 (A)	Write notes on a) Importance of Sampling in statistics b) Define Polygenic inheritance with TWO examples	04																
(B)	What is the probability of rolling two six-sided dice and Obtaining the following numbers? (a) 2 and 3 (b) 6 and 6 (c) At least one 6	03																
		<b>PTO</b>																

### Chi Square Critical Values Table

d.f.	Probability of exceeding the critical value				
	0.10	0.05	0.025	0.01	0.001
1	2.706	3.841	5.024	6.635	10.828
2	4.605	5.991	7.378	9.210	13.816
3	6.251	7.815	9.348	11.345	16.266
4	7.779	9.488	11.143	13.277	18.467
5	9.236	11.070	12.833	15.086	20.515
6	10.645	12.592	14.449	16.812	22.458
7	12.017	14.067	16.013	18.475	24.322
8	13.362	15.507	17.535	20.090	26.125
9	14.684	16.919	19.023	21.666	27.877
10	15.987	18.307	20.483	23.209	29.588
11	17.275	19.675	21.920	24.725	31.264
12	18.549	21.026	23.337	26.217	32.910
13	19.812	22.362	24.736	27.688	34.528
14	21.064	23.685	26.119	29.141	36.123
15	22.307	24.996	27.488	30.578	37.697
16	23.542	26.296	28.845	32.000	39.252
17	24.769	27.587	30.191	33.409	40.790
18	25.989	28.869	31.526	34.805	42.312
19	27.204	30.144	32.852	36.191	43.820
20	28.412	31.410	34.170	37.566	45.315
21	29.615	32.671	35.479	38.932	46.797
22	30.813	33.924	36.781	40.289	48.268
23	32.007	35.172	38.076	41.638	49.728
24	33.196	36.415	39.364	42.980	51.179
25	34.382	37.652	40.646	44.314	52.620
26	35.563	38.885	41.923	45.642	54.052
27	36.741	40.113	43.195	46.963	55.476
28	37.916	41.337	44.461	48.278	56.892
29	39.087	42.557	45.722	49.588	58.301
30	40.256	43.773	46.979	50.892	59.703
35	46.059	49.802	53.203	57.342	66.619
40	51.805	55.758	59.342	63.691	73.402
45	57.505	61.656	65.410	69.957	80.077
50	63.167	67.505	71.420	76.154	86.661
60	74.397	79.082	83.298	88.379	99.607
70	85.527	90.531	95.023	100.425	112.317
80	96.578	101.879	106.629	112.329	124.839
90	107.565	113.145	118.136	124.116	137.208
100	118.498	124.342	129.561	135.807	149.449



# UNIVERSITY OF THE PUNJAB

**B.A. / B.Sc. Part – II**  
**Annual Examination – 2018**

Roll No. ....

**Subject: Genetics-II**  
**PAPER: A (Molecular and Microbial Genetics)**

**TIME ALLOWED: 1 hrs.**  
**MAX. MARKS: 14**

## USE SEPARATE ANSWER SHEET FOR PART-I

**Note: Part-I (Q1 & Q2) is compulsory. Time allowed for Part-I is one hour. All questions carry equal marks.**

### PART-I

Q1.	Multiple choice questions	07
1.	Francis Griffith did experiments with <i>Streptococcus pneumoniae</i> and discovered: a. transcription    b. transduction c. transformation    d. conjugation e. translation  Which type of <i>Streptococcus pneumoniae</i> is pathogenic? a. S strain    b. R strain	Marks
2.	Which is true about the pairing of bases in the DNA molecule? a. purines always pair with pyrimidines b. a single ring base pairs with another single ring base c. a double ring base pairs with another double ring base d. purines pair with purines and pyrimidines with pyrimidines.	
3.	If this is the base sequence of a strand of DNA (A T G C C), what would be the base sequence of the complimentary DNA strand? a. T A C G G    b. A T G C C c. U A C G G    d. A U G C C	
4.	If this is base sequence of a strand of DNA (T A G G C T), what would be the base sequence of the complimentary RNA strand? a. A T C C G A    b. A U C C G A c. D O N T N O    d. T A G G C T e. A A C C G A	
5.	Transformation, transduction and conjugation are all examples of..... a. horizontal gene transfer    b. asexual reproduction c. vertical gene transfer    d. diagonal gene transfer    e. binary fission	
6.		

P.T.O.

7.	<p>Which type of RNA includes the anticodon and brings the amino acids to the site of protein synthesis?  a. mRNA   b. rRNA   c. tRNA   d. DNA</p>	
<b>Q2.</b>	<p><b>Fill in the blanks</b></p>	
1.	<p>Persistence of a prophage in the DNA of a cell without prophage replication or lysis of the bacterial cell is known as _____.</p>	
2.	<p>An _____ plasmid contains both the genetic information needed for a sex pilus as well as parts of the bacterial chromosome.</p>	07
3.	<p>In _____ transduction, only genes near the prophage are transferred to another bacterium.</p>	
4.	<p>_____ plasmids give a cell the ability to survive in the presence of certain antibiotics.</p>	
5.	<p>Bacteriocidal proteins called _____ are produced by some bacterial plasmids.</p>	
6.	<p>Mobile genetic elements called _____ were first found in the 1940s by Barbara McClintock.</p>	
7.	<p>Joining two pieces of DNA together requires the use of the enzyme _____ to reunite the ends of the two DNA fragments.</p>	



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## USE SEPARATE ANSWER SHEET FOR PART-II

**Note: Attempt Any Three Questions from Part-II. Time allowed for Part-II is two hours. All questions carry equal marks.**

### Part-II

Q3	a. How did the Hershey and Chase experiment produce evidence that DNA, and not protein, is the hereditary material in viruses? b. What did Avery MacLeod and McCarty discover and how?	04 03
Q4.	a. What is conjugation? What is the outcome of F' mating with F? b. generalized transduction c. specialized transduction	03 02 02
Q5	a. What is translation? b. What are ribosomal binding sites c. What are stop codons?	03 02 02
Q6	a. What are sticky and blunt end producing restriction enzymes? b. Define and draw Holliday Junction in recombination? c. State the function of Rec A proteins	02 02 03
Q7	a. What is a Tetratype? b. Define parental Ditype and non-parental ditype. c. If the two genes are linked we can calculate the map distance between them by using a formula that takes double cross-overs into account. Write formula for calculating map distances for pairs of linked yeast genes?	02 02 03