

**Q. 1 – Q. 5 carry one mark each.**

Q.1 The chairman requested the aggrieved shareholders to \_\_\_\_\_ him.

- (A) bare with                      (B) bore with                      (C) bear with                      (D) bare

Q.2 Identify the correct spelling out of the given options:

- (A) Managable                      (B) Manageable                      (C) Mangaible                      (D) Managible

Q.3 Pick the odd one out in the following:

13, 23, 33, 43, 53

- (A) 23                      (B) 33                      (C) 43                      (D) 53

Q.4 R2D2 is a robot. R2D2 can repair aeroplanes. No other robot can repair aeroplanes.

Which of the following can be logically inferred from the above statements?

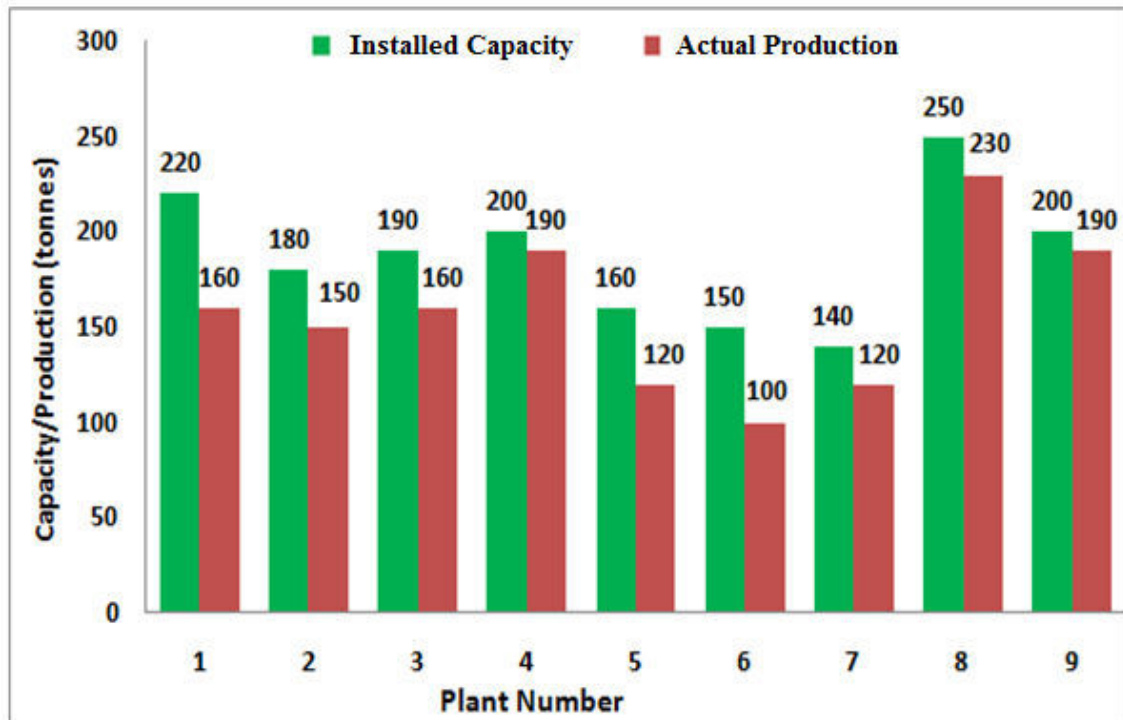
- (A) R2D2 is a robot which can only repair aeroplanes.  
(B) R2D2 is the only robot which can repair aeroplanes.  
(C) R2D2 is a robot which can repair only aeroplanes.  
(D) Only R2D2 is a robot.

Q.5 If  $|9y-6|=3$ , then  $y^2 - 4y/3$  is \_\_\_\_\_.

- (A) 0                      (B)  $+1/3$                       (C)  $-1/3$                       (D) undefined

**Q. 6 – Q. 10 carry two marks each.**

- Q.6 The following graph represents the installed capacity for cement production (in tonnes) and the actual production (in tonnes) of nine cement plants of a cement company. Capacity utilization of a plant is defined as ratio of actual production of cement to installed capacity. A plant with installed capacity of at least 200 tonnes is called a large plant and a plant with lesser capacity is called a small plant. The difference between total production of large plants and small plants, in tonnes is \_\_\_\_\_.



- Q.7 A poll of students appearing for masters in engineering indicated that 60 % of the students believed that mechanical engineering is a profession unsuitable for women. A research study on women with masters or higher degrees in mechanical engineering found that 99 % of such women were successful in their professions.

Which of the following can be logically inferred from the above paragraph?

- (A) Many students have misconceptions regarding various engineering disciplines.
- (B) Men with advanced degrees in mechanical engineering believe women are well suited to be mechanical engineers.
- (C) Mechanical engineering is a profession well suited for women with masters or higher degrees in mechanical engineering.
- (D) The number of women pursuing higher degrees in mechanical engineering is small.

- Q.8 Sourya committee had proposed the establishment of Sourya Institutes of Technology (SITs) in line with Indian Institutes of Technology (IITs) to cater to the technological and industrial needs of a developing country.

Which of the following can be logically inferred from the above sentence?

Based on the proposal,

- (i) In the initial years, SIT students will get degrees from IIT.
- (ii) SITs will have a distinct national objective.
- (iii) SIT like institutions can only be established in consultation with IIT.
- (iv) SITs will serve technological needs of a developing country.

- (A) (iii) and (iv) only. (B) (i) and (iv) only.  
(C) (ii) and (iv) only. (D) (ii) and (iii) only.

- Q.9 Shaquille O' Neal is a 60% career free throw shooter, meaning that he successfully makes 60 free throws out of 100 attempts on average. What is the probability that he will successfully make exactly 6 free throws in 10 attempts?

- (A) 0.2508 (B) 0.2816 (C) 0.2934 (D) 0.6000

- Q.10 The numeral in the units position of  $211^{870} + 146^{127} \times 3^{424}$  is \_\_\_\_\_.

**END OF THE QUESTION PAPER**

**L: Zoology****Q. 1 – Q. 10 carry one mark each.**

- Q.1 Acorn worms (*Saccoglossus sp.*) belong to which ONE of the following Phyla?  
(A) Platyhelminthes (B) Achelminthes  
(C) Hemichordata (Chordata) (D) Annelida
- Q.2 A population of Bees develops resistance to pesticides and the trait gets fixed within a few generations. This is an example of  
(A) macroevolution. (B) disruptive selection.  
(C) stabilizing selection. (D) microevolution.
- Q.3 The nature of the polymorphic DNA fragment used for mapping is  
(A) dominant. (B) partial dominant.  
(C) co-dominant. (D) recessive.
- Q.4 The sex of a *Drosophila melanogaster*, which has 4 copies of X-chromosomes and 4 sets of autosomes will be  
(A) female. (B) male. (C) metafemale. (D) metamale.
- Q.5 Which of the following cations are found in higher concentration in extracellular fluid as compared to intracellular fluid in animals?  
(A)  $\text{Na}^+$  and  $\text{Ca}^{++}$  (B)  $\text{K}^+$  and  $\text{Ca}^{++}$  (C)  $\text{K}^+$  and  $\text{Mg}^{++}$  (D)  $\text{Na}^+$  and  $\text{Mg}^{++}$
- Q.6 Detoxification of alcohol occurs in liver cells where peroxisomal enzymes remove hydrogen from it, which is  
(A) combined with water molecules to generate hydrogen peroxide.  
(B) used to break down hydrogen peroxide.  
(C) transferred to the mitochondria.  
(D) transferred to oxygen molecules to generate hydrogen peroxide.
- Q.7 When cells are treated with cyanide, which ONE of the following organelles will have the highest level of cyanide inside?  
(A) Mitochondria (B) Peroxisomes (C) Lysosomes (D) Endoplasmic reticulum
- Q.8 Toxoplasmosis in humans is caused by *Toxoplasma gondii*, an obligate intracellular parasite with two different life cycles, sexual and asexual. The sexual cycle occurs in which ONE of the following definitive hosts?  
(A) Dog (B) Cat (C) Rat (D) Human
- Q.9 Which ONE of the following is often a life-threatening systemic inflammatory response?  
(A) Tuberculosis  
(B) Lupus erythematosus  
(C) Septic shock  
(D) Hypertension
- Q.10 During the gastrulation stage of amphibian development, ectoderm formation takes place by the expansion of epithelial cell sheet over mesodermal cells. This type of cell movement is termed as  
(A) ingression. (B) epiboly. (C) involution. (D) delamination.

**Q. 11 – Q. 20 carry two marks each.**

- Q.11 In a population, 600 individuals have MM blood group, 300 have MN blood group and 100 have NN blood group. What will be the frequencies of M and N alleles in this population?
- (A) M 0.75 and N 0.25 (B) M 0.65 and N 0.35  
(C) M 0.85 and N 0.15 (D) M 0.55 and N 0.45
- Q.12 The molecules, hexanoic acid, lysine, histidine and glucose, each contain 6 carbon atoms, but have completely different properties due to the presence of different functional groups. Which ONE of these molecules has a high calorific value?
- (A) Lysine (B) Hexanoic acid (C) Glucose (D) Histidine
- Q.13 The primary function of polysaccharides attached to glycoproteins in the animal cell membrane is to
- (A) facilitate diffusion of molecules down their concentration gradients.  
(B) maintain membrane fluidity at low temperatures.  
(C) maintain the integrity of a fluid mosaic membrane.  
(D) mediate cell-to-cell recognition.
- Q.14 Which ONE of the following mechanisms is used to coordinate the expression of multiple, related genes in eukaryotic cells?
- (A) Environmental signals enter the cell and bind directly to promoters.  
(B) Genes share a common intragenic sequence, and allow several activators to turn on their transcription, regardless of location.  
(C) Genes are organized into large operons, allowing them to be transcribed as a single unit.  
(D) Genes are organized into clusters, with local chromatin structures influencing the expression of all the clustered genes at once.
- Q.15 In an experiment involving development of 64-cell stage sea urchin, an isolated animal hemisphere was combined with isolated micromeres. Which ONE of the following will be the resulting structure?
- (A) A ball of ectomesodermal cells (B) A ciliated ball of ectodermal cells  
(C) A recognizable pluteus larva (D) A ball of endodermal cells
- Q.16 Glycoprotein hormones, hCG and eCG, are synthesized in women and mares respectively, during pregnancy. Both of these chorionic gonadotropin hormones
- (A) have only LH-like activity in their respective species.  
(B) have only FSH-like activity in other species.  
(C) are biologically inactive in other species.  
(D) are routinely employed to promote final stages of follicular maturation, ovulation and to treat infertility in women.
- Q.17 *Entamoeba histolytica* is an intestinal parasite that causes dysentery in humans. This parasite resides in the isotonic environment of intestine and other tissues in the human body and does not possess contractile vacuoles. If this parasite is placed in fresh water, it will
- (A) survive for long time, until they re-enter the host environment.  
(B) die due to hypoosmotic shock.  
(C) not survive in water as they require high salt content.  
(D) die due to hyperosmotic shock.
- Q.18 In an experiment involving *Drosophila* development, a large amount of purified *bicoid* mRNA was injected into the posterior end of a wild-type embryo, the resulting developing embryo will have

- (A) normal development with one each of head, thorax and abdomen.
- (B) head in the middle with two thoraces and two abdomens.
- (C) a head with two thoraces and an abdomen.
- (D) two heads and two thoraces with an abdomen segment in the middle.

Q.19 The migratory desert locust, *Schistocerca gregaria*, exists in two mutually exclusive forms: a short-winged, uniformly colored, solitary insect and a long-winged, brightly colored, gregarious morph. These phenotypes depend on crowding. Such phenotypic plasticity is called

- (A) reaction norm.
- (B) polyphenism.
- (C) Batesian mimicry.
- (D) polymorphism.

Q.20 Given below is the list of animals and their respective characteristics.

| <i>Animals</i> | <i>Characteristics</i>         |
|----------------|--------------------------------|
| I. Sea anemone | i. Three pairs of jointed legs |
| II. Bluefly    | ii. Diploblastic acoelomate    |
| III. Starfish  | iii. Collar cells              |
| IV. Sponge     | iv. Tube feet                  |

Which ONE of the following represents the correct match?

- (A) I-iv; II-i; III-ii; IV-iii
- (B) I-iii; II-i; III-iv; IV-ii
- (C) I-ii; II-i; III-iv; IV-iii
- (D) I-ii; II-i; III-iii; IV - iv

**END OF THE QUESTION PAPER**