CS(O) SA-I/18

2018

SANTALI - PAPER-I

Time Allowed : 3 Hours

Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answer should be given in 'OLCHIKI' Script.

SECTION - A

᱑. ᱥᱟᱱᱟᱢ ᱠᱩᱠᱞᱤ ᱨᱮᱭᱟᱜ ᱜᱮ ᱛᱮᱞᱟ ᱚᱞ ᱢᱮ ।   5X10=50

(Answer all the questions)

ᱟ. ᱫᱷᱟᱨᱛᱤ ᱯᱮᱲᱟᱣ ᱥᱟᱱᱛᱟᱲᱤ ᱯᱟᱹᱨᱥᱤ ᱨᱮᱭᱟᱜ ᱛᱷᱟᱨᱴᱷᱤ (ᱥᱟᱠᱟᱢᱚᱱ) ᱚᱞ ᱥᱟᱶᱛᱮ ᱢᱮ ।

ᱵ. ᱯᱟᱹᱨᱥᱤ ᱫᱚ ᱪᱮᱫ ᱠᱟᱱᱟ ? ᱯᱟᱹᱨᱥᱤ ᱨᱮᱭᱟᱜ ᱠᱟᱹᱢᱤ ᱛᱮᱭᱟᱜ ᱢᱮᱱᱟᱜ-ᱟ ? ᱛᱟᱞᱟ-ᱥᱟᱵᱟᱫ ᱠᱚᱨᱮ ᱚᱞ ᱥᱟᱶᱛᱮ ᱢᱮ ।

ᱪ. ᱥᱟᱱᱛᱟᱲᱤ ᱠᱷᱚᱱ ᱱᱟᱶᱟ ᱯᱟᱹᱨᱥᱤ ᱨᱮᱭᱟᱜ ᱫᱩᱨᱟᱹᱵ ᱵᱟᱱᱟᱨ ᱱᱟᱢᱩᱱᱟ ᱵᱟᱛᱟᱣ ᱚᱞ ᱥᱮᱞᱮᱫ ᱢᱮ ।

ᱫ. ᱥᱟᱱᱛᱟᱲᱤ ᱯᱟᱹᱨᱥᱤ ᱨᱮᱭᱟᱜ ᱟᱹᱠᱷᱨᱤᱱ ᱵᱟᱱᱟᱨ ᱱᱟᱢᱩᱱᱟ ᱵᱟᱛᱟᱣ ᱚᱞ ᱢᱮ ।

ᱮ. ᱢᱟᱹᱭ ᱢᱟᱹᱨᱟᱝ ᱠᱟᱹᱢᱤᱭᱟᱹ ᱱᱟ.ᱥ ᱠᱩᱨᱟᱹ ᱵᱟᱱᱟᱨ ᱢᱤᱫ ᱨᱮᱭᱟᱜ ᱚᱞ ᱢᱮ ।

᱒. ᱡᱟᱦᱟᱸᱱ ᱜᱮ ᱵᱟᱨᱭᱟ (᱒) ᱠᱩᱠᱞᱤ ᱨᱮᱭᱟᱜ ᱛᱮᱞᱟ ᱚᱞ ᱢᱮ । (Answer any two)   2X25=50

ᱟ. ᱥᱟᱱᱛᱟᱲᱤ ᱱᱟ.ᱢᱩᱱ.ᱠᱚ ᱚᱞ ᱯᱟᱛᱷ ᱱᱤᱭᱟᱢ ᱛᱷᱮᱠ ᱡᱚᱜᱟᱣ ᱥᱟᱹᱢᱫᱷᱤ ᱨᱩᱯᱟᱹᱨᱩ-ᱱᱟ, ᱱᱟᱢᱩᱱᱟ ᱢᱮᱫ ᱚᱞ ᱥᱮᱞᱮᱫ ᱢᱮ ।

ᱵ. ᱱᱟᱜᱟᱹᱨᱤᱭᱟ ᱛᱟᱭᱚᱢᱟᱱᱟᱜ ᱯᱟᱹᱨᱥᱤ ᱠᱟᱹᱢᱤ ᱵᱟᱵᱚᱛ ᱵᱟᱛᱟᱣ ᱡᱚᱛᱚ ᱵᱟᱱᱟᱨ ᱱᱟᱢᱩᱱᱟ ᱚᱞ ᱢᱮ ।

ᱪ. ᱯᱟᱹᱨᱥᱤ ᱨᱮᱭᱟᱜ ᱛᱷᱟᱨᱴᱷᱤ ᱫᱚ ᱱᱚᱶᱟ ᱠᱩᱨᱤᱦᱟᱹᱨᱟᱹᱜ-ᱟ ? ᱥᱟᱱᱛᱟᱲᱤ ᱯᱟᱹᱨᱥᱤ ᱨᱮᱱ ᱯᱮᱲᱟᱣ ᱛᱷᱟᱨᱴᱷᱤ ᱱᱤᱵᱟᱱ ᱚᱞ ᱥᱟᱶᱛᱮ ᱢᱮ ।

ᱫ. ᱥᱟᱱᱛᱟᱲᱤ ᱯᱟᱹᱨᱥᱤ (Standardization) ᱢᱟ.ᱨᱮ ᱱᱮᱣᱛᱮ ᱠᱟᱹᱢᱤ ᱮᱢ ᱯᱟ.ᱛᱤᱭᱟᱹ ᱵᱟᱨᱚ ᱵᱟᱨᱚ ᱟᱹᱨᱥᱤᱭᱟᱹ ᱠᱚ ᱱᱟᱨᱟᱹᱦ ᱯᱟᱹᱨᱥᱤ-ᱱᱟ ᱚᱞ ᱢᱮ ।

P.T.O.

SECTION - B

3. [illegible] 5x10 = 50
(Answer all the question)

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

4. [illegible] (2) [illegible] 2x25 = 50
(Answer any two)

[illegible]

[illegible]

[illegible]

[illegible]

CS(O) SA-II/18

2018

SANTALI - PAPER-II

Time Allowed : 3 Hours

Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answer should be given in 'OLCHIKI' Script.

All questions carry equal marks.

7. ಸದರಿ ಮೂಲ ಪತ್ರಗಳನ್ನು ಪರಿಶೀಲಿಸಿ ಹಿಂತಿರುಗಿಸಿರುವುದಾಗಿ ಸಹಿ ಮಾಡಿಸಿಕೊಳ್ಳಲಾಗಿದೆ.

8. ಸದರಿ ಮೂಲ ಪತ್ರಗಳನ್ನು ಪರಿಶೀಲಿಸಿ ಹಿಂತಿರುಗಿಸಿರುವುದಾಗಿ ಸಹಿ ಮಾಡಿಸಿಕೊಳ್ಳಲಾಗಿದೆ,

9. ಸದರಿ ಪತ್ರಗಳನ್ನು ಪರಿಶೀಲಿಸಿ ಹಿಂತಿರುಗಿಸಿರುವುದಾಗಿ ಸಹಿ ಮಾಡಿಸಿಕೊಳ್ಳಲಾಗಿದೆ.

10. ಸಾಕ್ಷಿ ಹೇಳಿಕೆ :ಮಾಡಿಸಿದವರು ಸಾಕ್ಷಿಯ ಪರವಾಗಿ ಪ್ರಶ್ನೆ ಮಾಡಿದ್ದು ಸಾಕ್ಷಿಯ ಹೇಳಿಕೆಯನ್ನು ಸರಿಯಾಗಿ ಬರೆದಿರುವುದಾಗಿ ಸಹಿ ಮಾಡಿಸಿಕೊಳ್ಳಲಾಗಿದೆ.

11. ಸಾಕ್ಷಿ ಹೇಳಿಕೆ ಪ್ರಶ್ನೆ ಕೇಳಿದವರು ಸಾಕ್ಷಿಯ ಪರವಾಗಿ ಪ್ರಶ್ನೆ ಮಾಡಿದ್ದು ಸಾಕ್ಷಿಯ ಹೇಳಿಕೆಯನ್ನು ಸರಿಯಾಗಿ ಬರೆದಿರುವುದಾಗಿ ಸಹಿ ಮಾಡಿಸಿಕೊಳ್ಳಲಾಗಿದೆ.

12. ಸಾಕ್ಷಿ ಹೇಳಿಕೆ ಪ್ರಶ್ನೆ ಕೇಳಿದವರು ಸಾಕ್ಷಿಯ ಪರವಾಗಿ ಪ್ರಶ್ನೆ ಮಾಡಿದ್ದು ಸಾಕ್ಷಿಯ ಹೇಳಿಕೆಯನ್ನು ಸರಿಯಾಗಿ ಬರೆದಿರುವುದಾಗಿ ಸಹಿ ಮಾಡಿಸಿಕೊಳ್ಳಲಾಗಿದೆ.

13. ಸಾಕ್ಷಿ ಹೇಳಿಕೆಯಲ್ಲಿ ಸಹಿ ಪಡೆಯಲು ಸಾಧ್ಯವಾಗದಿದ್ದಲ್ಲಿ ಅದಕ್ಕೆ ಕಾರಣವನ್ನು ಸರಿಯಾಗಿ ಬರೆಯಲಾಗಿದೆ.

14. ಸಾಕ್ಷಿಯ ಹೇಳಿಕೆಯಲ್ಲಿ ಸಹಿ ಪಡೆಯಲು ಸಾಧ್ಯವಾಗದಿದ್ದಲ್ಲಿ ಅದಕ್ಕೆ ಕಾರಣವನ್ನು ಸರಿಯಾಗಿ ಬರೆಯಲಾಗಿದೆ.

15. ಸಾಕ್ಷಿಯ ಹೇಳಿಕೆಯಲ್ಲಿ ಸಹಿ ಪಡೆಯಲು ಸಾಧ್ಯವಾಗದಿದ್ದಲ್ಲಿ ಅದಕ್ಕೆ ಕಾರಣವನ್ನು ಸರಿಯಾಗಿ ಬರೆಯಲಾಗಿದೆ.

2018

AGRICULTURE - PAPER-I

Time Allowed : 3 Hours

Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP-A

Answer any three Questions :

1. i) Discuss on SRI. Mention the differences between SRI and conventional cultivation method of transplanted rice. 20

   ii) Describe in details about recommended management practices of jute crop. 20

2. i) Define "Weeds". 5

   ii) State the characteristics of Weeds. 5

   iii) Discuss in details about Weed management practices in Organic farming. 30

3. i) Define 'soil'. 5

   ii) Distinguish between soil fertility and soil productivity. 8

   iii) Discuss on modern concept of soil fertility. 7

   iv) Describe different methods of soil conservation. 20

4. i) What do you mean by 'essential plant nutrients' ? Classify and enlist essential plant nutrients. 10

   ii) Mention the important functions and commonly used sources of following plant nutrients :

   N, P, S and Mo 20

   iii) Narrate the important features of INM. 10

5. Write in brief on any four :

   a) Concentrated organic manure;

   b) Biofertilizers;

   c) Vermicompost;

   d) Drip irrigation;

   e) Strategies for improvement of fodder cultivation;

   f) Green manure crops and green manuring. 10x4

6. i) Write in details on sugarcane cultivation in W.B. with special reference to — varieties, soil, tillage practices, sowing parameters, intercultural operations, nutrient management, plant protection measures, harvesting and yield. 25

   ii) Describe the crop management practices of rabi maize. 15

P.T.O.

GROUP-B

Answer **any two** Questions :

7. Write short notes on **any five** :

a) Crop insurance;
b) Jute retting;
c) Farm forestry;
d) Soil solarisation;
e) Methods of fertilizer application;
f) Reduced tillage;
g) SHG in agriculture;
h) Reclamation of problem soils.

8x5

8. i) State the differences (with examples) between 'legumes' and 'pulses'. 5

ii) What do you mean by **pairа** crop ? State the importance of pairа cropping. 10

iii) Pulses are considered as "Climate smart crops" —— Explain the statement. 10

25

9. i) What is agroforestry ? Describe the benefits of agroforestry. 3+5

ii) What do you mean by MPTs ? State the characteristics of MPTs suitable for agroforestry. 2+10

iii) Narrate the following land use systems :

a) Alley cropping;
b) Shifting cultivation;
c) Wing-breaks;
d) **Taungya** system.

20

10. Write in brief on **any four** :

a) Cold storage and warehouse;
b) Farm planning;
c) Dryland farming;
d) K V K;
e) Afforestation;
f) Water harvesting.

10x4

2018

AGRICULTURE - PAPER-II

Time Allowed : 3 Hours

Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

ANSWER ANY FIVE QUESTIONS.

1. a) Write down types of photosynthesis.
   b) Write down the photosynthetic Pigments.
   c) Discuss the characteristics of chlorophyll.

   10+10+20

2. a) Write down the cultivation of Tea with special reference to climate, cultivation, training and prunning, plucking and Tea manufacturing.
   b) Discuss in details cultivation of Coffee.

   20+20

3. a) Ennumerate the cultivation of Banana mentioning varieties, propagation, manuring, after care, irrigation and harvesting.
   b) Discuss in details cultivation of mango with reference to varieties, after care, harvesting and marketing.

   20+20

4. a) Discuss the importance of vegetables.
   b) Write down the types of vegetable garden.
   c) Discuss the classification of vegetables.

   10+15+15

5. a) Discuss the Importance of medicinal plants.
   b) Write down the cultivation of Isobgol.

   20+20

6. a) Write down the Importance of Spices in India.
   b) Discuss in details cultivation of Pepper (Improved method).

   20+20

7. a) Write down definition, nature and causes of diseases of crops.
   b) Discuss about Seed-borne, Soil borne and air borne diseases of crops.
   c) What do you mean by fungicides ? Write in brief different types of fungicides used for control of diseases of crops.

   15+15+10

8. a) Critically discuss principles of Insect and Pest Control.
   b) Write down the selection of proper methods for controlling different Pests.

   20+20

2018

ANIMAL HUSBANDRY AND VETERINARY SCIENCE – PAPER-I

Time Allowed : 3 Hours

Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be written either in **English** or in **Bengali** but all answers must be in one and the same language

GROUP-A

Answer **any three** Questions :

1. a) What are the common feeds and fodder for a lactating cow ? Classify the feed stuff for the same. 10

   b) Please specify the requirement of energy for maintenance, growth, pregnancy and lactation in milk producing cow. 15

   c) Please describe the balance ration of a dairy cattle during their different phases of growth and production. 15

2. a) Describe the role of preboitics, probiotics, antibiotics, antioxidants and enzymes in feed activity of cattles. 10

   b) Describe the economic importance of commercial poultry farming and backward poultry farming. 15

   c) What is Sire index ? Describe the method of breeding for commercial production in livestocks. 15

3. a) Describe different hormones related to reproduction in cattle. 10

   b) Describe puberty, sexual maturity, libido, artificial preservation semen, deep freezing of semen. 15

   c) What is silent **hreat** ? Describe the symptomns of heat. Describe the method of detection of oestrus and calculation of ideal time for artificial insemination. 15

4. a) What are the common causes of abortion in dairy cattle ? What are the common causes of dystocia in cow **and** describe the management. 15

   b) What is the composition and nutritive values of milk ? Describe the processing, packaging, storing, distribution and marketing of milk. Describe the milk products available in the market for human consumption. 15

   c) Describe hormonal control of mammary growth, lactogenesis and letting down and holding up of milk. 10

P.T.O.

GROUP-B

Answer any two Questions :

5. a) What are the common poultry diseases in India ? How can we prevent it ? What is the nutritive value of poultry meat and egg ? How will you grade eggs ? Describe the different slaughtering techniques of poultry birds ? 15

b) Describe the parts of female reproductive tract of fowl and their role in egg formation. 10

c) What are the common Bacterial, Protozoal and viral diseases of domestic livestock. How you can prevent them ? 15

6. a) What is the importance of zoonotic diseases transmitted from animals ? 10

b) What is the role of veterinarians in animal welfare. 15

c) Describe the etiology, symptoms and treatment of milk fever, Ketosis, Pregnancy toxaemia in domestic animals. 15

7. Write short notes on any eight topics.

a) Net energy
b) Freemartin
c) Dentition and ageing of animals
d) Quarantine
e) Castration
f) Disposal of carcasses
g) Organic livestock production
h) Designer egg
i) Phenotype and Genotype
j) Preservation of semen
k) Toxic plants
l) Trypanosomiasis
m) Caesarian section
n) Conservation of Wildlife 5x8

2018

ANIMAL HUSBANDRY AND VETERINARY SCIENCE – PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be written either in **English** or in **Bengali** but all answers must be in one and the same language

GROUP-A

Answer **Question No.1** and **any two** from the rest :

1. Write in brief on **any ten** of the followings :

a) Write in brief about the composition of bone. Name about varieties of bone. 7+3

b) Discuss in brief about freemartin. What do you mean by fremitus ? 7+3

c) Write about the shape and position of Kidneys of cow and dog. 5+5

d) State the conditions affecting the milk yield of cow. What do you mean by milk lameness ? 6+4

e) Give an account of Coccidiosis in Rabbit. Out line its treatment. 8+2

f) Discuss on Thyroid gland including its minute structure. State about the functions of thyroxine. 7+3

g) State the factors influencing antifungal activity. Name some antifangal drugs for topical application. 6+4

h) Write in brief about various types of shock. State the treatment of hypovolxemic shock. 5+5

i) What are the main causes of ascites ? Give the line of treatment of it. 4+6

j) How would you diagnose leptospirosis in dog ? Give the line of treatment of tetanus in dog. 5+5

k) State the factors responsible for ruminal dysfunction. Why vitamin B_1 is given in Acid indigestin in Cattle ? 8+2

l) What is the role of CITES in relation to wild life protection ? Which birds are called Birds of prey ? 8+2

2. Discuss about the aetiopathogenesis, clinical findings, diagnosis and line of treatment of pyelonephritis in ruminants. 6+6+3+5

3. Give an account on the etilogy, mode of transmission, diagnosis, treatment, control and zoonotic aspect of Toxoplasmosis. 2+5+4+3+4+2

4. Write down the itiopathogenesis, clinical signs, treatment and Control of Chronic Respiratory Disease (CCRD) in poultry. 6+4+4+6

P.T.O.

GROUP-B

Answer any two Questions :

5. Write in brief about the followings :

a) Difference between diarrhoea and dysentry.

b) Difference between prevalence and incidence from epidemiological stand point.

c) Write a note on Maiming.

d) Euthanasia.

e) Haematemesis.

6x5

6. Discuss on downer cow syndrome in reference to its clinical signs, prognosis, treatment and prevention.

5+10+5+10

7. Write short notes on :

a) Strauss' reaction.

b) Ascoli's test.

c) Mode of transmission of Diamond Skin disease.

d) Post F M D complications.

e) Antiviral disinfectants for some viral diseases.

6x5

2018

ANTHROPOLOGY - PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP-A

Answer any three Questions :

1. Briefly discuss the concept of 'race' in Anthropology. Discuss about anthropological debates on 'race and racism'.

   Define 'polymorphic traits'. Discuss polymorphic traits with special reference to ABO Bloodgroup and its distribution.

   7+8+15

2. What do you mean by 'hominization precess' ? What evolutionary changes occurred in human pelvic girdle and hind limbs in the process of evolution ? Why do you think the Spatio-temporal expansion of Homo erectus was more than the Australopithecus ?

   10+10+10

3. Briefly enumerate the application of Human Genetics with Special referrence to forensic anthropology.

   How the knowledge of Osteology is used in determination of age and sex of cranial Skeleton.

   Dermatoglyphics is used in personal identifications — illustrate.

   10+12+8

4. Briefly discuss the concept of human adaptation and acclimatization.

   What adaptive changes occured in human living in hot and cold climates and in high altitude regions of the world ?

   Briefly define Bergman's and Allen's Rule.

   (5+5)+(5+5+5)+(2½+2½)

GROUP-B

Answer any three Questions :

5. Critically evaluate anthropological theory of Evolutionism.

   What is ethnocentrism ?

   24+6

6. Define Political Anthropology. What do you understand by Political Movement ? Briefly ennumerate the different types of socio-political movements. Elaborate one such movement. Define ethnicity.

   6+6+12+6

7. What is the scope of Economic Anthropology ? Briefly discuss on Reciprocity. Redistribution, and Market Exchange.

   What is Potlatch ? — discuss its significance.

   6+18+6

8. What is radiometric dating ? What are its advantages and disadvantages ?

   Write a brief account on Potassium-Argon dating technique.

   What are the characteristic features of Neolithic culture of India ?

   2+8+10+10

GROUP-C

Write Short Notes on any two :

9. a) Lingustic Anthropology.
   b) Archaic Homo Sapiens.
   c) Stages of human growth.
   d) Colonialism and Anthropology.

10x2

2018

ANTHROPOLOGY - PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP-A

Answer any three Questions :

1. Briefly state the 6th schedule. Give an account of ethnic, linguistic and economic distribution of tribal populations of India. 20+20

2. Define Jajmani systems. Enumerate briefly the theory of the origin of caste system. State the salient features of caste system in India. 10+15+15

3. Define Demography and state its relationship with Anthropological demography. Enumerate the different factors that affect fertility. Assume the total population of females of age group 20-24 was 35000 in 2007 in a city. The women of the same age group gave birth to 2500 babies in the same year. Calculate age specific fertility rate (ASFR). 10+20+10

4. Make a critical appraisal of the ethnic classification made by H. H. Risley, B. S. Guha and S. S. Sarkar.

   Describe the distribution of Hb variants in Indian population. 30+10

5. **Write Short Notes on any two of the following :**

   a) Constitutional provisions of SCs and STs in India.

   b) Sacred complex.

   c) Village studies in India.

   d) Folklore and identity. 20+20

GROUP-B

Answer any two Questions :

6. a) Enumerate the perspective of Biomedical Anthropology in the understanding of non-communicable diseases.

   b) What do you mean by critical Medical Anthropology ? 30+10

7. Give an account of the tribal development programmes in post Colonial India. 40

8. State the Mesolithic Cultural Phase in Middle Ganges Plain and adjoining regions of North-Central India. 40

BENGALI-Paper-I

Time Allowed-3 Hours *Full Marks-200*

If the questions attempted are in excess of the Prescribed number ,only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

ক - বিভাগ

(যে কোনো একটি প্রশ্নের উত্তর লিখুন) ৫০

১) ক) প্রত্ন-বাংলা থেকে উদ্ভবের সূত্র ধরে আধুনিক বাংলা ভাষার উত্তরনের স্তরগুলি উদাহরণ সহযোগে আলোচনা করুন ।

খ) ভাষা ও উপভাষার সংজ্ঞা নির্ণয় করে এই দুইয়ের পারস্পরিক সম্পর্কটি ব্যাখ্যা করুন। প্রসঙ্গক্রমে যে কোনো একটি বাংলা উপভাষার ভাষাতাত্ত্বিক বৈশিষ্ট্য উদাহরণ সহ উল্লেখ করুন।

খ-বিভাগ

(যে কোনো দুটি প্রশ্নের উত্তর দিন) ৫০X২=১০০

২) 'শ্রীকৃষ্ণকীর্তন' কাব্যটিকে 'নাটগীত' অভিধায় ভূষিত করা হয়,এ সম্পর্কে আপনার মতামত যুক্তিসহ আলোচনা করুন ।

৩) মধ্যযুগীয় ভক্তিরসের ধারা বাংলা অনুবাদ-সাহিত্যকে কীভাবে নিয়ন্ত্রিত করেছে,সে বিষয়ে বিস্তারিত আলোচনা করুন ।

৪) ষোড়শ শতককে বাংলা সাহিত্যের স্বর্ণযুগ বলার বিশিষ্ট কারনগুলি ব্যাখ্যা করে এই কালের অন্তত দুটি সাহিত্যকীর্তির সম্যক্ বিশ্লেষণ করুন ।

৫) ''ভারতচন্দ্র ও রামপ্রসাদের সাহিত্যগুলির সূত্র ধরেই ঊনিশ শতকের মানবতাবাদের সূচনা'' - মন্তব্যটির যৌক্তিকতা উপযুক্ত তথ্য সহযোগে বিশ্লেষণ করুন ।

গ - বিভাগ

(য কোনো একটি প্রশ্নের উত্তর দিন) ৫০

৬) বাংলা গীতিকবিতার আসরে 'ভোরের পাখি' কাকে বলা হয় ? তাঁকে এই অভিধায় কে ভূষিত করেছেন? এই কবির অবদান সম্পর্কে বিস্তারিত আলোচনা করুন ।

৭) ''মানিক বন্দ্যোপাধ্যায়ের উপন্যাসগুলিতে সাধারন মানুষের সাধারন জীবনযাত্রাই মুখ্য উপজীব্য''। তাঁর রচিত দুটি উপন্যাস সহযোগে বক্তব্যটি বিশ্লেষণ করুন ।

৮) নারীজীবনে স্বাভাবিক চাহিদার 'চাপান-উতোর'-এ সৃষ্ট সামাজিক সংঘর্ষই আশাপূর্ণাদেবীর 'ত্রয়ী' উপন্যাসের মূল ভিত্তি - বিশ্লেষণ করুন ।

BENGALI-Paper-II

Time Allowed-3 Hours *Full Marks-200*

If the questions attempted are in excess of the Prescribed number ,only the questions attempted first upto the prescribed number shall be valued and the remaining ones ignored.

(উত্তর সাধু বা চলিত যে কোনো একটি ভাষারীতিতে হওয়া বাঞ্ছনীয়)

ক - বিভাগ

(যে কোনো তিনটি প্রশ্নের উত্তর লিখুন) ৪০x৩

১) বৈষ্ণব পদাবলী-তে ' অভিসার ' কাকে বলে? এই পর্যায়ের শ্রেষ্ঠ পদকর্তা কে? উপযুক্ত উদাহরণসহ তিনজন পদকর্তা-রচিত অভিসার পর্যায়ের একাধিক পদ বিষয়ে আলোচনা করুন ।

২) 'মেঘনাদবধ' কাব্যে,প্রমীলা চরিত্রাঙ্কনে মধুসূদন দত্ত যে দক্ষতার পরিচয় দিয়েছেন,সে বিষয়ে উদাহরণসহ আলোচনা করুন ।

৩) 'রজনী' উপন্যাসে বঙ্কিমচন্দ্র চট্টোপাধ্যায় যে উপন্যাসের চরিত্রগুলিকেই বক্তার আসনে বসিয়েছেন,এই বিশেষ কৌশলটি উপন্যাসটির শিল্পগত স্বার্থকতার পক্ষে কতদূর ফলপ্রসূ হয়েছে তা ব্যাখ্যা করুন।

৪) 'বঙ্গদেশের কৃষক ' প্রবন্ধে পরাণ মন্ডল নামের এক কৃষককে অবলম্বন ক'রে বঙ্কিমচন্দ্র বাংলাদেশের কৃষকদের দূর্ভাগ্যের যে বর্ণনা করেছেন , তা ব্যক্ত করুন ।

৫) 'পুনশ্চ' কাব্যে রবীন্দ্রনাথ ঠাকুর গদ্যছন্দে যে আখ্যানমূলক কবিতাগুলি রচনা করেছেন , তারমধ্যে তিনটি কবিতা বিশ্লেষণ ক'রে দেখান, যে,উক্ত কবিতাগুলির ক্ষেত্রে বিষয় এবং ছন্দের সামঞ্জস্য সাধিত হয়েছে কি না।

খ-বিভাগ

(যে কোনো দুটি প্রশ্নের উত্তর দিন) ৪০x২

১) 'গৃহদাহ' উপন্যাসে মহিম এবং সুরেশের প্রতি অচলার যে দোলাচল চিত্তবৃত্তির পরিচয় শরৎচন্দ্র দিয়েছেন,সেই বিষয়টি ব্যাখ্যা করুন এবং উপন্যাসটির পরিনতি নির্ধারনের পক্ষে উক্ত দোলাচলতার ভূমিকা নির্দেশ করুন ।

২) 'এবং ইন্দ্রজিৎ' নাটকটিকে সম্পূর্ণভাবে 'অ্যাবসার্ড নাটক' আখ্যা দেওয়া যায় কিনা, সে বিষয়ে যুক্তিসিদ্ধ আলোচনা করুন ।

৩) 'আবার আসিব ফিরে' কবিতায় কবি বাংলাদেশের প্রকৃতির যে বিশিষ্টরূপ ফুটিয়ে তুলেছেন,তা নিজের ভাষায় ব্যক্ত করুন ।

2018

BOTANY – PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be written either in **English** or in **Bengali** or in **Nepali** but all answers must be in one and the same language

GROUP-A

Answer any four from the following

1. Answer briefly : (Any four)

   (a) Process of conjugation in bacteria. 10

   (b) Cell wall of eubacteria(gm+ve& gm-ve) and archebacteria. 3+3+4

   (c) Generation time & Growth curve in bacteria. 5+5

   (d) Ultrastructure of flagella of prokaryotic and eukaryotic algae. 5+5

   (e) Range of thallus structure in chlorophycean algae. 10

   (f) Cell wall structure of diatom. 10

2. Write brief notes on : (Any four)

   (a) Bipolar and tetrapolar heterothallism in fungi. 5+5

   (b) Role of mycorrhiza in chemical communication of forest vegetation. 10

   (c) Different types of Lichen and vegetative propagule of Lichen. 5+5

   (d) Principles of mass cultivation in algae. 10

   (e) Phycotoxins and some natural events of fish poisoning. 10

   (f) Parasexuality. 10

3. Explain any four of the following :

   (a) Physicochemical characteristics of TMV. 10

   (b) Antithetic theory. 10

   (c) NPC classification of Erdtman. 10

   (d) Disease cycle of Brown Spot of rice. 10

   (e) Fungal sources for antibiotics and vitamins. 10

   (f) Salient features of Lyginopteris. 10

4. Write brief notes on : (Any four)

   (a) Describe Geologic time scale diagrammatically and mention distribution of plant kingdom along ages. 5+5

   (b) Origin of seed habit. 10

   (c) Ex-situ conservation. 10

   (d) Disease triangle. 10

   (e) Role of bryophytes in pollution monitoring. 10

   (f) Tunica corpus theory. 10

5. Compare between : (Any four)

(a) Polyembryony & Pseudopolyembryony. 5+5

(b) Autogenic and Allogenic succession. 10

(c) Inverted vascular bundle & medullary bundle 5+5

(d) Fusiform initial and ray initial. 5+5

(e) Collenchyma and sclerenchyma 5+5

(f) Ecotone and edge effect. 5+5

GROUP-B

Answer any two from the following

6. Comment on :

(a) Mention diagonostic features of Orchidaceae and Solanaceae. 6+4

(b) Define :-

(i) Plasmodesmata.

(ii) Commensalism.

(iii) Psammosere.

(iv) Allelopathy. 2½x4

7. Describe very briefly :

(a) (i) Fruit of Poaceae.

(ii) Stamens of Cruciferae.

(iii) Anisocytic stoma. 3+3+4

(b) (i) Adaptive features of halophytes.

(ii) Distinguish between viroids and prions. 5+5

8. Explain in brief :

(a) Age and Area hypothesis. 10

(b) Role of phytochemistry in taxonomy. 10

2018

BOTANY – PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be written either in **English** or in **Bengali** or in **Nepali** but all answers must be in one and the same language

ANSWER ANY FIVE QUESTIONS.

1. Answer any four :-

a) Write Short answer - 2x5

i) Under what circumstances R.Q. of plant tissue may become zero and infinity.

ii) What is Emerson effect ?

iii) Why is CO_2 compensation point low in C_4 plants ?

iv) What is Hill reaction ?

v) At which specific step does molecular oxygen participate in aerobic respiration ?

b) Explain the role of the followings :- 5x2

i) Phytochrome in flowering.

ii) Auxin in phototropism.

c) Distinguish between :- 5x2

i) Z DNA and B DNA

ii) Translocation and Inversion.

d) What is meant by genetic code ? Establish that genetic code is Universal and non overlapping. 3+3+4

e) i) Mention the similarities and dissimilarities between CAM and C_4 plants.

ii) Describe the Organic acid metabolic pathway in CAM plants. 4+6

2. Answer any four :-

a) i) How many oxidative reactions take place in photorespiration ? What are the sites, substrates, enzymes and products of these oxidative reactions.

ii) What are phospholipids ? Where do they occur in plants ? Give example each of saturated and unsaturated fatty acids. 5+5

b) i) What is Operon ? Explain the regulatory mechanism of Lac Operon in the presence of Lactose.

ii) What is transduction ? How does it help to establish that DNA is the genetic material. 5+5

c) What is G_0 phase ? Discuss its relationship with G_1 phase. Discuss the role of cyclin in cell cycle. 2+4+4

P.T.O.

d) Write notes on the followings : 5x2

i) Semiconservative DNA replication.

ii) Epistasis.

e) i) Discuss the role of RNA polymerases in protein synthesis.

ii) Discuss different methods of germplasm maintenance.

5+5

3. Answer any four :-

a) i) How carotene differs from Xanthophyll ? Mention the biological significance of carotenoid pigments.

ii) Define free radicals citing examples. Mention the role of free radicals in plant metabolism.

5+5

b) A cross is made between a heterozygote ABC/abc and a recessive homozygote abc/abc. 1280 progeny were analysed, giving the result below. Determine the order of three genes A, B and C. Mention their distance and calculate the co-incidence and interference.

ABC	= 413	Abc	= 170
abc	= 426	aBC	= 161
ABc	= 6	AbC	= 47
abC	= 3	aBc	= 54

7+2+1

c) i) What is Somatic embryogenesis ? Discuss the importance of zygotic embryo culture.

ii) What are the common methods of transfer of genes in plants ?

5+5

d) i) Distinguish between cyclic and non cyclic photophospharylation.

ii) Outline the Process of Synthesis of amino acids by Gs-GoGAT enzyme system.

3+7

e) Write short notes on :- 5x2

i) Use of DNA markers in plant breeding.

ii) Heterosis and hybrid seed production.

4. a) Write down the principles and applications of UV-Visible Spectrophotometry and deferential centrifugation. 5+5

b) i) Enumerate the structure and function of di-nitrogenase complex.

ii) 'The Calvin Cycle is autocatalytic in nature'. — explain.

5+5

c) i) Discuss the role of Ca^{2+} as second messenger with reference to signal transduction pathway.

ii) How Km value of an enzyme can be determined with the help of an equation of straight line.

5+5

Contd..P/3.

d) i) What are crude drugs ? Write down the differences between primary and secondary metabolites. 2+3

ii) Give an outline of interrelationship of basic metabolic pathways with secondary metabolite biosynthesis. 5

e) Write short notes on : 5x2

i) Drug evaluation

ii) Importance of pharmacognosy in modern medicine.

5. a) i) Write down the geological or taxonomic evidences for organic evolution.

ii) Explain the concept of RNA world. 5+5

b) Distinguish between mass and pedigree selection methods used in plant breeding. Mention the most useful methods that are employed in plant breeding. 4+6

c) i) Name two bioreactive components of Ipecac sp. 2

ii) Write the species name, family and Order of the Ipecac plant from which the active components are isolated. 3

iii) Draw a flow chart for extraction procedure of bioactive components. 5

d) i) What is the Principle of Western blotting ? 3

ii) Explain (with diagram) the Working Principle of compound microscope. 4

iii) Differentiate between Southern and Northern blotting. 3

e) Distinguish between :-

i) Non competitive and Un competitive enzyme inhibition. 4

ii) Nitrification and Ammonification. 3

iii) Nif gene and Nod gene. 3

6. a) Write short notes on : 5x2

i) Nucleosome model of chromosome.

ii) Point mutation.

b) Enumerate the differences between fats and oils. Write a comprehensive note on the types of lipids available in plants. Distinguish between saturated and unsaturated fatty acids. 2+6+2

c) Write a brief note on : 5x2

i) Transgenic plants

ii) Micropropagation

d) Compare between <u>any two</u> : 5x2

i) Lyases and Ligases group of enzymes.

ii) Action spectrum and absorption spectrum.

iii) Glycolipid and phospholipid.

e) Explain —— 5x2

i) 'In aerobic organisms, the Citric acid cycle is an amphibolic pathway'.

ii) 'Photorespiration also called peroxisomal respiration'.

7. a) i) A test cross between F_1 (C_c S_s) corn heterozygous for colour and full endosperm with a corn homozygous and recessive for colourless shrunken, show the following result ——

Colour full -- 4032 Colourless full -- 152

Colour shrunken - 149 Colourless Shrunken - 4035

Are these two genes for colour and shape of the endosperm present in same or different chromosome ? Show the map distance between the 2 (two) genes. 5

ii) Describe allopolyploidy. 5

b) Describe briefly —— 5x2

i) Protin sequence databases.

ii) Maintenance of germplasm.

c) i) Classify Enzymes according to IUBMB. 5

ii) Comment on allosteric enzyme regulation. 5

d) i) Name 2 (two) plant oncogenes and state their functions. 4

ii) What are the meiotic consequence of translocation ? 3

iii) Define 'split gene'. 3

e) Write the principles of the following : 2½x4

i) Electron microscopy.

ii) Colorimetry.

iii) RT - PCR

iv) ELISA

2018

COMMERCE AND ACCOUNTANCY - PAPER - I

Time Allowed : 3 Hours Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Answer one question each from the following five groups :-

GROUP - A

1. (a) What are the procedures for issuing Accounting Standard ?

(b) Who are the users of accounting information ?

(c) What are the qualitative characteristics of financial statements ?

(d) What are the needs for providing depreciation ?

(e) On 1.1.2015, a new plant was purchased by Mrs. Kalyani Basu for Rs.1,00,000 and a further sum of Rs.5,000 was spent on its installation. On 1.6.2016, another plant was acquired for Rs.65,000.

On 2.10.2017, the first plant was totally destroyed and the amount of Rs.2,500 only was realised by selling the scrap. It was not insured. On 20.10.2017, a second hand plant was purchased for Rs.75,000 and a further sum of Rs.7,500 was spent on repairs and Rs.2,500 on its erection. It came into use on 15.11.2017. Depreciation has been provided at 10% on the original cost annually on 31st December. It was the practice to provide depreciation for full year on all acquisitions made at any time during any year and to ignore depreciation on any item sold during the year. The accounts are closed annually on 31st December. In December 2017, it was decided to change the method of depreciation and to follow the rate of 15% on diminishing balance method (w.e.f. 1.1.2015). Show Plant Account, Plant Disposal Account and Provision for Depreciation Account for 3 years. 5+5+5+5+20

2. The following is the Receipts and Payments Account of Sydney Club for the year ended 31st March, 2017 :-

Receipts	Rs.	Payments	Rs.
Opening Balance :		Salaries	1,20,000
Cash	10,000	Creditors	15,20,000
Bank	3,850	Printing & Stationery	70,000
Subscriptions Received	2,02,750	Postage	40,000
Entrance Donation	1,00,000	Telephones & Telex	52,000
Interest Received	58,000	Repairs & Maintenance	48,000
Sale of Assets	8,000	Glass & Table Linen	12,000
Miscellaneous Income	9,000	Crockery & Cutlery	14,000
Receipts at :		Garden Upkeep	8,000
Coffee Room	10,70,000	Membership Fees	4,000
Wines and Spirits	5,10,000	Insurance	5,000
Swimming Pool	80,000	Electricity	28,000
Tennis Court	1,02,000	Closing Balance :	
		Cash	8,000
		Bank	2,24,600
	21,53,600		21,53,600

P. T. O.

The Assets and Liabilities as on 01.04.2016 were as follows :-

Particulars	Rs.	Particulars	Rs.
Fixed Assets (net)	5,00,000	Sundry Creditors	1,12,000
Stock	3,80,000	Subscriptions Received in Advance	15,000
Investment in 12% Government Securities	5,00,000	Entrance Donation Received pending Membership	1,00,000
Outstanding Subscriptions	12,000	Gratuity Fund	1,50,000
Prepaid Insurance	1,000		

The following adjustments are to be made while drawing up the Accounts :

(i) Subscriptions received in advance as on 31st March, 2017 was Rs.18,000.

(ii) Outstanding subscriptions as on 31st March, 2017 was Rs.7,000.

(iii) Outstanding expenses are salaries Rs.8,000 and electricity Rs.15,000.

(iv) Fifty per cent of the Entrance Donation was to be capitalised. There was no pending membership as on 31st March, 2017.

(v) The value of assets sold (net) as on 01.04.2016 was Rs.10,000.

(vi) Depreciation is to be provided at the rate of 10% on assets.

(vii) A sum of Rs.20,000 received in October 2016 as entrance Donation from an applicant was to be refunded as he has not fulfilled the requisite membership qualifications. The refund was made on 03.06.2017.

(viii) Purchases made during the year amounted to Rs.15,00,000.

(ix) The value of closing stock was Rs.2,10,000.

(x) The club as a matter of policy charges-off to Income and Expenditure Account all purchases made on account of crockery, cutlery, glass and linen in the year of purchase.

You are required to prepare an Income and Expenditure Account for the year ended 31st March, 2017 and the Balance Sheet as on 31st March, 2017 alongwith necessary workings. 25 + 15

GROUP - B

3. (a) X Ltd. offered 10,000 equity shares of Rs.10 each for subscription at a premium of Rs.2 per share payable as follows :-

On application Rs.2, on allotment Rs.5 (including premium), on first call Rs.2, and on final call Rs.3.

The Company received applications of 15,000 shares and allotment was made pro-rata to the applicants of 12,000 shares, the remaining applications being refused. The excess application money was adjusted on account of sums due on allotment.

Kapil to whom 500 shares were allotted failed to pay the allotment money and on his subsequent failure to pay the first call money his shares were forfeited. Srinath who originally applied for 300 shares failed to pay the two calls and his shares were also forfeited after the final call.

Subsequently, out of these forfeited shares 600 shares (including all shares of Kapil) were re-issued to Sharma as fully paid up at Rs.9 per share.

Show the Cash Book, the Journal Entries and the Balance Sheet of the Company as per Schedule III to the Companies Act, 2013 to give effect to the above.

(b) What do you mean by issue of shares for consideration other than cash ? Illustrate with an example. 30 + 10

Contd...P/3.

4. On 1st July, 2017 Maharaja Ltd. acquired 8,000 shares of ₹.10 each of Praja Ltd. at ₹.1,00,000. Their respective Balance Sheets on 31.12.2017 were as follows :-

Balance Sheets of Maharaja Ltd. & Praja Ltd. as at 31st Dec.,'17

Particulars	Maharaja Ltd. (₹.)	Praja Ltd. (₹.)
EQUITY AND LIABILITIES		
(1) Shareholders' Funds :		
(a) Share Capital-Equity Share of ₹.10 each	2,00,000	1,00,000
(b) Reserves and Surplus :		
General Reserve	30,000	40,000
Profit & Loss Account	70,000	60,000
(2) Share Application Money Pending Allotment :	--	--
(3) Non-current Liabilities :	--	--
(4) Current Liabilities :		
(a) Short-term Borrowings	--	--
(b) Trade Payables : Creditors	25,000	15,000
Bills Payable (Accepted-all are in favour of Maharaja Ltd.)	--	5,000
Total =	3,25,000	2,20,000
ASSETS		
(1) Non-current Assets :		
(a) Fixed Assets		
(i) Tangible Assets-Land & Building	1,00,000	1,00,000
(b) Non-current investments-8,000 equity shares of Praja Ltd.	1,00,000	--
(2) Current Assets :		
(a) Current Investments	--	--
(b) Inventories - Stock	50,000	40,000
(c) Trade Receivables :		
Debtors	65,000	70,000
Bills Receivable (Received from Praja Ltd.)	5,000	--
(d) Cash & Cash Equivalents -		
Cash at Bank	5,000	10,000
Total =	3,25,000	2,20,000

Additional Information :-

(a) At the time of acquiring shares, Praja Ltd. had ₹.15,000 in Reserve and on 1.1.2017 Praja Ltd. had ₹.20,000 in Profit & Loss Account.

(b) Praja Ltd. paid 10% dividend in July for the year 2016 and Maharaja Ltd. credited the share of dividend to their Profit and Loss Account.

(c) On the date of acquisition of shares, Land and Building of Praja Ltd. stood at ₹.1,20,000 on 1.1.2017 these were revalued at ₹.1,40,000. Stock of Praja Ltd. includes ₹.12,000 on which Maharaja Ltd. made a profit of 25% on sales.

(d) Proposed Dividend of both the companies for 2017 is 10%.

Prepare a Consolidated Balance Sheet as on 31st December, 2017.(40)

P. T. O.

GROUP - C

5. (a) The standard cost of one Widget was made up as follows :-

Direct labour 4 hours @ ₨.45 per hour
Direct materials 3 kg. @ ₨.24 per kg.
The factory employs 25 workers, each work a 40-hour week :
20 of the workers are paid ₨.46 per hour
5 of the workers are paid ₨.42 per hour
During the four-week period ending 1st June, the factory produced 1006 units. There were no breakdowns or absenteism during the period.
3200 kg. of the materials were used, at a total cost of ₨.75,000.

Calculate :

(i) Direct labour cost variance ;
(ii) Direct labour efficiency variance ;
(iii) Direct labour rate variance ;
(iv) Direct materials cost variance ;
(v) Direct materials usage variance ; and
(vi) Direct materials price variance.

Note : Your variances must refer to the total output of 1006 units.

(b) Two manufacturing companies which have the following operating details decide to merge :-

	Company 1	Company 2
Capacity utilization (%)	90	60
Sales (₨. Lakhs)	540	300
Variable Costs (₨.Lakhs)	396	225
Fixed Costs (₨. Lakhs)	80	50

Assuming that the proposal is implemented,
Calculate :

(i) Break-even sales of merged plant and the capacity utilization at that stage.
(ii) Profitability of the merged plant at 80% capacity utilisation.
(iii) Sales turnover of the merged plant to earn a profit of ₨.75 lakhs.
(iv) When the merged plant is working at a capacity to earn a profit of ₨.75 lakhs, what percentage increase in selling price is required to sustain an increase of 5% in fixed overheads ? 20 + 20

6. (a) From the following particulars prepare the Balance Sheet of Robin Hood Ltd. as at 31st March, 2018 :-

Current Ratio	2
Working Capital	₨. 4,00,000
Capital Employed to current assets	3 : 2
Fixed assets to Turnover	1 : 3
Sales Cash/Credit	1 : 2
Creditors velocity	2 months
Inventories velocity	2 months
Debtors' velocity	3 months

Capital Employed :
Net Profit 10% of Turnover, General Reserve 2.5% of Turnover
Debenture/Share Capital-1 : 2, Gross Profit Ratio-25% (to Sales)

(b) The following figures have been extracted from the books of X Limited for the year ended on 31.3.2018. You are required to prepare a Cash Flow Statement.

(i) Net profit before taking into account income tax and income from law suits but after taking into account the following items was ₨.20 lakhs.

(a) Depreciation on Fixed Assets ₨.5 lakhs.
(b) Discount on issue of Debentures written off ₨.30,000.
(c) Interest on Debentures paid ₨.3,50,000.
(d) Book value of investments ₨.3 lakhs (sale of investments for ₨.3,20,000).

Contd...P/5.

(e) Interest received on investments Rs.60,000.
(f) Compensation received Rs.90,000 by the company in a suit filed.

(ii) Income tax paid during the year Rs.10,50,000.

(iii) 15,000, 10% preference shares of Rs.100 each were redeemed on 31.3.2018 at a premium of 5%. Further the company issued 50,000 equity shares of Rs.10 each at a premium of 20% on 2.4.2017. Dividend on preference shares were paid at the time of redemption.

(iv) Dividends paid for the year 2016-17 Rs.5 lakhs and interim dividend paid Rs.3 lakhs for the year 2015-16.

(v) Land was purchased on 2.4.2017 for Rs.2,40,000 for which the company issued 20,000 equity shares of Rs.10 each at a premium of 20% to the land owner as consideration.

(vi) Current assets and current liabilities in the beginning and at the end of the year were as detailed below :-

Particulars	as on 31.3.'17(Rs.)	as on 31.3.'18(Rs.)
Stock	12,00,000	13,18,000
Sundry Debtors	2,08,000	2,13,100
Cash in Hand	1,96,300	35,300
Bills Receivable	50,000	40,000
Bills Payable	45,000	40,000
Sundry Creditors	1,66,000	1,71,300
Outstanding Expenses	75,000	81,800

GROUP - D

20 + 20

7. Ms. Piyali is a Chartered Accountant in practice. She maintains her accounts on cash basis. Her Income and Expenditure Account for the year ended March 31, 2018 reads as follows :-

Expenditure	Rs.	Income	Rs.	Rs.
Salary to staff	5,50,000	Fees earned :		
Stipend to articled assistants	37,000	Audit	7,88,000	
Incentive to articled assistants	3,000	Taxation services	5,40,300	
Office rent	24,000	Consultance	2,70,000	15,98,300
Printing & Stationery	22,000	Dividend on shares of Indian Companies(Gross)		10,000
Meeting, seminar and conference	31,600	Income from Unit Trust of India		7,600
Purchase of car	80,000	Honorarium received from various institutions for valuation of answer papers		15,800
Repairs, maintenance and petrol of car	4,000	Rent received from residential flat let out		85,600
Travelling expenses	35,000			
Municipal tax paid in respect of house property	3,000			
Net Profit	9,27,700			
	17,17,300			17,17,300

Other information :

(i) Allowable rate of depreciation on motor car is 15%.
(ii) Value of benefits received from clients during the course of profession is Rs.10,500.
(iii) Incentives to articled assistants represent amount paid to two articled assistants for passing IPCC Examination at first attempt.
(iv) Repairs and maintenance of car include Rs.2,000 for the period from 1.10.2017 to 30.9.2018.
(v) Salary include Rs.30,000 to a computer specialist in cash for assisting Ms. Piyali in one professional assignment.
(vi) The total travelling expenses including on foreign tour was Rs.32,000 which was within the RBI norms.

P. T. O.

(vii) Medical Insurance premium on the health of dependent brother and major son dependent on her amounts to ₹.5,000 and ₹.10,000 respectively, paid in cash.

(viii) She invested an amount of ₹.10,000 in National Savings Certificate.

Compute the total income of Ms. Piyali for the assessment year 2018-19. 40

8. (a) Mr. Sriman has two sons. He is in receipt of children education allowance of ₹.150 p.m. for his elder son and ₹.70 p.m. for younger son. Both his sons are going to school. He also receives the following allowances :-

Transport allowance : ₹.1,800 p.m.
Tribal area allowance : ₹.500 p.m.

Compute his taxable allowances.

(b) From the following details, find out the salary chargeable to tax of Mr. Ahmed for the assessment year 2018-19 :-

Mr. Ahmed is a regular employee of Malpani Ltd. in Mumbai. He was appointed on 1.3.2017 in the scale of ₹.25,000 - ₹.2,500 - ₹.35,000. He is paid dearness allowance (which forms part of salary for retirement benefits) @ 15% of basic pay and bonus equivalent to one and a half month's basic pay as at the end of the year. He contributes 18% of his salary (basic pay plus dearness allowance) towards recognized provident fund and the company contributes the same amount. He is provided with free housing facility which has been taken on rent by the company at ₹.15,000 per month. He is also provided with following facilities :-

(i) The company reimbursed the medical treatment bill of ₹.40,000 of his daughter, who is dependent on him.
(ii) The monthly salary of ₹.2,000 of a house keeper is reimbursed by the company.
(iii) He is getting telephone allowance @ ₹.1,000 per month.
(iv) A gift voucher of ₹.4,700 was given on the occasion of his marriage anniversary.
(v) The company pays medical include premium to effect an insurance on the health of Mr. Ahmed ₹.12,000.
(vi) Motor car running and maintenance charges of ₹.36,600 fully paid by employer. (The motor car is owned and driven by Mr. Ahmed. The engine cubic capacity is below 1.60 litres. The motor car is used for both official and personal purpose by the employee).
(vii) Value of free lunch provided during office hours is ₹.2,200. 10 + 30

GROUP - E

9. (a) Andrew Yule of Kolkata provides the following information for the month of December, 2016 :-

(i) Purchase of raw materials from the local market (excluding VAT @ 4%) ₹.90,00,000.
(ii) Half of the goods manufactured from the above materials were exported at a sale price of ₹.50,00,000.
(iii) Balance goods were given on lease to Mr. Ramesh of Delhi at a deemed sale price of ₹.70,00,000 (excluding VAT @ 12.5%).

You may assume that exports are subject to zero rate of tax and input tax credit of tax paid on raw materials used in the manufacture of leased goods is available immediately. Compute the amount of net VAT payable/refund and input tax credit for the month of December, 2016. 15

Contd...P/7.

(b) Compute the taxable turnover and the tax liability of Mr. Ashim under CST Act, assuming that the VAT rate within the state is 4%.
Total inter-state sales during the financial year 2016-17 were Rs.25,00,000 inclusive of CST.
The sales do not include the following :-
(i) Goods worth Rs.50,000 provided as free samples to Mr.D of Delhi.
(ii) Sale of goods amounting to Rs.1,50,000 to Mr.David, a foreign tourist.
(iii) Despatch of goods worth Rs.2,00,000 to Mr.Ashim's branch located in another state.
(iv) Hypothecation of the goods worth Rs.12,00,000 for a working capital loan from SBI amounting to Rs.10,00,000. 15

(c) State any five purchases eligible for availing input tax credit. 10

10. (a) The capital structure of a company consists of 20,000 equity shares of Rs.10 each fully paid up and 1,000, 8% redeemable preference shares of Rs.100 each fully paid up. Undistributed reserve and surplus stood as : General Reserve Rs.80,000, profit and loss account Rs.10,000, Investment Allowance Reserve (out of which Rs.5,000, not free for distribution as dividend) Rs.10,000, Securities Premium Rs.12,000. Cash at bank amounted to Rs.98,000. Preference shares are to be redeemed at a premium of 10% and for the purpose of redemption, the directors are empowered to make fresh issue of equity shares at par after utilising the undistributed reserve and surplus, subject to the condition that a sum of Rs.10,000 shall be retained in general reserve and which should not be utilised.

Pass Journal Entries to give effect to the above arrangements and also show the extract of the Balance Sheet of the Company after the redemption carried out.

(b) On 1st July 2014, H.P. Ltd. issued 2,000, 6% Debentures of Rs.100 each. The interest is payable on 30th June and 31st December every year. The company is allowed to purchase its own debentures which may be cancelled or kept or re-issued at the company's option. The company made the following purchases by cheque in the open market.

On 31st May 2015, 200 Debentures @ Rs.98 ex-interest. On 30th September 2016, 100 Debentures @ Rs.97 cum-interest. The debentures, which were purchased on 31st May 2015, were cancelled on 31st December 2016. All payments were made on due dates.

Pass necessary Journal Entries to record the above transactions (including receipts and payments).

(c) Delight Ltd. decided to buy back 60,000 of the equity shares of Rs.10 each at a premium of 25%. For this, it issues 5,000, 7.5% Preference Shares of Rs.100 each at par. The company has Rs.80,000 in General Reserve, Rs.1,00,000 in Profit and Loss Account (Cr.), Rs.1,20,000 in Capital Reserve and Rs.1,00,000 in security premium. It decided to utilise profits and reserves also. Give Journal Entries assuming that the transactions have been duly carried out.

(d) The Directors of P Ltd., a fashion wholeseller, are reviewing the company's draft financial statements for the year ended 31st March, 2017, which show a profit of Rs.90,00,000 before tax. The following matters require consideration :

(i) The closing inventory includes :-

I. 3,000 shirts at cost of Rs.4,00,000. Since the Balance Sheet date they have all been sold for Rs.6,50,000, with selling expenses of Rs.30,000.

II. 2,000 jackets at cost of ₨.6,00,000. Since Balance Sheet date half of the jackets have been sold for ₨.2,50,000 (selling expenses ₨.18,000) and the remainder are expected to sell for ₨.2,00,000 with selling expenses of ₨.20,000.

(ii) An employee dismissed in January 2017 began an action for damages for wrongful dismissal in April 2017. He is claiming ₨.10,00,000 as damages. P Ltd. is defending the claim and the company's lawyer has advised that the employee has a 30% chance of sucess in his claim. The financial statements currently include a provision for ₨.10,00,000 claim.

Required :-

Explain to the Directors how these matter should be treated in the financial statements for the year ended on 31st March, 2017, stating the relevant accounting standard. 10 x 4

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2018

COMMERCE AND ACCOUNTANCY - PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP - A

Answer Question No.1 and any one from the rest.

1. (a) What are the roles of finance in an economy ? 16
   (b) What are the objectives of financial system ? 8
   (c) What is meant by financial system ? Discuss the main components of the Indian financial system. 16

2. What do you mean by Financial Innovations ? Discuss the role of financial innovations in sustainable development of an economic system. State, in brief, recent financial innovations in Indian economy. 8+16+8

3. (a) Give a brief idea about IFCI Ltd. and discuss its main functions. 16
   (b) State the objectives and main functions of SIDBI. 16

4. (a) What is private placement ? Elaborate the different types of private placement. 16
   (b) Elaborate upon the IPO Grading Process in the context of public issues. What are the limitations of IPO Grading ? 16

GROUP - B

Answer any two questions

5. (a) What do you understand by capacity to contract ? What is the effect of any agreement made by persons not qualified to contract ? 16
   (b) What are agreements by way of wager ? What are the legal consequences that flow from an arrangement by way of wager ? 16

6. (a) "Directors are not only agents, but are also in some sense trustee of the Company". Discuss. 16
   (b) What is a 'Prospectus' ? What does it contain ? What is 'misstatement in a prospectus' ? Who is liable ? what is the nature of liability ? 16

7. (a) What do you understand by 'industrial dispute' as defined in the Industrial Disputes Act, 1947 ? Who can raise a dispute? 16
   (b) Distinguish between Strikes and Lock outs. What are the restrictions imposed on strikes and lock outs under the Industrial Disputes Act, 1947 ? 16

8. (a) State the Composition and objective of State Consumer Protection Council. 16
   (b) Discuss the procedures on settlement of disputes on receipt of Complaint. 16

P. T. O.

GROUP - C

Answer any one question

9. (a) "An auditor is not a valuer though he is intimately connected with values". Discuss referring to the relevant case decisions. 16

(b) What do you mean by 'teeming and lading' ? What is the duty of an auditor in this respect ? 16

10. (a) How is audit dependent on Internal Control ? Can external auditor rely on internal auditor ? 16

(b) What are the different types of audit report ? How are they different ? 16

GROUP - D

Answer any one question

11. (a) Define 'formal' and 'informal'organisation. 8

"Organisation is a process" — Discuss. 8

(b) Compare between X-theory and Y-theory as enunciated by McGregor. 8

State the criticisms faced by the McGregor's X-theory and Y-theory. 8

12. (a) What are the qualities/traits that should be possessed by a leader ? 16

(b) Is leadership situational ? Discuss various situational theories of Leadership. 16

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2018

CIVIL ENGINEERING - PAPER-I

Time Allowed : 3 Hours

Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

All notations/symbols have their usual meanings, unless otherwise specified

GROUP - A

Answer any four questions

1. (a) A footing 2m square, rests on a soft clay soil, with its base at a depth of 1.5m from ground surface. The clay stratum is 3.5m thick and is underlain by a firm sand stratum. The clay soil has LL = 30%, G = 2.7, water content at saturation = 40%, cohesion = 0.5kg./cm^2(ϕ = 0). It is found that the clay stratum is normally consolidated. Compute the settlement that would result if the load intensity equal to safe bearing of soil were allowed to act on the footing. Natural water table is quite close to the ground surface. For given conditions, bearing capacity factor (N_c) is obtained as 6.9. Take factor of safety as 3. Assume load spread of 2(vertical) to 1(horizontal). 20

   (b) A vertical bank was formed during the excavation of a soil having ϕ = 15° and unit weight of 1800 kg/m^3. When the depth of excavation reached 5.5 m, the bank failed. What was the approximate value of the cohesion of the clay ? 15

2. (a) At a given site the subsoil consists of a 10m thick homogeneous sand stratum. The dry density of the sand is 15.5 kN/m^3 and its angle of internal friction is 32 . The specific gravity of solids is 2.68. Initially the ground water table is at 6.5m below the ground level.

   (i) Determine the shear strength of the sand on horizontal plane through its middle ; and

   (ii) Find the percent change in the shear strength if the ground water table rises to a level of 1.5m below GL during monsoon. Assume the void ratio to remain unchanged.

   5 + 10

   (b) The following results were obtained from a standard proctor test : Given that, the internal diameter and height of the mould were 10cm and 12.7cm respectively. The mass of the empty mould = 1.89 kg. and G = 2.68.

No. of Test	1	2	3	4	5	6
Mass of mould and soil (g)	3526	3711	3797	3906	3924	3882
Water content (%)	8.33	10.40	12.23	16.20	17.92	20.39

Plot the compaction curve. Hence determine the optimum moisture content and maximum dry density of the soil. 10

   (c) A vertical concentrated force of 40 kN is acting at a point on the ground surface. Determine the vertical stress intensities due to this load at the following points :-

   (i) At a depth of 2.5m below GL on the line of action of the load ; and

   (ii) At a depth of 1.5m below GL and a radial distance of 3m.

   5 + 5

P.T.O.

3. (a) A continuous beam ABC (Fig.1) is simply supported at A, B and C. The support C is yielding and settles at the rate of 3 mm per 1000 kg. EI = 8×10^{10} kg.cm^2. Analyse the beam and draw bending moment and shear force diagrams. 25

(b) Enumerate the Castigliano's theorems explaining their uses. 10

4. (a) Design a cantilever beam with a clear span of 3m which carries a superimposed load of 15 kN/m. Its depth varies from 500 mm at the fixed end to 150 mm at the free end. Show reinforcements with a neat sketch. Use M 15 mix and mild steel. 20

(b) Design a rectangular beam section subjected to a moment of 60 kN.m. Take M 20 mix and Fe415 grade steel. 15

5. (a) Differentiate between disturbed, undisturbed and representative samples. Also discuss the uses to which such samples can be put to, respectively. 3x3+6

(b) Explain the 'seismic refraction method' for sketching the general ground profile at a given site. 10

(c) A sampling tube has an outer diameter of 75 mm and wall thickness of 1.7 mm. Find the area ratio of the tube, and comment on whether the tube could be used for obtaining undisturbed soil samples. 10

GROUP - B

Answer any four questions

6. Two straight rods, one made of steel and the other of brass hang vertically. Each rod is 1 m long. The rods support a rigid bar horizontally. When a load of 25 kN is placed at 40cm from the steel rod on the horizontal bar, the deflection of the two vertical rods are found to be equal. The centre to centre distance of the steel and brass rods is 1 m. If the areaof steel rod is 3 cm^2, find (a) the area of the other rod, (b) stresses in the rods, and (c) strains in the rods. Take $E_s = 200 \times 10^6$ kN/m^2 and $E_b = 85 \times 10^6$ kN/m^2. 3 x 5

7. A simply supported beam is loaded by the couple of 10 kN.m, as shown in Fig.2. Draw the shearing force and bending moment diagrams due to this loading. 7 + 8

8. In a 16 pile group, the pile diameter is 45 cm and centre to centre spacing of the square group is 1.5m. If C=50 kN/m^2, determine whether the failure would occur with the piles acting indivi-dually, or as a group ? Neglect bearing at the tip of the piles. All piles are 10 m long. Take m=0.7 for shear mobilisation around each pile. 15

9. The Atterberg limits of a clay soil are : LL=52%, PL=30% and SL=18%. If the specimen of this soil shrinks from a volume of 39.5 cm^3 at the liquid limit to a volume of 24.2 cm^3 at the shrinkage limit, calculate the true specific gravity. 15

10. A 10 m thick layer of stiff saturated clay is underlain by a layer of sand. The sand is under artesian pressure, as shown in Fig. 3. Calculate the maximum depth of cut H that can be made in the clay. 15

NOTE : Please find the figures in the next page.

Contd..P/3.

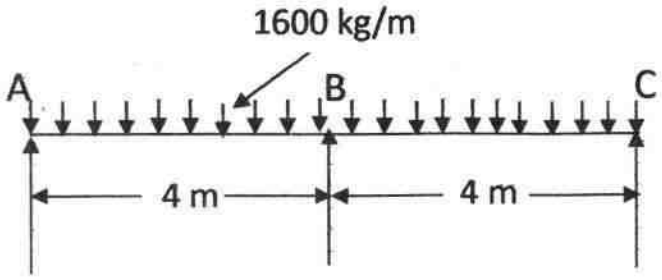


Fig. 1

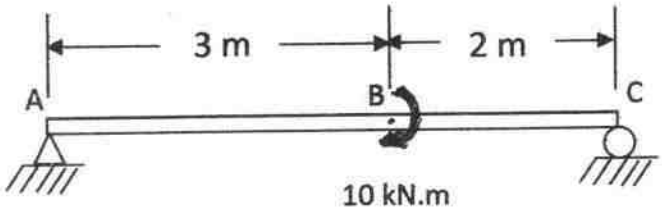


Fig. 2

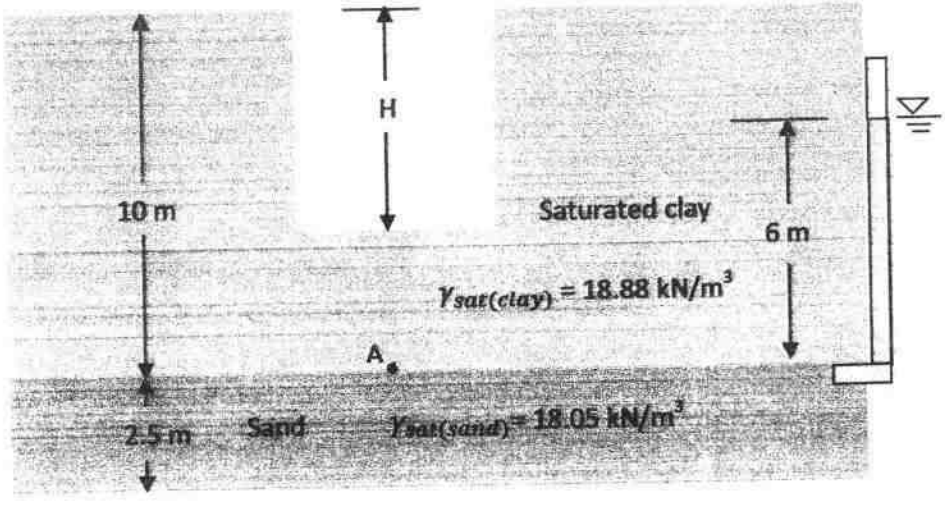


Fig. 3

2018

CIVIL ENGINEERING - PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP - A

Answer any four questions

1. (a) A steel tape was exactly 30 m long at 20° C when supported throughout its length under a pull 15 kg. A line was measured with a pull of 10 kg applied to the tape at a mean temperature of 13° C and found to be 810 m long. The cross sectional area of the tape = 0.03cm^2, total weight of tape = 0.65 kg., α for steel = 11 x 10^{-6}/°C and E for steel = 2.1 x 10^6 kg/cm^2. Compute the true length of the line if the tape was supported during measurement - (i) at every 30 m and (ii) at every 15 m. 12

(b) The following readings are successively taken from an instrument in a leveling work : 0.255, 0.385, 0.520, 1.785, 1.895, 2.300, 1.785, 0.335, 0.858 and 1.255. The position of the instrument was changed after taking 3rd and 6th readings.

Draw out the form of a level field book and enter the above reading properly. Assume the R.L. of the first point as 80.0 m. Calculate the R.L.s of all the points in Rise and Fall system and apply usual arithmetic check. 12

(c) Give the Bessel's graphical solutions to 'three point problem'. When does it fail ? 8

2. (a) Distinguish between hyetograph and hydrograph. 4

(b) Lists the factors affecting a flood hydrograph. Discuss the role of these factors. 2 + 10

(c) What is an Unit Hydrograph (UH) ? State and explain the assumptions involved in the UH theory. 2 + 6

(d) The peak flood hydrograph due to a 3-h duration isolated storm in a catchment is 270 m^3/s. The total depth of rainfall is 5.9 cm. Assuming an average infiltration loss of 0.3 cm/h and constant base flow of 20 m^3/s.

(i) Estimate the peak of the 3-h UH of this catchment.

(ii) If the area of the catchment is 567 km^2 determine the base width of the 3-h UH by assuming it to be triangular shape. 4 + 4

3. (a) With help of a sketch, explain the reactions that happen at different stages of the breakpoint chlorination curve. Also, state the importance of breakpoint chlorination in water treatment. 18

(b) The BOD_5 of a waste has been measured as 600 mg/1. If k_1 = 0.23/day (base e), what is the ultimate BOD_u of the waste ? What proportion of the BOD_u would remain unoxidised after 20 days ? 14

4. (a) (i) Name the tests to measure workability of fresh concrete.

(ii) What is a super plasticizing admixture ?

(iii) What are the three basic qualities of high performance concrete ? Discuss the contradictions.

(iv) What is creep of concrete ? 4 x 4

(b) Briefly answer the following :-

(i) How can an existing bar chart be modified to depict the project progress made ?

(ii) Differentiate between the terms 'Activity' and 'Dummy'.

(iii) Differentiate between 'Forward Planning' and 'Backward Planning' for network construction.

(iv) Differentiate between 'Optimistic time estimate' and 'Pessimistic time estimate'. 4 x 4

5. (a) Explain briefly the Marshall method of bituminous mix design. 14

(b) Discuss Westergaard's concept of temperature stresses in concrete pavements. 14

(c) Explain the procedure for patch repair works in bituminous pavement. 4

6. (a) What is the purpose of intake structure ? What factors should be considered in locating an intake structure and what are the main considerations in the design of an intake structure ? 2 + 3 + 5

(b) Explain briefly with neat sketches different system of layout of water distribution network. Also mention for which town or city, each of the above distribution network is suitable with their advantage(s) and/or disadvantage(s). 12

(c) Write short note on :-

(i) Electrostatic precipitators

(ii) Fabric filters. 5 x 2

GROUP - B

Answer any two questions

7. (a) What is meant by 'Duty' and 'Delta' of canal water ? Derive a relationship between duty and delta for a given base period. 4 + 6

(b) Describe briefly the factors affecting duty. 8

(c) Define - (i) Cash crops
(ii) Field capacity
(iii) Kor water depth
(iv) Overlap allowance. 8

(d) After how many days will you supply water to soil in order to ensure sufficient irrigation of the given crop, if

(i) Field capacity of soil = 28%

(ii) Permanent wilting point = 13%

(iii) Dry density of soil = 1.3 gm/cc

(iv) Effective depth of root zone = 70 cm

(v) Daily consumptive use of water for the given crop=12 mm

Assume any other data, not given. 10

Contd...P/3.

8. (a) Explain briefly the following terms as used in groundwater flow studies :-

(i) Specific yield

(ii) Storage coefficient

(iii) Specific capacity

(iv) Barometric efficienty 4 x 4

(b) Derive the basic differential equation of unsteady groundwater flow in a confined aquifer. State clearly the assumptions involved. 16 + 4

9. (a) What is 'Trunnion axis adjustment' ? Why it is needed ? How the adjustment is done ? 2 + 2 + 12

(b) From a common point A, traverse are conducted on either side of a harbour as follows :-

Line	Length(m)	Bearing
	Traverse - I	
AB	200	85° 26'20"
BC	100	125° 10'40"
	Traverse - 2	
AD	225	175° 50'00"
DE	500	85° 06'40"

Calculate the distance from C to a point F on DE, due south of C and the distance EF. 20

10. (a) Briefly explain five important factors which should be considered for selection of equipment for a construction Project. 10

(b) What is an admixture ? List four different mineral and chemical admixtures. 10

(c) List the factors that influences the basic permissible compressive stresses for masonary for different mortars. Also elaborate the modification due to each factor. 10

(d) Explain the concept of 'Global Positioning System (GPS)'. 6

§§§§§§§§§§§§§§§§

2018

CHEMISTRY - I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the question attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answer may be written either in English or in Bengali but all answers must be in one and the same language.

SECTION-I

This section comprises 15 questions in three Groups. Answer any ten questions taking at least three questions from each group.

GROUP - A

1. Using VSEPR throry predict for structures of

   (a) $NSCl_2^-$ (b) XeF_5^+ (c) BrF_5 (d) O_3

2. Compare the size of S^{2-}, Cl^- and K^+ using Slater's rule.

3. Give four characteristics of a good redox indicator.

4. State Heisenberg's uncertainty principle. Using uncertainty principle, explain why it is never possible for an electron to be present within the nucleus.

5. Derive an expression for the pH of a weak monobasic acid. Hence calculate the pH of a 0.05(M) acetic acid, given that pK_a = 4.74.

4x5

Group - B

6. Write down the expression for the probability of finding a molecule with x-component of velocity in the range between u and u+du. Using Maxwell distribution find an expression for the average speed of gas molecules. Given $\int_0^\infty xe^{-x} = 1$

7. Derive an expression for the number of molecules having kinetic energies between ε and $\varepsilon + d\varepsilon$, where the molecules obey Maxwell's speed distribution.

8. Show that $Z = 1 + 1/RT(b-a/RT)P + a/(RT)^3(2b-a/RT)P^2$ for a gas obeying van der Waals equation of state, where Z is the compressibility factor.

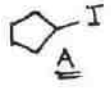
9. Distinguish between the number of atoms in a unit cell of a bcc and fcc lattice.

10. Calculate the separation of (a) the {123} planes and (b) the {246} planes of an orthorhombic unit cell with a = 0.82 nm, b = 0.94 nm, and c = 0.75 nm.

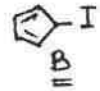
4x5

Group - C

11. The iodide A is rapidly solvolyzed with silver perchlorate in propionic acid whereas the compound B is not solvolyzed at all under the same conditions. Explain.



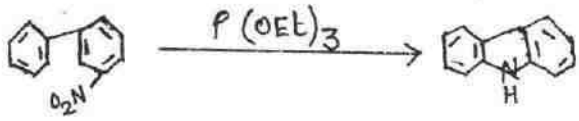
A



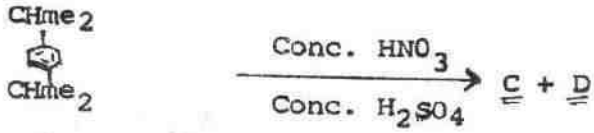
B

GROUP - C

12. Give the mechanism of the following reaction



13. Identify the products $\underline{\underline{C}}$ and $\underline{\underline{D}}$ of the following reaction



Explain their formation.

14. The rate of solvolysis of Ph CH_2 CH_2 OT_s at 75°c in CF_3CO_2H is 3040 times than the rate for CH_3 CH_2OT_s . Explain.

15. How can you distinguish between ethyl butyrate and vinyl acetate from their IR spectra? 4x5

SECTION - II

This section comprises 6 questions in three groups. Answer any four questions taking at least one question from each group.

GROUP - A

16. (a) Compare the trend in the

(i) second ionization energy of S and Cl.

(ii) atomic size of Nb and Ta.

(iii) electron affinity of F and Cl.

(iv) electronegativity of Si and Ge.

(b) Explain the principle involved in the estimation of copper from a solution ofCu^{2+} by iodometry.

(c) Give a comparitive account of the halides of Group 14 elements with reference to

(i) type of holides

(ii) hydrolytic behaviour

(iii) structure

(d) Construct the MO energy level diogram of CO and hence explain how it can behave as a ligand towards transition metal ions.

(e) Using the concept of hybridization, explain the bonding in

(i) XeO_2F_2

(ii) NPF_2

(iii) NO_2^+

(iv) $SOCl_2$

8x5

contd...p.3.

GROUP - A

17. (a) What are interhalogen compounds ? Why they are more reactive than the corresponding halogens ? Also explain why they contain even number of halogen atoms. 2+3+3

(b) Calculate the potential at different stages of titration of 100 ml 10.1(N) Fe^{2+} sol. by 0.1(N) $Cr_2O_7^{2-}$ when

(i) 50ml 0.1(N) $Cr_2O_7^{2-}$ is added

(ii) 100 ml 0.1 (N) $Cr_2O_7^{2-}$ is added

(The conc. of H_2SO_4 maintained in 1(M))

What indicator may be used for this titration ? Explain.

$E^\circ Cr_2O_7^{2-}/Cr^{3+} = 1.33\ V$

$E^\circ Fe^{3+}/Fe^{2+} = 0.77\ V$ 4+4

(c) Discuss the structure and bonding in polythiazyl. Also explain how can it be synthesized from S_4N_4. 6+2

(d) Derive an expression of pH of a solution of ammonium acetate and hence explain why such solution is always neutral.

(pk_a of AcoH = 4.74

pk_b of NH_3 = 4.75) 6+2

(e) $Cu^{2+} \xrightarrow{0.15V} Cu^{+} \xrightarrow{0.52V} Cu$

Construct a Frost Diagram of Cu from the above Latiner Diagram and hence explain whether Cu^+ is prove towards disproportionation. Also explain whether the disproportionation will be favoured in presence of KI. 4+2+2

GROUP - B

18. (a) As a first approximation, the compressibility factor of the van der Waals gas is given by

$PV/RT = 1 + (b - a/RT)P$. Show that $(\delta S/\delta P)_T = -[R/P + Ra/(RT)^2]$ 10

(b) Show that $\left(\frac{\delta S}{\delta P}\right)_V = \frac{\beta C_V}{\alpha T}$

and $\left(\frac{\delta S}{\delta V}\right)_P = \frac{C_P}{\alpha V T}$ where the terms have their usual significances. 8

(c) At 20°C the interfacial tension between water and enzene is 35 mN m^{-1}. If the surface tension γ =28.85 mN m^{-1} for benzene and 72.75 mN m^{-1} for water, calculate (i) the work of adhesion between water and benzene (ii) the work for cohesion for benzene and for water, and (iii) the spreading coefficient for benzene on water. 8

(d) Deduce the expression for the Van't Hoff reaction isotherm. 10

(e) The first order reflection from a crystal plane in a cubic crystal occurs at 13°41′. Find the Miller indices of the plane. [Given, a =5.63 Å, λ=1.54 Å, $\sin^2 13^\circ 41' = 0.056$] 4

contd...p.4.

GROUP - B

19. (a) (i) State and explain Nernst heat theorem. 2

(ii) A spherical drop of a liquid weighing 0.04 g is dispersed into 1500 microglobules of radius 0.02 cm. Find the resultant increase in surface energy. 8

(b) Show that $C_P - C_V = \left[V - \left(\frac{\delta H}{\delta P}\right)_T\right]\left(\frac{\delta P}{\delta T}\right)_V$ 8

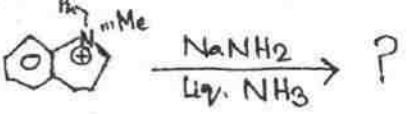
(c) Find $\left(\frac{\delta H}{\delta V}\right)_T$ for n-mole of a van der Waals gas and n-mole of an ideal gas. 8

(d) Show that $\left(\frac{T_2}{T_1}\right)^{5/2} = \frac{V_1 - b}{V_2 - b}$ for reversible, adiabatic expansion of 1 mol of a diatomic gas that obeys the equation of state $P(V-b) = RT$ 7

(e) At 20° C water with an absolute viscosity of 0·01009 dyne.sec. cm^{-2} requires 102.2 seconds to flow through the capillary of an Ostwald viscometer, whereas, toluene requires 68.9 seconds. If the densities of water and toluene be 0.998 $g.cm^{-3}$ and 0.866 $g.cm^{-3}$, respectively, calculate the viscosity of toluene. 7

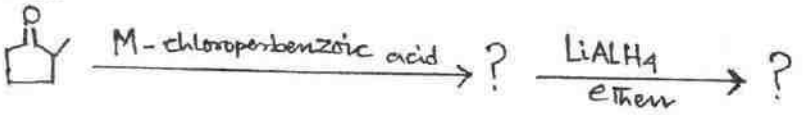
GROUP - C

20. (a) Predict the product of the following reaction. Explain.



6

(b) Identify the products of the following reaction sequence. Explain.

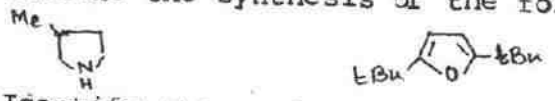


6

(c) Arrange the following chloro compounds in the increasing order of rates of nucleophilic displacement with NaOMe. Explain.

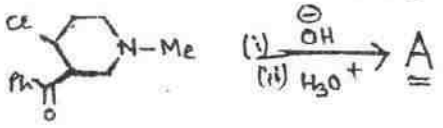
8

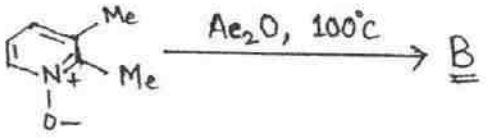
(d) Outline the synthesis of the following compounds

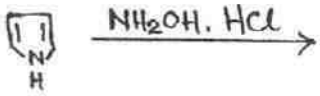


8

(e) Identify the products A - C of the following reactions. Give mechanism in each case.

(i) 

(ii) 

(iii) 

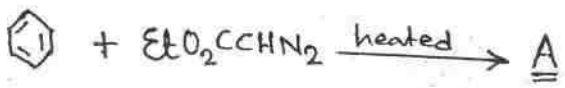
4x3

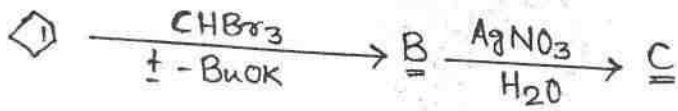
contd...p.5.

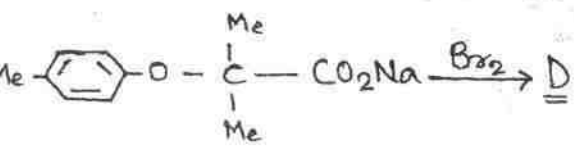
GROUP - C

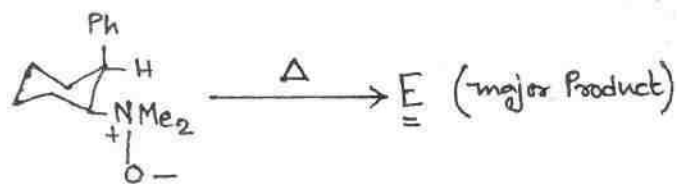
21. (a) There is deuterium in the recovered alkene, $Cl_2C{=}CHCl$ when it reacts with NaOD to give $ClC{\equiv}Ccl$ and the reaction is stopped before completion. No such deuterium incorporation is found for similar reaction with $PhCH_2CH_2Br$. Explain. 6

(b) Identify the products A - E of the following reactions. Explain their formation and comment on their stereochemistry, if required.

(i) 

(ii) 

(iii) 

(iv) 

5x4

(c) What is a metastable ion peak in mass spectrum of organic compounds ? Why they frequently occur at non-integral values of m/z ? 4

(d) How can you distinguish isopropyl-benzane and n-propyl benzene from their mass spectral features ? 6

(e) Give an example of free radical initiator organic compound. Explain the mechanism of benzylic bromination of toluene with N-bromosuccinimide (NBS) 4

2018

CHEMISTRY - II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the question attempted first up to the prescribed number shall be valued and the remaining ones ignored. Answer may be written either in English or in Bengali but all answers must be in one and the same language.

SECTION - I

This section comprises 15 questions in three Groups. Answer Any Ten questions taking at least three questions from each Group.

GROUP - A

1. Hemoglobin exhibits Bour effect, but myoglobin does not. Explain.
2. Compare the C-C lengths of the alkenes in $[Pt(C_2H_4)Cl_3]^-$ and $[Pt(C_2F_2)Cl_3]^-$.
3. Predict the electronic transition spectra of a Mn^{2+} ion in an weak octahedral field.
4. $Cu(eu)_3^{2+}$ is less stable than $Ni(eu)_3^{2+}$. (en= ethslenecdiamine) Explain.
5. Co occupies the highest position of the spectrochemical series. Explain. 4x5

GROUP - B

6. Why a binary solution of two components cannot be completely separated if an azeotrope is formed ?
7. From the expression for energy levels in a rigid rotor, show how you can determine the bond length of a diatomic molecule ?
8. State Grothus Draper and Stark Einstein's laws of photochemistry.
9. Why is the life time of fluorescence much less than that of phosphorescence ?
10. For a second order reaction of the form A→pdts , show that the half life time is dependent on the initial concentration. 4x5

GROUP - C

11. Draw Fisher Projection formula of all the stereoisomers of 3-bromo - 2 - butanol. Assign R/S configuration to C-2 and -3 of one of the threo-isomers.
12. Predict the major diastereomer formed by reduction of n-BuCO CH(Et)cl with $NaBH_4$. Explain.
13. Explain atropisomerism with an example.
14. Outline a method of resolution of $(\pm)$ - $CH_3CH(NH_2)CO_2H$
15. Explain the regioselectivity of addition of acrolein with 1-methoxybutadiene. 4x5

P.T.O.

SECTION - II

This section comprises 6 questions in three groups. Answer Any Four questions taking at least one question from each group.

GROUP - A

16. (a) State the ground state term symbols of a d^2 ion and predict the electronic spectra in an octahedral field.

(b) Illustrate all the stereoisomers possible for $[Co(NH_3)_2 (H_2O)_2 Cl_2]^+$ ion.

(c) Describe the active site of myoglobin and function of it.

(d) Illustrate the structures of $Fe_2(CO)_9$ and $Fe_3(CO)_{12}$. Explain.

(e) For which of the following species the experimentally determined magnatic moment should be higher ? Explain your answer.

(i) $[NiCl_4]^{2-}$ (ii) $[Ni(NH_3)_6]^{2+}$ 8x5

17. (a) Explain with examples the oxidative addition and insertion reactions. Give example of a fluxional organometallies.

(b) What are ferredoxins ? Discuss the importance of ferredoxins in biology.

(c) Calculate the $CFSE_s$ of $[Co(H_2O)_4 (NH_3)_2]^{3+}$, $[CoF_6]^{3-}$ and $[Co(CN)_6]^{3-}$ ions.

(d) Explain with examples the chelate effect, trans effect and trans influence.

(e) Predict the geometries of $Ni(CO)_4$, $[Ni(CN)_4]^{2-}$ and $[Nicl_4]^{2-}$.

8x5

GROUP - B

18. (a) From first principles arrive at the expression for Gibbs Phase Rule, which connects the degree of freedom with number of components and phases. 10

(b) Draw a labelled phase diagram of water, showing clearly the phase boundaries. Calculate the degree of freedom for each region in the diagram. 8

(c) Write down the expression for Arrhenius' temperature dependence of reaction rate constant and explain the terms in it. In certain reactions it is seen that the rate constant decreases with rise in temperature. How do you account for this ? 2+2+3

(d) Discuss two methods to experimentally determine the order of a reaction. 10

(e) A first order reaction ($A \rightarrow B+C$) is 35 percent complete after 325 S. Calculate the rate constant. How long will it take for the reaction to be 70 percent complete ? 5

contd...p.3

GROUP - B

19. (a) Draw a labelled Jablonski diagram with proper explanation of the steps. 8

(b) The photochemical reaction between H_2 and Br_2 follows the following steps

$$Br_2 + h\nu \rightarrow 2\,Br$$

$$Br + H_2 \xrightarrow{K_2} H\,Br + H$$

$$H + Br_2 \xrightarrow{K_3} HBr + Br$$

$$H + H\,Br \xrightarrow{K_4} H_2 + Br$$

$$2\,Br \xrightarrow{K_5} Br_2$$

Find out an expression for $d[HBr]$ in terms of the rate constants, absorbed intensity (Ia) and concentrations of H_2, Br_2 and HBr. 12

(c) For the liquid - liquid phenol water system, draw the phase diagram and label each region. Also find the degree of freedom for each including the upper critical solution temperature (UCST). 8

(d) Explain what do you understand by number and mass averaged molecular weight giving expressions for both. 6

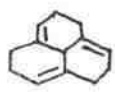
(e) State Raoult's law and derive the expression for partial pressure P_i of pure liquid i at temperature T considering an equilibrium between the pure liquid i and its vapour. 6

GROUP - C

20. (a) Draw Fischer projection formulae of the possible stereo-isomers of 2,3,4 - trihydroxyglutaric acid. Comment on their chirality, assigning R/S configuration to C-3 atom in each case. 8

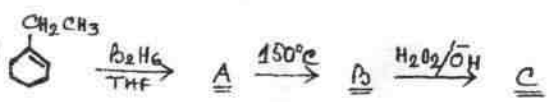
(b) Identify the symmetry elements present in the following molecules. Assign point group and symmetry number to each structures.

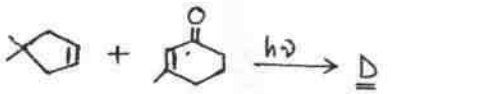
1,3-Dichloroallene, cis-decalin, twist-boat conformer of cyclo exane,

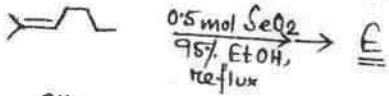


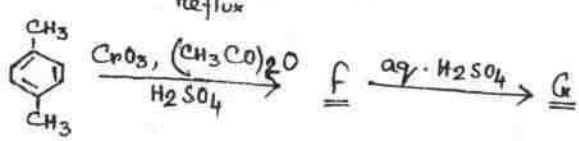
16

(c) Identify the products A - F of the following reactions. (mechanism not required)

(i) 

(ii) 

(iii) 

(iv) 

9

contd..p.4.

GROUP - C

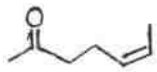
(d) Carry out the following conversions

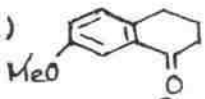
(i) 

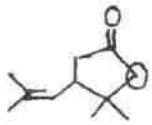
(ii) 

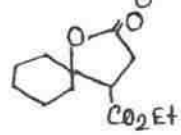
3+4

21. (a) Outline the synthetic route for each of the following compounds

(i) 

(ii) 

(iii) 

(iv) 

20

(b) What is meant by directed aldol condensation ? Explain it in case of aldol condensation of 2- pentanone and acetaldehyde. 6

(c) Depict the preferred conformer of trans-1,3 -di-tert-butylcyclohexane. Explain. 3

(d) Draw the conformations of the following cyclohexane derivatives. Comment on their energy difference, if any, onthe basis of number of gauche butane interactions present. Also explain their chirality.

<u>Cis</u>-1,2 - Dimethylcyclohexane, <u>trans</u>-1,2-Dimethylcyclohexane. 8

(e) How can you carry out <u>Cis</u>-perhydroxylation of <u>E</u>-crotonic acid ? Depict the flying wedge projection formula of the product. 3

2018

COMPUTER SCIENCE- PAPER-I

Time Allowed : 3 Hours

Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Answer any five questions

1. (a) Minimize the sum of products (SOP) expression for the following function :-

$$F(A,B,C,D) = \sum m\,(1,3,8,9,15) + \sum d(6,7,12)$$

(b) Design a combinational circuit that accepts a 3-bit number as input and generates an output binary number equal to square of the input number.

(c) Find the decimal equivalent of the following IEEE 754 32-bit floating-point number :-

0 10000000 110 0000 0000 0000 0000 0000

(d) Implement the following Boolean functions using a decoder and OR gates :-

$$F_1\,(A,B,C) = \sum m(0,3,4)$$
$$F_2\,(A,B,C) = \sum m(1,2,7)$$
$$F_3\,(A,B,C) = \sum m(0,1,2,4)$$

(e) Convert $(56)_{10}$ to its equivalent gray code. 10+10+5+10+5

2. (a) What is the maximum and minimum height of a tree of n nodes ?

(b) Given the inorder and pre-order traversal of a binary tree :-

Inorder : D B E A F C G

Pre-Order : A B D E C F G

(i) Construct the binary tree.

(ii) Find the post order traversal of the binary tree.

(c) Draw a binary search tree (BST) for the input 8,13,27,16,39, 44,55,82,70. Trace the algorithm to insert the node 20 into the BST.

(d) Design a recursive algorithm to compute 2^n for any non-negative integer using the formula :-

$$2^n = 2^{n-1} + 2^{n-1}$$

Draw a tree of recursive calls for 2^4 generated by the algorithm.

8+12+10+10

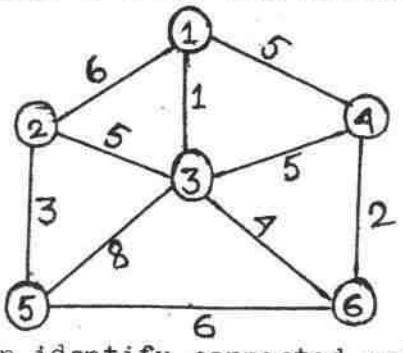
3. (a) Draw the directed graph that corresponds to the following adjacency matrix :-

	v_0	v_1	v_2	v_3
v_0	1	0	1	0
v_1	1	0	0	0
v_2	0	0	0	1
v_3	1	0	1	0

(b) State the quick sort algorithm and compute its worst case and best case time complexity. Illustrate the working principle of the quick sort algorithm using the following array :-

[5, 3, 1, 9, 8, 2, 4, 7]

(c) Distinguish between spanning tree and minimum spanning tree. Find minimum spanning free for the following weighted graph :-



(d) Explain how one can identify connected and strongly connected components of a graph using DFS and BFS. 10 x 4

4. (a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's 1/3rd rule taking 6 intervals. Hence, obtain the approximate value of π.

(b) Using the following data find the value of $\sqrt{2}$ correct upto five significant figures.

x	1.9	2.1	2.3	2.5	2.7
$\sqrt{x}$	1.3784	1.4491	1.5166	1.5811	1.6432

(c) Use Runge-Kutta method of fourth order to find y(0.2) and y(0.4) where

$\frac{dy}{dx} = 1 + y^2$ and $y = 0$ when $x = 0$ 15+15+10

5. (a) Solve the following LP problem :-

Maximize $Z = 5x_1 + 7x_2$

Subject to : $x_1 + x_2 \leq 4$

$3x_1 + 8x_2 \leq 24$

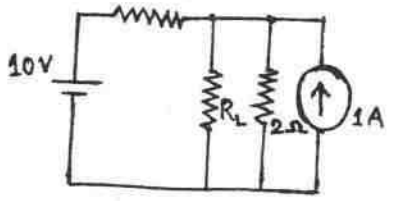
$10x_1 + 7x_2 \leq 35$

$x_1, x_2 \geq 0$

(b) ABC Ltd. has two products : 'X' and 'Y'. To produce one unit of 'X', 2 units of materil P and 4 units of material Q are required and to produce one unit of 'Y' 3 units of material P and 2 units of material Q are required. At least 16 units of each material must be used in order to meet the committed sales of the two products. Cost per unit of paterial P and material Q are Rs.2.50 and Rs.0.25 respectively. Formulate the problem as LPP and solve it graphically to minimize the total cost. 20 + 20

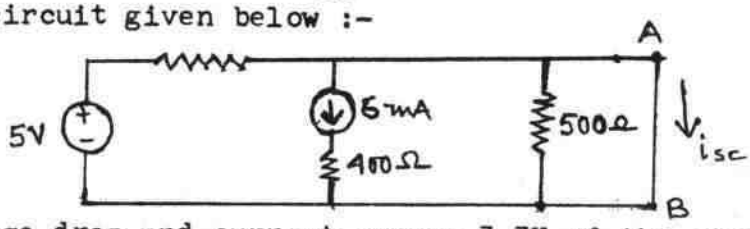
6. (a) State the Maximum Power Transfer Theorem.

(b) Calculate the value of the load resistance R_L which will transfer maximum power to the load for the circuit shown in Fig. below. Also calculate the value of the maximum power thus transferred to the load.

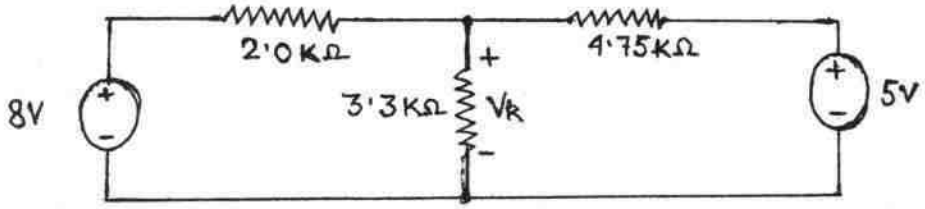


Contd...P/3.

(c) Find the short-circuit current i_{sc} between the terminals A and B of the circuit given below :-



(d) Find the voltage drop and current across 3.3K of the circuit given below using Superposition theorem



8+12+10+10

7. (a) Explain schemes of Parity and CRC as used for error detection.

(b) Distinguish between adaptive and non-adaptive routing algorithm.

(c) Consider a 2.5 Mbps token ring LAN and frame size of 180 bytes. If the ring latency is 210μ_s, then calculate the effective data rate of the LAN.

(d) Implement the function $f(A,B,C,D) = \sum m(1,2,5,7,9,14)$ using MUX.

(e) Calculate the minimum number of gates required to implement the Boolean function XY + Z using 2-input NOR gates. 10 x 4

8. Write short notes on <u>any four</u> of the following :-

(a) Carry Look-ahead Adder

(b) Merge sort algorithm and its time complexity

(c) Kruskal Algorith

(d) Synchronous counter

(e) Pushdown Automata

(f) Sliding Window Protocol. 10 x 4

§§§§§§§§§§§§§§

2018

COMPUTER SCIENCE- PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Answer any Five Questions :

1. a) What are the differences among **DDL**, **DML** and **DCL** in **SQL** ? 5

   b) What is a view in **SQL** ? Give an example of creating a view. 5+5

   c) What is a Trigger ? What is the difference between Trigger and Stored Procedure ? 5+5

   d) What are the differences between **INNER JOIN** and **FULL JOIN** in **SQL** using illustrative examples. 10

   e) What is the purpose of a commit statement in **SQL** ? 5

2. a) What does functionall dependent mean ? What is trivial functional dependency ? Explain with examples. 4+4

   b) Consider a relation **R(A, B, C, D)** having two sets of FD, $FD_1 = \{A \rightarrow B,\ B \rightarrow C,\ AB \rightarrow D\}$ and $FD_2 = \{A \rightarrow B,\ B \rightarrow C,\ A \rightarrow C,\ A \rightarrow D\}$. Establish whether these two FD sets are semantically equivalent or not. 12

   c) Create using **SQL** a new table called **CUSTOMERS** and add five columns ID (Integer - 10 digits), **NAME** (20 characters), **AGE** (integer - 3 digits), **ADDRESS** (25 characters) and **SALARY** (in the format xxxxxx.xx), three of which (ID, **NAME**, **AGE**) shall not accept **NULLs**. 10

   d) Write **SQL** statements for the following queries on **CUSTOMERS** (assuming it has been created with several tuples):

      i) Display all the records from **CUSTOMERS** table where **SALARY** starts with Rs.200.

      ii) Delete complete data from **CUSTOMERS** without deleting the table. 5+5

3. a) What do you understand by process and process table ? What are the different states of a process ? 8+6

   b) What is a thread ? What are the differences between process and thread ? 8+8

   c) What is a semaphore ? Explain with an illustrative example the role of a semaphore. 10

4. a) What is spooling ? Explain. What are the advantages of spooling ? 6+4

b) Four processes are scheduled with shortest job first scheduling as follows :

Process	Arrival Time	Execution Time	Service Time
P0	0	5	3
P1	1	3	0
P2	2	8	16
P3	3	6	8

Find the wait time of each process and the average wait time. 4+4

c) What is a virtual memory ? What are the advantages of such a memory ? 6+6

d) Suppose the time to service a page fault is on the average 10 milliseconds and a memory access takes 1 microsecond. Find the average memory access time with a 99.99% hit ratio. 10

5. a) State the differences among Internet, Intranet, and Extranet. 8

b) What are **IP** classes and how can you identify the **IP** class of a given **IP** address ? What do you understand by Static **IP** and Dynamic **IP** ? 6+4

c) What is the purpose of line coding ? Discuss bipolar encoding with an appropriate illustration. 4+8

d) Compare and contrast : **TCP** and **UDP**. 10

6. a) Explain different types of Inheritance associated with Object Oriented Programming. 10

b) What are the differences between an Abstract Class and an Interface ? 8

c) What are the differences between Method Overloading and Method Overriding ? 10

d) Write a C++ Program to reverse an integer, e.g., if the input is 12345 the corresponding output will be 54321. 12

7. a) State the characteristics of the **RISC** Architecture. Compare it with CISC. 8

b) What are tri-state devices and why they are essential in a bus oriented system ? 10

c) Compare between **SRAM** and **DRAM**. Describe the memory hierarchy of a Computes System. 4+8

d) List and explain the different types of micro-operations. 10

8. **Write short notes on :**

a) **Use of Finite State Machines in the design of Lexical Analyzers.**

b) Video streaming through Internet.

c) Assemblers and Interpreters.

d) Additive and subtractive colors. 10x4

2018

ENGLISH - PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Group - A

1. Write an essay on any one of the following topics : 40

a) The social value of literature.

b) Literature and film.

c) Magic realism in leteratu re.

d) The cultural value of biography and autobiography.

e) The role of literary theory in reading literary texts.

Group - B

2. Answer any two of the following questions : 40x2

a) How would you assess Macbeth - as a villain or as a doomed hero? Give reasons for your answer.

b) Critically consider Donne's use of metaphysical conceits in the poems on your syllabus.

c) What is the function and importance of epic similes in Paradise Lost Book I? Answer with close reference to two epic similes in Book I.

d) Discuss Pope's use of supernatural elements in The Rape of the Lock.

e) Consider Keats's 'Ode to Nightingale' and 'Ode on a Grecian Urn' as meditations on life and death.

f) Show how Jennyson reflects on the many uncertainties of the Victorian Age in 'Ulysses'and 'Tithonus'.

Group - C

3. Answer any two of the following questions : 40x2

a) How apt is the title 'Pride and Prejudice' for Jane Austen's novel? Give reasons for your answer.

b) Critically consider the importance of the rustic characters in The Mayor of Casterbridge of Hardy.

c) Analyse the structure of Wuthering Heights and show how it helps to focus the main concerns of the novel.

d) Examine Mark Twain's hardling of the issues of race, humanity and identity in The Adventures of Huckleberry Finn.

e) How would you read Mary Shelley's Frankenstein - as science fiction or as a novel of social commentary or as both? Justify your answer.

2018

ENGLISH - PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

1. Critically evaluate the following poem :- 50

Two roads diverged in a yellow wood,
And sorry I could not travel both
And be one traveler, long I stood
And looked down one as far as I could
To where it bent in the undergrowth;

Then took the other, as just as fair,
And having perhaps the better claim,
Because it was grassy and wanted wear;
Though as for that, the passing there
Had worn them really about the same,

And both that morning equally lay
In leaves no step had trodden black.
Oh, I kept the first for another day!
Yet knowing how way leads on to way,
I doubted if I should ever come back.

I shall be telling this with a sigh
Somewhere ages and ages hence:
Two roads diverged in wood and I -
I took the one less traveled by,
And that has made all the difference.

2. Answer any one of the following :- 50

(a) Do you regard Yeats's 'Easter 1916' as a "public poem"? Justify your answer with close textual reference.

(b) Critically analyse the images used in Eliot's 'The Journey of the Magi'

(c) Would you call Kamala Das's poem 'An Introduction' eccentric or sex-centric or iconoclastic? Give reasons for your answer.

(d) What is the message that Sylvia Plath's 'Mirror' gives to the wary reader? Answer with close textual references.

3. Answer any one of the following:- 50

(a) Estimate the achievement of patriotic Derozio as a sonneteer in 'To India - My Native Land'.

(b) Discuss the problem of alienation in Osborne's angry young man as it is evident in Look Back in Anger.

(c) Would you classify Waiting for Godot as an "absurd" play? Who is Godot and what is this play about?

(d) As for Yeats's 'Sailing to Byzantium' wherein does the heart of the poem lie? Give a critical answer.

4. Answer any one of the following :- 50

(a) Consider the role of regionalism in Kanthapura. Would you call this work the first evocation of the Gandhian age in Indo-Anglian fiction? Give reasons for your answer.

(b) Is it possible to look upon Lawrence's novel The Rainbow as a kind of Bible, recalling its readers to a religious vision of the world? Answer critically.

(c) Elaborate on the scriptural significance of the name of the protagonist in Joyce's A Portrait of the Artist as a Young Man?

(d) How far is Tagore's trust in man (as enounced in Crisis in Civilisation) an embodiment of his love and fear, faith and philosophy?

2018

ECONOMICS - PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Answer 5 questions taking at least 2 from each group.

GROUP A

1) a. Derive the short run supply curve under perfect competition. (20)
b. Why does a monopoly market have no supply curve? (20)

2) a. Diagrammatically, show how corner solutions arise when the indifference curves are linear in shape. (20)
b. State the relationship between average product and marginal product curves of labour and show it diagrammatically. (20)

3) Given Mundell Flemming model, find out the effects of the following on an open economy, given there is **perfect capital mobility** and **fixed** exchange rate regime and compare it with the effects of the following for a closed economy.
a. Fiscal expansion(20)
b. Monetary expansion (20)

4) a. Explain how the supply curve changes when
i. Per unit tax is imposed on a commodity
ii. Advalorem tax is imposed on a commodity (10+10)
b. Distinguish between private costs and benefits and social costs and benefits and suggest ways to do away with this inefficiency. (20)

5) a. Show diagrammatically the equivalence of tariffs and quotas under perfectly competitive markets.(20)

b. Refer to the table given below. As per the theory of comparative advantage, which country will specialise in production of which item? Explain. (20)

Labour hours to produce one unit		
Produce **Country**	**Good 1**	**Good 2**
A	100	120
B	90	80

GROUP B

6) a. State and explain the properties of the disturbance term in Classical Linear Regression Model. (20)

b. Define

i) Type 1 error

ii) Type 2 error

iii) The power of the test

iv) Level of significance (5+5+5+5)

7) a. Given the following sample data set:

6, 12, 9, 7, 8, 4, 3, 12, 15

i. Compute the mean.
ii. What is the median?
iii. What is the mode?
iv. Compute the variance. (5+5+5+10)

b. A fair 12-sided die is rolled. What is the probability that the roll is a 3 given that the roll is odd? (15)

8) a) What do you mean by Ricardian Equivalence? (10)
b) Define the Golden Rule Savings Rate. (10)
c) What are the three types of growth mentioned in Harrod Domar Model. (10)
d) How does one differentiate between public goods and private goods? (10)

9) a. Distinguish between the value added method, expenditure method and income method of national income accounting. (20)

b. Define

i. fiscal deficit
ii. primary deficit
iii. autonomous transactions in BOP
iv. Accommodating transactions in BOP (5+5+5+5)

10) a. State and explain the three conditions for pareto optimality. (10+10+10)
b. What are the first and second fundamental theorems of welfare? (10)

2018

ECONOMICS - PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP-A

Answer any three Questions :

1. Analyse the fundamental features of a lessdeveloped economy. Do you think that the percapita income is a good measure of economic development ?

30+10

2. Use the Harris-Todaro model to posit the possibility of over-migration as a threat to the problem of Urban unemployment.

40

3. a) What is the **'Environment Kuznets Curve'** ? Spell out its economic implications.

   b) Is it possible to use **'environmental standards'** as the basis of international trade ? Explain your answer.

(10+10)+20

4. Critically evaluate the hypothesis that **'Trade is an Engine of Growth'**.

40

5. **"The market-based approach to development cannot address the problem of widespread poverty in the less-developed economies".** Analyse the statement to give your arguments for the relevance of **'planning for development'**.

20+20

GROUP-B

Answer any two Questions :

6. Distinguish between the Old Guarantee System and the New Guarantee System in terms of their **(a)** contribution to the development of the Indian Railways and **(b)** effect on the financial liability of colonial India.

30+10

7. Critically evaluate the New Agricultural Strategy in relation to its effects on **inter-regional, inter-class** and **inter-crop** inequalities. Do you think that land reforms should have been adequately emphasized before initiating the new strategy ?

10x3+10

8. **"Economic development is a process that benefits the least-privileged first".** Evaluate the proposition with reference to the policies of the Government of West Bengal in relation to **(a)** primary and secondary education, **(b)** public health, **(c)** public distribution system and **(d)** employment generation.

10x4

2018

ELECTRICAL ENGINEERING - PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

All Symbols have their usual significance

GROUP - A

Answer any three questions

1. (a) Find the current I_1 by mesh equation given in Fig.1.

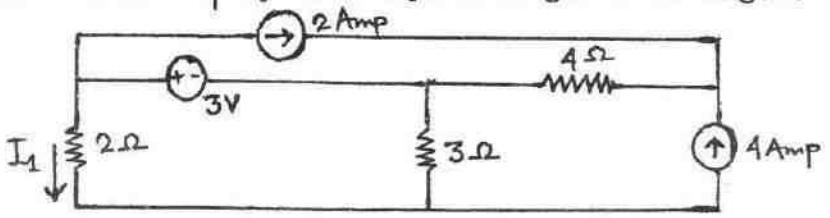


Fig.-1 10

(b) Find the Thevenin and Norton equivalent circuits as seen at terminal A-B for the circuit given in Fig.-2.

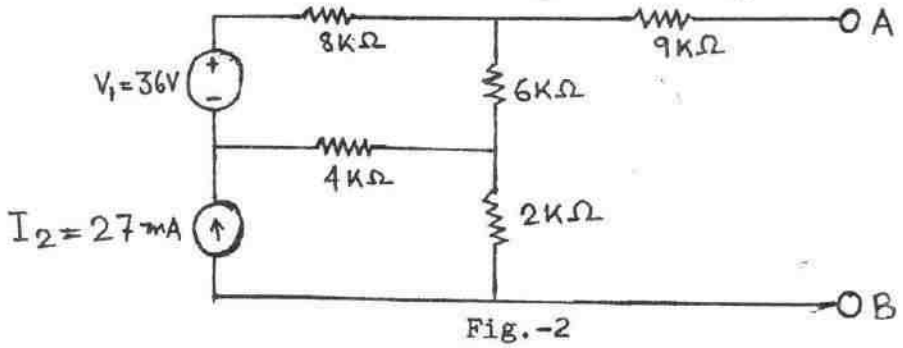


Fig.-2 10

(c) Compute the short-circuit admittance parameters of the circuit given in Fig.-3.

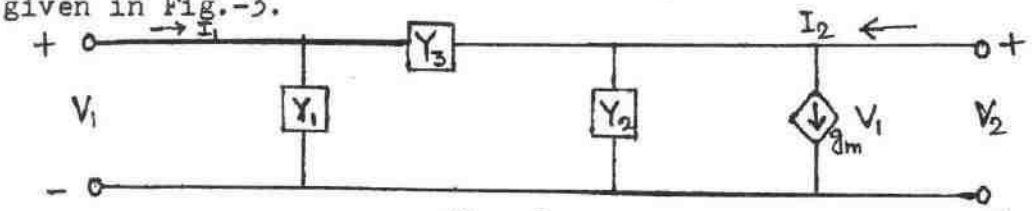


Fig.-3 10

(d) A battery consists of 20 cells each of emf 1.5 volts and internal resistance 0.2 Ω connected five in series per row, four rows in parallel. If this battery is connected to an external resistance of 1.25 Ω how much current will it supply ? 10

2. (a) A copper wire of 2 mm diameter with conductivity of 5.8×10^7 s/m and electron mobility of 0.0032 m^2/v is subjected to an electric field of 20 mV/m. Find

(i) the charge density of free electrons,

(ii) the current density and

(iii) the current flowing through the wire. 10

(b) Two coils connected in series have a resistance of 18Ω and when connected in parallel have a resistance of 4Ω. Find the resistance of each coil. 10

(c) An immersion heater takes 1 hour to heat 50 kg. of water from 20°C to boiling point. Obtain power rating of the heater. Assume efficiency of heating equipment = 90%. 10

(d) A hydro-electric power station has an available head of 30 m, a catchment area of 50×10^6 m^2, the rainfall for which is 120 cm. per annum. If 70% of the total rainfall can be collected, calculate the power that could be generated. Assume the efficiencies of :- Penstock 95%, Turbine 80% and Generator 85%. 10

3. (a) Determine the stability of the system and comment on the location of the roots of the characteristics equation (poles of the system) using Routh's array.

$$5S^6+8S^5+12S^4+20S^3+100S^2+150S+100 = 0$$ 10

(b) The open loop transfer function of a system with unity feedback is given by

$$G(S) = \frac{K_1(2S+1)}{S(5S+1)(1+S)^2}$$

and the input signal to be applied to the system is given by $r(t) = (1 + 6t)$. Determine K_1 so that the steady-state error of the system is 0.1. 10

(c) A control system with PD controller is shown in Fig.4. If the velocity error constant K_v=1000, and the damping ratio ζ=0.5, find the values of K_p and K_D.

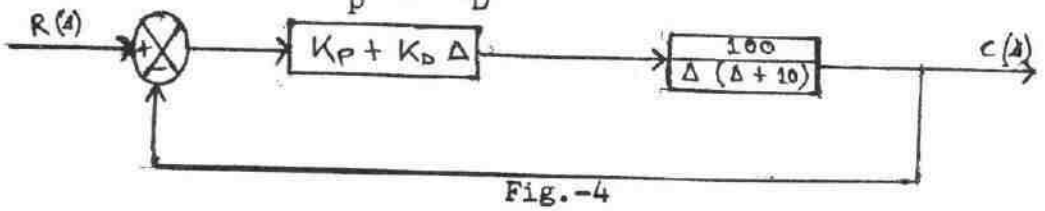


Fig.-4 10

(d) For the mechanical translational system shown in Fig.-5, obtain (i) differential equations and (ii) transfer function of the system.

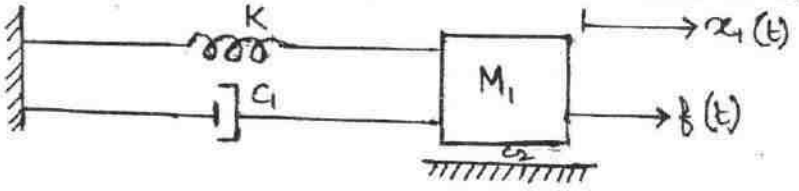


Fig.-5 10

4. (a) A filament lamp of 500 W is suspended at a height of 4.5 m above the working plane and gives uniform illumination over an area of 6 m diameter. Assuming an efficiency of the reflector as 70% and efficiency of lamp as 0.8 watt per candle power, determine the illumination on the working plane. 10

(b) The following parameters of a 3-phase, 400 volt, 50 Hz, 8-pole star connected induction motor are as follows :-

R_1=0.12Ω, R_2=0.6Ω, X_1=0.72Ω, X_2=2.88Ω, S_f=0.05 and the ratio of effective stator to rotor turns=1:2. The motor is to be braked at rated speed and an external resistance of 2.4Ω per phase (referred to stator) has been inserted into the rotor circuit. Determine the initial braking torque in plugging. 15

Contd...P/3.

(c) A 200 h.p.(metric) motor has to operate at full load for 2000 hours in a year, being shut down for the remaining period. Two motors are available - Motor A with 89% efficiency and Motor B with 90% efficiency. Cost of energy is 6 paise per kwh and interest and depreciation is 10% per annum. Find how much more amount could be economically paid for motor B over and above the price of Motor A. 15

5. (a) What is the percentage saving in feeder copper if the line voltage in a 2-wire dc system be raised from 220 volts to 400 volts for the same power transmitted over same distance and having the same power loss. 15

(b) A transmission line has a span of 200 m between level supports. The conductor has a cross-sectional area of 1.29 cm^2, weighs 1170 kg./km. and has a breaking stress of 4218 kg/cm^2. Calculate the sag for a safety factor of 5, allowing a wind pressure of 122 kg. per square metre of projected area. What is the vertical sag ? 10

(c) A 6.6 KV, 10 MVA star connected alternator has a reactance of 2 ohms per phase and negligible resistance. Merz-Price protection is used for protection of winding. The neutral grounding resistance is 5 ohms. If only 10% of the winding is to remain unprotected, determine the setting of the relay. 15

GROUP - B

Answer any two questions

6. (a) In a short circuit test on a circuit breaker, the following data was obtained on a frequency transient.

(i) Time to reach the peak restriking voltage 55 μ Sec.

(ii) The peak restriking voltage 100 KV.

Determine the natural frequency of the circuit and average rate of rise of restriking voltage. 10

(b) The capacitances of a 3-phase belted cable are 12.6 μF between the three cores bunched together and the load sheath and 7.4 μF between one core and the others two connected to sheath. Find the charging current drawn by the cable when connected to 66 KV, 50 Hz supply. 10

(c) A short 3-phase transmission line with an impedance of $(6+J8)\Omega$ per phase has sending end and receiving end voltages of 120 KV and 110 KV respectively for some receiving end load at a p.f. of 0.9 lagging. Determine (i) power output and (ii) sending end power factor. 10

(d) The three conductors of a 3-phase line are arranged at the corners of a triangle of sides 2m, 2.5m and 4.5m. Calculate the inductance per KM of the line when the conductors are regularly transposed. The diameter of each conductor is 1.24 cm. 10

7. (a) A 3-phase, half wave controlled converter is connected to a 380 volt supply. The load current is constant at 32 Amps, and is independent of firing angle. Find the average load voltage at firing angle 0 and 45 , given that the tyristors have a forward voltage drop of 1.2 volt. What is the current rating of the tyristor ? 10

(b) An 80 KW, 440V, 800 rpm d.c motor is operating at 600 rpm and developing 75% rated torque is controlled by 3-phase, six pulse tyristor converter. If the back emf at rated speed is 410 V, determine the triggering angle of the converter. The input to the converter is 3-phase, 415 volt, 50 Hz, a.c. supply. 15

P. T. O.

(c) A steady current of 600 μ Amp flows through the plane electrodes seperated by a distance of 0.5 cm. when a voltage of 10 KV is applied. Determine the Townsend's first ionization constant (coefficient) if a current of 60 μA flows when the distance of seperation is reduced to 0.1 cm. and the field is kept constant at previous value. 15

8. (a) A 10 KW, 200 V DC shunt generator has total no-load rotational losses of 300 W. The armature circuit (including brushes) and shunt field resistances are 0.4 Ω and 200 Ω respectively. Calculate the mechanical power Input at rated load. 10

(b) Calculate the voltage across a resistive load that consumes 50 A from a 10 KVA, 400/200 V single phase transformer with a percentage resistance of 3% and percentage reactance of 6%. 10

(c) A 20 HP, 3 phase, 50 Hz, four pole induction motor has a full load slip of 3%. The friction and windage losses are 500 W. Calculate the rotor copper loss. 10

(d) A squirrel cage induction motor having full load slip of 4% draws 5 times its full load current at starting. Neglecting stator impedance and magnetizing current, calculate the ratio of maximum torque to full load torque. 10

9. (a) A moving coil instrument has a coil 1.5 cm. wide and 1.2 cm. long. The flux density in the air gap is 1.8×10^{-3} wb/m^2. The spring constant is 1.4×10^{-7} Nm/rad. Determine the number of turns required to produce an angular deflection of 90° when current of 5mA is flowing through the coil. 10

(b) Describe the construction and operation of a 3-phase induction motor. 10

(c) Find the Laplace transformation of Damped sine function. 10

(d) A constant voltage at a frequency of 1 MHz is applied to an inductor in series with a variable capacitor. When the capacitor is set 500 pF, the current has its maximum value while it is reduced to one half when the capacitance is 600 pF. Find the resistance and Inductance of the inductor. 10

2018

ELECTRICAL ENGINEERING-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored

Answers may be written either in English or in Bengali but all the answers must be in one and the same language

Answer any **five** (5) out of eight

1.(a) What are the parameters generally considered in indoor lighting design? What do you mean by Light Loss Factor for lighting design? What is the significance of three values of service illuminance level as mentioned in IS 3646, 1992, Part-II ? What do you mean by term service illuminance? **14**

(b) Design a general Lighting Scheme with two different options with different types of lighting system (mentioned below) for an auditorium. The tentative dimension of the auditorium is 28 m X 12 m X 4 m . The target maintained average illuminance level is 300 Lux . The overall Light Loss Factor to be considered as 0.7. Consider the room is to be used for 300 days per year with 10 hours per day. Compute the energy consumption for both the options and clearly mention which one is the best option from energy saving point of view. Also calculate LPD (light power density) for both. **16**

Option-1

Lighting System type –Luminaire with 2 X 36 W T12 Fluorescent lamp & Electro Magnetic Ballast

Luminous flux per Lamp = 3100 Lumen

Coefficient of Utilization Value = 0.75

Cost per Luminaire(including Ballast) = Rs 2000/-

Cost per Lamp = Rs. 50/-

Power consumption per luminaire (including Ballast) = 80 W

Option-2

Lighting System type –Luminaire with 2 X 20 W LED tube based lighting system

Luminous flux per Lamp = 3350 Lumen

Coefficient of Utilization Value = 0.85

Cost per Luminaire(including Driver) = Rs 6000/-

Power consumption per luminaire (including Ballast) = 42 W

(c) Prove that in case of flat perfect diffuser Luminous Flux $\Phi = \Pi I_n$ where I_n = Intensity along normal direction. **10**

2.(a)What are the differences between integral cycle control and integral control for a heating process ? **6**

(b)Discuss the starting process of a salt bath furnace. **6**

(c)In a single phase 220V resistance oven the wire temperature is controlled by series parallel combinations of two nichrome coils, each of 8.5 m length and 0.312 cm conductor dia. Determine the different option of oven temperature. Maximum temperature of the wire is 1175°C. Take, K=0.57, e=0.95, p=1.09 $\mu\Omega$-m **12**

(d) Justify the following (4X4 =**16**)

(i) Thermal plants are not suitable for supplying fluctuating loads

(ii) Sulphur and oxygen are an undesirable element in coal.

(iii) Balanced draught must be used in thermal power plants.

(iv) Pumped storage plants are economic as peak load plant

3. (a) Explain the principle of delta modulation with neat diagrams. How is adaptive delta modulation different from delta modulation? **14**
b)Explain the Armstrong method of FM generation **6**
c)Mention the drawbacks of installation of higher capacity power plant. Specify the apprehended problems of distributed generation while uploading in the grid **10**
d)Explain the limitations of renewable energy resources. Write the principal of operation of solar engine.**10**

4. (a) An air blast circuit breaker has to open a transformer in the following operating conditions:

i) Transformer supplying a full load of 200A at 0.8 lagging power factor.
ii) Transformer supplying no load i.e. with the secondary terminals open.
Which of these two operations may appear to be more critical? Explain your answer. **8**

(b) A 50Hz, 20 kV generating system with negligible resistance has reactance of 5 ohm is connected to the bus bar through a circuit breaker. The distributed capacitance to neutral is 0.01μF. Calculate i) the maximum voltage across the contacts of then circuit breaker when it breaks a short circuit current at current zero, ii) the frequency of the transient oscillation and iii) the average rate of rise of restriking voltage upto the first peak of oscillation. **10**

(c) Why autoreclosing feature is preferable for circuit breakers under certain operating conditions? Why oil circuit breaker is not suitable for auto-reclosing operation? Name two types of circuit breakers suitable for auto reclosing. Also state why they are suitable for this purpose. **(5+3+2+2=12)**

Contd.....P-3

(d) "In a power system, active power - voltage magnitude (P- V) and reactive power – angle (Q-δ) are weakly coupled" – justify this statement. **10**

5. (a) Discuss operating principle of an non-directional IDMTL type overcurrent relay? Draw characteristics of attraction type overcurrent relay and IDMTL type overcurrent relay. Which one would perform better for feeder protection? Justify your answer. **(5+4+3=12)**

(b) An IDMTL relay with PSM =18, is carrying a fault current of 135 A in CT secondary. The rated current CT secondary current is 5A. Calculate plug setting of the relay. This relay is acting as a backup relay with DTM of 0.2 sec where the actual time of operation of the primary relay is 0.52 sec. Also calculate TMS of the relay. **8**

PSM	2	6	10	12	18	20
Time	10	3.8	3	2.8	2.4	2.2

(c) Discuss how differential relay is employed for stator winding inter-phase fault protection of an alternator. Why biasing is required for differential relay? **8**

(d) A load of 240 MW is to be shared by the three generators, rated at 75, 125 and 100 MW at a power plant. Determine the optimum distribution of the load and incremental production cost. Assume operating cost of the three generators to be respectively **12**

$$C1 = 100 + 0.200\ P1 + 0.001\ P12$$
$$C2 = 150 + 0.160\ P2 + 0.002\ P22$$
$$C3 = 200 + 0.100\ P1 + 0.001\ P32$$

6. (a) Derive an expression for voltage regulation for a transformer. **10**

(b)Two single phase transformers work in parallel on a load of 750 A at 0.8 p.f. lagging.

Determine the secondary voltage and the output and power-factor of each transformer. Test data are:

Open-circuit: 11,000/3,300 V for each transformer.

Short-circuit: with h.v. winding short circuited.

Transformer A-secondary input 200 V. 400 A, 15 kW

Transformer B-secondary input 100 V. 400 A, 20 kW **20**

(c)Two identical single phase transformer have tapping at 50% and 86.7% . Describe with proper diagrams how they can be connected in Scott connection producing two phase output from three phase input. **10**

7.(a) Using the per phase equivalent circuit of a three phase induction motor discuss how you can determine the parameters of this circuit. Show the schematic circuit diagram. **15**

(b)Describe the phenomenon of cogging and crawling. What measures can eliminate these effects? **10**

(c)The standstill impedances of the two cages of a double-cage induction motor are (3.2+j1.2) ohm and (0.5+j6.5) ohm respectively. If the full-load slip is 5%, then find the ratio of starting torque to full-load torque. Neglect magnetizing current and stator impedance.**15**

8.(a) A three phase fully controlled full wave rectifier is connected to a 380 V peak, 50 Hz three phase supply. The load is resistive with a value of 10 ohm. If it is required to get 400 V DC output voltage, calculate (a) firing angle, and (b) r.m.s output voltage. **15**

(b)Sketch the circuit and explain the operation of a step-down DC-DC Chopper (or buck converter) feeding a resistive load using relevant waveforms. Derive the expression for its output average voltage in terms of its input voltage. Also briefly explain the need for a low-pass LC filter at its output. **15**

(c)What is commutation overlap? Sketch with necessary sketches for a three phase half wave rectifier. **10**

2018

GEOGRAPHY- PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Illustrate your answer with suitable sketches and diagrams.

Answer any five Questions, taking at least two from each Group.

GROUP-A

1. Critically evaluate Penck's view of "Cycle of Erosion". How does it differ from Davisian "Cycle of Erosion" ? 28+12

2. Describe the various types of land forms developed on Igneous rock with suitable examples. Critically discuss the theory of Seafloor spreading. 20+20

3. Mention the theories related to the origin of Indian Monsoon emphasizing the role of Jet stream. Explain the phenomenon of Ozone depletion and its Consequences. 22+18

4. Explain the characteristics of Tropical-rainforest biome with special emphasis on the biodiversity of this region. Mention the major Consequences of deforestation. 28+12

5. Classify Map projections on the basis of their properties. Discuss the fundamental properties and principles of Mercator's projection. State the reasons why this projection is used for navigational purpose. 8+20+12

GROUP-B

6. Define 'Urban morphology'. Illustrate at least two models of Urban land use with suitable examples. What is meant by "occupational structure". 10+24+6

7. Critically discuss Von-Thunen's model of agricultural landuse. State how far it is relevant in the present day society. Mention the physical and cultural factors responsible for the development of dairy farming in temperate land. 14+8+18

8. Explain the factors which facilitate the concentration of population in any region. Mention the several measures of population growth. State the significance of age-sex structure of population. 14+14+12

9. Critically explain Mackinder's Heartland theory highlighting a debate on his prediction of Germany would be a super power of the world. Distinguish between "frontier" and "boundary". 28+12

10. Discuss the concept of "planning region". Explain the methods of regionalisation.

Illustrate how resource base and technology help in the development of a region. 6+12+22

2018

GEOGRAPHY- PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP-A

Answer Question 1 and any two from the rest.

1. Devide India into climatic regions and state the basis of your classification. Elucidate the characteristics of each region with special reference to the seasonal variation of rainfall. Explain how the agricultural regions of India are related to the climatic regions.

10+20+10

2. Attempt a classification of Indian soils, mentioning their characteristics and area of occurrence. Name the regions where soil erosion is prevalent in India. Mention the different programmes adopted by the government to control soil erosion.

15+5+10

3. Analyse in detail the inter-state water dispute with reference to sharing of Kaveri river water. Describe how far India has been successful in developing solar power as a non-conventional energy source.

20+10

4. Write an account of the location and growth of oil refining industry in India. To what extent is the country capable of meeting its demand for oil ?

20+10

5. Analyse the trend of urbanisation in India during the 20th century. Discuss the various problems related to urbanisation in India.

15+15

GROUP-B

Answer Question 6 and any two from the rest.

6. Classify the drainage system of West Bengal on the basis of their place of origin. Explain the characteristics of each type. Comment on the problem of flood in West Bengal.

5+25+10

7. Describe the characteristics of the major soil types of West Bengal. Account for the seasonel variation of rainfall in West Bengal.

15+15

8. Evaluate the prospects of developing hydroelectric power in West Bengal. Specify the problems of management of natural resources in the Sundarbon region of West Bengal.

20+10

9. Analyse the causes of degeneration of inland water transport in deltaic West Bengal. What are the problems and prospects of development of fisheries in the state ?

15+15

10. Elucidate the factors responsible for the growth of population in West Bengal after independence. Highlight the effect of migration on population structure and composition in the state.

20+10

2018

GEOLOGY - PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

ANSWER ANY FIVE QUESTIONS.

1. a) Describe five basic concepts of geomorphology.
   b) Describe five aeolian landforms.
   c) State Fundamental Principles of remote sensing and describe advantages and limitations of this technique.

10+10+20

2. a) What are lineations ? State different types of lineations. What is the effectiveness of slickenside lineation ?
   b) Give the classification of fold on the basis of interlimb angle.
   c) State five criteria of recognition of folding.

20+10+10

3. a) Give the Precambrian stratigraphy of Northern Singhbhum.
   b) Give the Palaeozoic stratigraphy of Kashmir.
   c) State the Proterozoic stratigraphy.

20+10+10

4. a) Give an account of different types of
      i) Sutures of cephalopods
      ii) Dentition in Pelecypods
   b) Define Index fossil and state their significance.
   c) Give an outline of evolution of Proboscidae.

20+10+10

5. a) Define Earthquake. How are they caused ?
   b) Give an idea of Earthquake belts in the earth.
   c) Give an idea of floral composition in Upper Gondwana.
   d) Briefly describe of cosmic abundance of elements.

10+10+10+10

6. i) Give an account of hydrological cycle.
   ii) What do you mean by
      a) secondary porosity b) Aquiland
      c) transmissivity d) perched Watertable

20+20

7. a) Define 'Landslids'. Give an idea of causes and remedies of landslids.
   b) Which site is more suitable for erection of dam and why ?
      i) Beds are dipping towards the upstream
      ii) Beds are dipping towards the downstream
   c) What are 'compressive strength' and 'shear strength' of a building stone and state their valus in case of basalts and granits.

20+10+10

8. a) State how are landforms controlled by geologic structure and lithology.
   b) What are (hol) and (okl) joints. State with diagrams.
   c) Give an idea of marine rocks in Gondwana.

20+10+10

2018

GEOLOGY - PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP-A

Answer any three of the following Questions :

1. a) What are crystal systems ? Illustrate with Stereogram the forms of the normal class of Tetragonal System. Draw a neat sketch of the crystal form of normal class. 20

   b) What is a twin crystal ? Illustrate twin laws and common types of twins in rock-forming minerals. 20

2. a) Briefly state different approaches for the classification of igneous rocks. Illustrate with diagram the IUGS classification of plutonic igneous rocks. 20

   b) Briefly describe the mechanisms of magmatic differenciation. 20

3. a) Illustrate with neat sketches the primary sedimentary structures that can be used for distinguishing between a normal and an overturned limb of a fold. 20

   b) How are carbonate rocks classified based on textural components ? State genetic implications for such classification. 20

4. a) Give an account of the origin of bauxite deposits. Briefly state the major types of bauxite deposits in India and their distribution. 20

   b) What are porphyry copper deposits ? Briefly state characteristics and mode of origin of such deposits. 20

5. a) What are metamorphic facies ? How are metamorphic facies classified ? 20

   b) Give an account of mineralogical and textural changes in basic igneous rocks during regional metamorphism. 20

GROUP-B

Answer any two of the following Questions :

6. Write notes on any four of the following : 10x4

   i) Migmatites
   ii) Pyroclastic deposits
   iii) Carbonate Cements
   iv) Earthquake hazards
   v) Optical indicatrix diagrams

7. a) Illustrate with neat sketches the principles of optic sign determination from interference figures of biaxial minerals. 20

   b) Briefly discuss the petrogenesis of anorthosites. 20

8. a) Give an account of impact of mining activities on environment. Suggest possible measures for the mitigation of such hazards. 20

b) Illustrate with neat sketches the facies model for sedimentation in meandering fluvial system. 20

2018

HINDI–I

Time Allowed—3 Hours *Full Marks—200*

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

The figures in the margin indicate marks for each question. All questions carry equal marks.

Group-A

1. भाषा के विभिन्न तत्वों की विवेचना करते हुए स्वनिम की संकल्पना स्पष्ट कीजिए। 30

अथवा,

भाषा शिक्षण और भाषा की अवधारणा को स्पष्ट करते हुए आधुनिक युग में भाषा शिक्षण की विभिन्न पद्धतियों के विषय में लिखिए।

2. भाषा अधिगम की प्रक्रिया तथा वाक् विकार के विभिन्न पक्षों पर प्रकाश डालिए। 20

अथवा,

हिन्दी के विकास और विश्व में उसकी महत्ता पर निबंध लिखिए।

Group-B

3. हिन्दी साहित्य के भक्तिकाल की विशेषताओं पर प्रकाश डालिए। 30

अथवा,

कृष्णभक्ति धारा की प्रमुख प्रवृत्तियां बताइए।

4. रीतिकाल के कवि घनानंद के काव्य सौंदर्य पर प्रकाश डालिए। 30

अथवा,

रीतिकाल की प्रमुख प्रवृत्तियों पर प्रकाश डालते हुए बिहारी के काव्य की सोदाहरण विवेचना कीजिए।

5. हिन्दी निबंध के विकास पर निबंध लिखिए। 40

अथवा,

हिन्दी उपन्यासों के उद्‌भव और विकास का परिचय दीजिए।

6. किन्हीं *दो* पर टिप्पणी लिखिए : 25×2=50

(क) सरहपा

(ख) अमीर खुसरो

(ग) जायसी

(घ) कबीर

2018

HINDI–II

Time Allowed—3 Hours *Full Marks—200*

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

All questions carry equal marks.

Group-A

निम्नलिखित प्रश्नों में से किन्हीं प्रश्नों *तीन* के उत्तर लिखिए : 40×3=120

1. पठित पदों के आधार पर कबीरदास की प्रासंगिकता पर अपने विचार व्यक्त कीजिए।
2. 'विनय पत्रिका' के आधार पर तुलसीदास की भक्ति-भावना पर प्रकाश डालिए।
3. बिहारी के पठित दोहों के आधार पर उनकी बहुज्ञता एवं सौंदर्य-दृष्टि पर अपने विचार व्यक्त करें।
4. 'निराला विद्रोह के कवि हैं।' इस कथन की समीक्षा करें।
5. सर्वेश्वर दयाल सक्सेना की काव्यगत विशेषताओं की विवेचना कीजिए।
6. 'असाध्य वीणा' एक सशक्त कविता है। इस कथन का विश्लेषण करें।

Group-B

निम्नलिखित प्रश्नों में से किन्हीं *दो* प्रश्नों के उत्तर लिखिए : 40×2=80

7. 'ध्रुवस्वामिनी' की प्रमुख समस्याओं पर प्रकाश डालिए।
8. रंगमंचीयता की दृष्टि से 'आषाढ़ का एक दिन' की समीक्षा कीजिए।
9. 'प्रेमचंद का कथा-साहित्य किसानों की जीवन गाथा है।' पठित साहित्य के आधार पर इस कथन का विश्लेषण कीजिए।
10. निबंधकार के रूप में आचार्य रामचन्द्र शुक्ल के साहित्यिक अवदान को रेखांकित करते हुए उनके पठित निबंधों को समीक्षा करें।

2018

HISTORY-PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali or in Nepali but all answers must be in one and the same language.

GROUP-A

1. **Answer any three Questions :-** 10x3

   a) How valuable are literary sources for the reconstruction of ancient Indian history ?

   b) Discuss the various theories regarding the decline of Harappan civilization.

   c) To what extent was later Vedic society different from the early Vedic one ?

   d) Would you consider the Gupta period a 'Golden Age' ?

2. **Answer any two Questions :-** 20x2

   a) Discuss the administrative system of the Mauryan empire.

   b) Discuss the position of Women in the Gupta empire.

   c) Discuss the system of local self-government under the Cholas.

   d) Discuss the significance of Arab conquest of Sind.

3. **Write an Essay on any One of the following :-** 30

   a) The debate on Indian Feudalism.

   b) The development of art and literature under the Palas and Senas.

   c) Discuss the accounts of India presented in the writings of foreign travellers such as Huen Tsang, Fa Hien, Alberuni etc.

GROUP-B

4. **Answer any three Questions :-** 10x3

   a) Discuss Balban's theory of kingship.

   b) Discuss the impact of the Sufi Movement on Indian society and culture.

   c) Examine the salient features of Akbar's religious policy.

   d) Write a note on Mughal paintings.

5. **Answer any two Questions :-** 20x2

   a) Discuss the reforms of Firuz Tughlaq. How far was he responsible for the decline of the Delhi Sultanate ?

   b) How would you explain the origin of the Bhakti Movement in medieval India ?

   c) Discuss the major features of the Mansabdari system of Akbar. What changes were introduced in the system under Akbar's successors ?

6. **Write an Essay on any One of the following :-** 30

   a) The debate on the decline and disintegration of the Mughal empire.

   b) Economy and society in the Vijaynagar empire with reference to the accounts of foreign travellers.

2018

HISTORY-PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali or in Nepali but all answers must be in one and the same language.

GROUP-A

Answer Question No.1 and any two from the rest.

1. Answer any one Question :-

a) Write a note on Dual System of Administration of Bengal. How did it affect the political economy of early colonial bengal ? 20

b) Define economic nationalism in colonial India with reference to a few concrete issues in the late nineteenth and early twentieth centuries. 20

c) Write a note on Brahmo Samaj, Arya Samaj and Ramkrishna Mission. 20

2. To what extent India's first war of independence in 1857 was result of popular discontent against the British rule ? How would you explain the failure of the movement ? 40

3. Identify the factors responsible for growth of Indian National Congress in 1885. Discuss M. K. Gandhi's nationalist movements within Congress. 40

4. Write a note on framing of Indian constitution after 1947 with special reference to the issue of integration of princely states. 40

GROUP-B

Answer Question No.5 and any two from the rest.

5. Answer any one Question :-

a) Identify the causes behind French Revolution of 1789. 20

b) Discuss nature and impact of Industrial revolution in England. 20

c) Discuss the rise of fascism in inter war Italy. 20

6. Write a note on the making of Russian revolution leading to foundation of a socialist state. 40

7. Identify the causes and consequences of second world war. 40

8. What were the causes behind disintegration of Soviet Union ? How collapse of Soviet Union brought political changes in Eastern Europe. 40

2018

LAW - PAPER - I

Time Allowed : 3 Hours Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be **written** either in English or in Bengali but all answers must be in one and the same language.

GROUP - A

Answer any three questions

1. (a) "For the philosophy underlying our Constitution we must look back into the historic objective resolution ... which was adopted by the Constituent Assembly on January 22, 1947 and which inspired the shaping of the Constitution through all its subsequent stages" - In the light of the statement discuss the underlying philosophy of the Constitution of India.

   (b) Discuss the outstanding features of the Constitution of India. 20 + 20

2. (a) Discuss the law relating to protective discrimination under Articles 15 and 16 of the Constitution of India.

   (b) Discuss the various facets of freedom of conscience and free profession, practice and propagation of religion under Articles 25 to 28 of the Constitution of India. 20 + 20

3. (a) Critically discuss the relation between fundamental rights and directive principles under the Constitution of India.

   (b) Discuss about various fundamental duties under the Constitution of India and evaluate their importance. 20 + 20

4. (a) Discuss about the scheme of distribution of legislative powers between Union and State under the Indian Constitution.

   (b) Discuss about the administrative relation between the Union and State under the Constitution of India. 20 + 20

5. (a) State in brief about the procedure of the amendment of the Constitution of India.

   (b) Write a note on election of the President of India. 20 + 20

6. Write notes on any two of the following :-

   (a) System of Panchayats and Municipalities

   (b) Power of Judicial Review

   (c) Administration of scheduled and tribal areas. 20 x 2

P. T. O.

GROUP - B

Answer any one question

7. (a) Discuss about different sources of international law.
   (b) State in brief about nature of international law. 20 + 20

8. (a) Discuss about the importance of law of treaty in international law.
   (b) Discuss about recent development of human rights under international law. 20 + 20

GROUP - C

Anawer any one question

9. (a) Discuss about various school of jurisprudence.
   (b) Write an explanatory note on sources of law. 20 + 20

10. (a) "Rights and duties are co-relative" - In the light of the statement discuss about the relationship between rights and duties.
   (b) Write an essay on the concept of person in jurisprudence. 20 + 20

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2018

LAW - PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP - A

Answer Question No.1 and any three questions from the rest of the Group - A.

1. Write short notes on any four of the following :-
   (a) Tort and Breach of Contract
   (b) Injuria sine damno
   (c) Vicarious liability
   (d) Public Nuisance
   (e) Rule of strict liability
   (f) Essentials of a Tort. 5 x 4

2. (a) Discuss about the general defences in law of Tort.
   (b) Discuss about the principle relating to remoteness of damage. 10 + 10

3. (a) Enumarate the provisions of law relating extra-territorial operation of the Indian Penal Code.
   (b) Mention some of the mental elements that play a significant part in criminal law with reference to certain offences in the Indian Penal Code. 10 + 10

4. (a) Discuss about the general exception under the Indian Penal Code.
   (b) Write the difference between culpable homicide and murder. 10 + 10

5. (a) What are the main ingredients of the offences of Grievous Hurt? Distinguish between Hurt and Grievous Hurt.
   (b) Discuss the relating to offences against marriage under the Indian Penal Code. 10 + 10

6. (a) Discuss the law relating to attempt under the Indian Penal Code.
   (b) Distinguish between Mistake of Fact and Mistake of Law. Do you thing medical insanity is a good defence in the I.P.C. - Discuss with case law. 10 + 10

GROUP - B

Answer Question No.7 and any three questions from the rest of the Group.

7. Write short notes on any four of the following :-
   (a) Minor's agreement
   (b) Fraud and Misrepresentation
   (c) Voidable contract and contingent contract
   (d) Agreement in restraint of legal proceedings
   (e) Anticipatory breach of contract
   (f) Free consent. 5 x 4

P. T. O.

8. Define consideration. What is past, present and future consideration ? Is it possible to make a valid contract without the presence of consideration ? Discuss with exceptions. 20

9. Discuss various principles relating to quasi-contract under the Indian Contract Act, 1872. 20

10. State in brief about various remedies available for breach of contract. 20

11. (a) Explain the concept acceptance.
(b) Explain various modes of revocation of offer. 10 + 10

12. (a) Write a note on standard form of contract.
(b) Explain the concept promissory estoppel. 10 + 10

GROUP - C

Answer Question No.13 and any one from the rest of the group.

13. Write short notes on any four of the following :-

(a) Burden of proof
(b) Hostile witness
(c) Examination of Chief
(d) Previledged communication
(e) Doctrine of Res-gestae
(f) May presume, shall presume and conclusive proof. 5 x 4

14. (a) "All confessions are admissions but all admissions are not confessions" — Explain.
(b) Explain and illustrate "May Presume", "shall presume", "conclusive proof" and "best evidence".
(c) What is dying declarations ? Discuss the evidencery value of dying declaration.
(d) Discuss the concept of "expert opinion" with case law. 5 x 4

15. Define and explain the doctrine "Estoppel". Discuss in brief the rules upon which the rule of estoppel is laid down in the Indian Evidence Act. 20

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2018

MATHEMATICS - PAPER-I

Time Allowed : 3 Hours

Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

1. Answer any two questions :-

(a) Find a basis and dimension of the subsperce W of R^3, where $W = \{(x,y,z) + R^3 : x+2y+z=0,\ 2x+y+3z=0\}$

(b) The matrix of a linear mapping $T : \mathbb{R}^3 \to \mathbb{R}^3$ with respect to the ordered basis $((0,1,1), (1,0,1), (1,1,W))$ of $\mathbb{R}^3$ is given by $\begin{pmatrix} 0 & 3 & 0 \\ 2 & 3 & -2 \\ 2 & -1 & 2 \end{pmatrix}$ Find T.

Find the matrix of T relative to ordered basis $((2,1,1), (1,2,1), (1,1,2))$ of $\mathbb{R}^3$.

(c) If $p(x)$ is a polynomial of degree >1 and $K \in \mathbb{R}$, prove that between two real roots of $p(x) = 0$ there is a real root of $p'(x) + kp(x) = 0$.

10 x 2

2. Answer any two questions :-

(a) A sequence $\{u_n\}$ is defined by $u_n > 0$ and $u_{n+1} = \frac{6}{1+u_n}\ \forall n \in \mathbb{N}$

(i) Prove that the subsequence $\{u_{2n-1}\}$ and $\{u_{2n}\}$ converge to the same limit.

(ii) Find $\lim_{n\to\infty} U_n$

(b) Test the convergence of the series $\sum U_n$ where $U_n = \sqrt{n^4+1} - \sqrt{n^4-1}$

(c) Find $\lim_{n\to\infty} (1 + \frac{1}{n})^{2n}$

10 x 2

3. Answer any two questions :-

(a) Prove that $\frac{\pi^2}{9} < \int_{\pi/6}^{\pi/2} \frac{x}{\sin x}\,dx < \frac{2\pi^2}{9}$

(b) Is $f_n(x) = \frac{nx}{1+n^2x^2}$ uniformly convergent on $[0,1]$? Justify it.

(c) Find the radius of convergence of the power series

$$x + \frac{x^2}{2!} \cdot 2^2 + \frac{x^3}{3!} 3^3 + \ldots\infty$$

10 x 2

4. Answer any two questions :-

(a) Determine the condition for which the system of equations

$$\left.\begin{aligned} x + y + z &= 1 \\ x + 2y - z &= b \\ 5x + 7y + az &= b^2 \end{aligned}\right\}$$ admits of (i) only one

Solution (ii) no solution (iii) many solution.

P. T. O.

(b) Find the asymptotes of the given curve $x^3+y^3-3xy = 0$

(c) Find the pedal equation of the following curve $r^2=a^2 \sin 2\theta$. 10x2

5. Answer any two questions :-

(a) Show that the triange formed by st.lines $ax^2 + 2hxy + by^2 = 0$ and the st.line $lx+my=1$ is right angled if $(a+b)(al^2+2hlm+bm^2)=0$

(b) If a point lies on the ellipse $\frac{x^2}{a'^2} + \frac{y^2}{b'^2} = 1$, prove that its polar w.r.t. the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ touches the ellipse

$$\frac{a'^2}{a^4}x^2 + \frac{b'^2}{b^4}y^2 = 1$$

(c) Show that the product of focal distances of a point on an ellipse is equal to the square of the length of semi-diameter parallel to the tangent at this point. 10x2

6. Answer any two questions :-

(a) The plane $lx+my=0$ is rotated about its line of intersection with the plane $z=0$ through an angle α. Prove that in its new position, its equation will be $lx+my \pm z\sqrt{l^2+m^2}\tan\alpha = 0$.

(b) If the lines $x = ay + b = cz + d$, $x = \alpha y + \beta = \gamma z + \delta$ are co-planar, then show that $(\gamma - c)(\alpha\beta - b\alpha) = (a - \alpha)(c\delta - d\gamma)$.

(c) Show that the locus of a point which is equidistant from the given straight lines $y = mx$, $z=c$ and $y=mx$, $z= -c$ is $mxy + c(1+m^2)z = 0$. 10x2

7. Answer any two questions :-

(a) Solve : $y^2 \log y = xpy + p^2$

(b) Solve : $(D^2-3D+2)y = e^{3x}$

(c) Solve : $(x+2)\frac{d^2y}{dx^2} - (2x+5)\frac{dy}{dx} + 2y = (x+1)e^x$ 10x2

8. Answer any two questions :-

(a) Solve $x^2p + y^2q = (x+y)z$

(b) Solve by Charpit method $(x^2-y^2)pq - xy(p^2 - q^2) = 1$

(c) Find the complete integral of $z^2 = pqxy$
(p, q have their usual significance) 10x2

9. Answer any two questions :-

(a) The moments of a system of forces about the points (0,0), (a,0), (0,a) are aw, 2aw, 3aw respectively. Find the components of their resultants parallel to the co-ordinate axes and the equation to its line of action.

(b) Two equal ladders of weight w are placed so as to lean against each other at an angle 2θ, with their ends resting on a rough horizontal floor, the coefficients of friction of which w.r.t. either being μ, then show that $\tan\theta > \mu > \frac{1}{2}\tan\theta$.

Contd...P/3.

(c) If a force (X, Y, Z) act along a generator of the hyperbolic paraboloid $\frac{x^2}{a^2} - \frac{y^2}{b^2} = \frac{2z}{c}$ and be equivalent to an equal forces (X,Y,Z) at the origin together with a couple (L,M,N), show that $aL \pm bM = 0$, $bX \pm aY = 0$ and $cN \pm abZ = 0$ 10x2

10. Answer any two questions :-

(a) A particle moving in a straight line is acted on by a force which works at a constant rate and changes its velocity from u to v in passing over a distance x. Prove that the time taken is $\frac{3(u+v)x}{2(u^2+uv+v^2)}$

(b) Two perfectly inelastic bodies of masses m_1 and m_2 moving with velocities u_1 and u_2 in the same direction impinge directly. Show that the loss of kinetic energy due to impact is $\frac{1}{2}\frac{m_1 m_2}{m_1+m_2}(u_1 - u_2)^2$

(c) A particle is executing a S.H.M. in a straight line under an accleration μx(distance). If a periodic force mL Cospt be introduced and the time period of force vibration increased to $1\frac{1}{2}$ times, show that $9p^2 = 4\mu$. 10x2

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2018

MATHEMATICS - PAPER-II

Time Allowed : 3 Hours

Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP - A

Answer any five questions

1. (a) The roats of the equation $z^2 + pz + q = 0$, where p, q are complex numbers, are represented by the points A, B on the complex plane. If OA=OB and $\angle AOB = 2\beta$, where O is the origin, prove that –

$$p^2 = 4q \cos^2\beta$$ 14

(b) Prove that $3.4^{n+1} \equiv 3 \pmod 9$ for all positive integer n. Find the remainder when $1! + 2! + 3! + \ldots + 50!$ is divided by 15. If p be a prime number greater than 2, prove that

$$1^p + 2^p + \ldots + (p-1)^p \equiv 0 \pmod p.$$ 4 + 5 + 5

2. (a) If the product of two roots of the equation $x^4+px^3+qx^2+rx+s = 0$ be equal to the product of the other two, prove that $r^2=p^2s$. If $p \neq 0$, show that the equation can be solved by the substitution $x + \frac{r}{px} = t$. 10 + 4

(b) If n be a positive integer, prove that

$$\frac{1}{\sqrt{4n+1}} < \frac{3.7.11. \ldots (4n-1)}{5.9.13. \ldots (4n+1)} < \sqrt{\frac{3}{4n+3}}$$ 14

3. (a) Show that if G is a group of order 10, then it must have a subgroup of order 5. Suppose G is a finite group of order pq, where p, q are primes and $p > q$. Show that G has at most one subgroup of order p. 8 + 6

(b) If G is a group such that $\frac{G}{Z(G)}$ is cyclic, where Z(G) is the center of G, then show that G is abelian. 14

4. (a) Given that $f(x,y) = \begin{cases} \frac{xy}{\sqrt{x^2+y^2}}, & x^2 + y^2 \neq 0 \\ 0, & \text{when } x^2 + y^2 = 0 \end{cases}$

Prove that f is continuous at (0,0) and f_x, f_y both exist at (0,0) but f is not differentiable at (0,0). 4 + 5 + 5

(b) Prove that the functions u, v, w given by $u = \frac{x}{y-z}$, $v = \frac{y}{z-x}$ and $w = \frac{z}{x-y}$ are linearly independent. But u, v, w are related by the relation $uv + vw + wu = -1$

5. (a) If $\vec{a}$ is a constant vector, then prove that

$$\text{curl } \frac{\vec{a} \times \vec{r}}{r^3} = -\frac{\vec{a}}{r^3} + \frac{3\vec{r}}{r^5}(\vec{a}.\ \vec{r}) \quad \text{where } r = |\vec{r}|$$ 14

(b) Evaluate $\iint_S \vec{F}.\ \vec{n}\ ds$, where $\vec{F} = \vec{yi} + zx\vec{j} - z\vec{k}$ and S is the surface of the plane $2x + y = 6$ in the first octant cut off by the plane $z = 4$. 14

P. T. O.

6. (a) Let x be the set of all real valued continuously differentiable functions on a, b and d is defined on X x X by

$$d(f,g) = \sup_{a \le x \le b} |f(x) - g(x)| + \sup_{a \le x \le b} |f'(x) - g'(x)|,$$

for $f, g \in X$; prove that (x, d) is a metric space. 14

(b) Show that $u(x,y) = e^x \cos y$ is harmonic. Determine its harmonic conjugate. 6 + 8

7. (a) If $y = x^3+x^2-2x+1$, calculate the values of y for x = 0,1,2,3,4,5 and form the difference table. Find the value of y at x=6 by extending the table and verify that the same value is obtained by substitution. 14

(b) Obtain a real root of the equation $e^x - 3x = 0$, by Newton-Rapson method, correct to four decimal places. 14

GROUP - B

Answer any two questions

8. (a) Let X and Y be two continuous random variables having joint probability density function

$$f(x,y) = 1 - \frac{x}{3} - \frac{y}{3}, \quad 0 \le x \le 2, \ 0 \le y \le 1$$
$$= 0, \text{ otherwise.}$$

Obtain the marginal densities of X and y. Also find

$E(xy)$, $P(x < y)$ and $P(x \ge 1, y \le 0.5)$ 5+5+5+5

(b) If the probability density function of a random variable x is given by

$$f(x) = c\, e^{-(x^2+2x+3)} \quad -\infty < x < \infty$$

, find the value of C and the variance of the distribution. 5 + 5

9. (a) Show that the correlation coefficient between two random variables lies between 1 and -1. 15

(b) Out of two regression lines given by $x + 2y = 5$ and $2x + 3y = 8$ which one is the regression line of x on y ?

Find also the values of $\bar{x}$, $\bar{y}$, r and σ_y, given that $\sigma_x = 12$.

5+2.5+2.5+2.5+2.5

10. (a) Apply the two-phase process to show that the following L.P.P has unbounded solution :

$$\text{Max. } Z = 2x_1 - x_2 + x_3$$
$$\text{Subject to } x_1 + x_2 - 3x_3 \le 8$$
$$4x_1 - x_2 + x_3 \ge 2$$
$$2x_1 + 3x_2 - x_3 \ge 4$$
$$x_1, x_2, x_3 \ge 0$$

15

(b) Find the optimum assignment to find the minimum cost for the assignment problem with the following cost matrix :-

	M_1	M_2	M_3	M_4	M_5
J_1	8	4	2	6	1
J_2	0	9	5	5	4
J_3	3	8	9	2	6
J_4	4	3	1	0	3
J_5	9	5	8	9	5

15

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2018

MECHANICAL ENGINEERING-PAPER - I

Time Allowed : 3 Hours Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be written either in English or in Bengali but all answers must be in one and the same language.

Answer any five questions

1. The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long.
Determine graphically :
(i) Linear velocity and acceleration of the midpoint of the connecting rod, and
(ii) Angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position. 40

2. (a) A leather belt is required to transmit 7.5 kw from a pulley 1.2 m in diameter, running at 250 r.p.m. The angle embraced is 165° and the coefficient of friction between the belt and the pulley is 0.3. If the safe working stress for the leather belt is 1.5 MPa, density of leather 1 Mg/m^3 and the thickness of belt is 10 mm, determine the width of the belt taking centrifugal tension into account. 20

(b) Prove that the speed at which a belt should be run to transmit maximum power is that at which the maximum allowable tension is three times the centrifugal tension in the belt at that speed. 20

3. (a) A shaft fitted with a flywheel rotates at 250 r.p.m. and drives a machine. The torque of machine varies in a cyclic manner over a period of 3 revolutions. The torque rises from 750 N-m to 3000 N-m uniformly during ½ revolution and remains constant for the following revolution. It then falls uniformly to 750 N-m during the next ½ revolution and remains constant for one revolution, the cycle being repeated thereafter.

Determine the power required to drive the machine and percentage fluctuation in speed, if the driving torque applied to the shaft is constant and the mass of the flywheel is 500 kg. with radius of gyration of 600 mm. 20

(b) The arms of a Porter governor are each 250 mm long and pivoted on the governor axis. The mass of each ball is 5 kg.and the mass of the central sleeve is 30 kg. The radius of rotation of the balls is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent of 20 N of load at the sleeve, determine how the speed range is modified. 20

4. (a) A steel girder of uniform section, 14 metres long is simply supported at its ends. It carries concentrated loads of 90 kN and 60 kN at two points 3 metres and 4.5 metres from the two ends respectively. Calculate

(i) the deflection at the points under the two loads &

(ii) the maximum deflection.

Given : $I = 64 \times 10^{-4}\ m^4$ and $E = 210 \times 10^6 kN/m^2$ 25

P.T.O.

(b) A crane-chain whose sectional area is 6.25 cm^2 carries a load of 10 kN. As it is being lowered at a uniform rate of 40m/min., the chain gets jammed suddenly, at which time the length of the chain unwound is 10 m. Estimate the stress induced in the chain due to sudden stoppage. Neglect the weight of the chain.

Take $E = 2.1 \times 10^5$ N/m^2 15

5. (a) Calculate the equilibrium number of vacancies per cubic meter for copper at 1000° C. The energy for vacancy formation is 0.9 eV/atom, the atomic weight and density (at 1000° C) for copper are 63.5 g/mol and 8.4 g/cm^3, respectively. Take Boltsmann's Constant as 8.62×10^{-5} ev/atom-k. 15

(b) For a 79.65 wt% Fe - 0.35 wt% C alloy at a temperature just below the eutectoid, determine the following :-

(i) The fractions of total ferrite and cementite phases

(ii) The fractions of the proeutectoid ferrite and pearlite

(iii) The fraction of eutectoid ferrite. 20

(c) Briefly state the differences between Pearlite and spherodite relative to microstructure and mechanical properties. 5

6. (a) The voltage - length characteristic of a direct current arc is given by $V = (20 + 40l)$ Volts where, l is the length of arc in Cm. The power source characteristic is approximated by a straight line with an open circuit voltage = 80V and a short circuit current is 1000 amp.

Determine the optimum arc length and the corresponding arc power. 20

(b) During an electric discharge drilling of 10 mm square hole in a low carbon steel plate of 5 mm thickness, brass tool and kerosene are used. The resistance and capacitance in the relaxation circuit are 50Ω and 10μF respectively. The supply voltage is 200V and thegap is maintained at such a value that the discharge takes place at 150V. Estimate the time required to complete the drilling process. 20

7. (a) What do you understand by EOQ ? Explain graphically. 20

(b) A Company has got a demand for particular part at 10,000 units per year. The cost per unit is ₨.2 and it costs ₨.36 to place an order to process the delivery. The inventory carrying cost is estimated at 9% of average inventory investment.

Determine :-

(i) Economic Order Quantity (E O Q)
(ii) Optimum member of orders placed per annum
(iii) Minimum total cost of inventory per annum. 20

8. (a) Give a flow chart for finding greatest among three members to visualize the working of the algorithm. 20

(b) A file called "STUDENT.DAT" contains information such as student roll number, name and total marks.

Write a C Programme to create a file to store details of n students. 20

§§§§§§§§§§§§§§§§§§

2018

MECHANICAL ENGINEERING-PAPER - II

Time Allowed : 3 Hours Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Answer any five questions

1. (a) A uniform, closed cylindrical buoy, 1.5m high, 1.0m diameter and of mass 81 kg. is to float with its axis vertical in sea water of density 1025 kg./m^3. A body of mass 11 kg. is attached to the centre of the top surface of the buoy. Show that, if the buoy floats freely, initial instability will occur.

   (b) With the help of neat sketches, explain the performance characteristics of axial flow pump and mixed flow pump.

   (c) An experiment to determine the force (F) arising from the steady low-speed flow with velocity u past a smooth sphere of diameter d is planned. The sphere is immersed in the fluid of density ρ and dynamic viscosity μ, so that free surface effects are absent. Carry out a dimensional analysis for finding an expression of F (force on the sphere). 10 + 10 + 20

2. (a) Write Kelvin-Planck and Clausius statements of second law of thermodynamics and prove their equivalence.

   (b) The interior lighting of refrigerators are provided by incandescent lamps whose switches are actuated by the opening of the refrigerator door. Consider a refrigerator whose 40 W light bulb remains on continuously as a result of a malfunction of the switch. If the refrigefator has a cop of 1.4 and the cost of electricity is Rs.5.00 per kWh, determine the increase in the energy consumption of the refrigerator and its cost per year if the switch is not fixed. Assume the refrigerator is opened 20 times a day for an average of 30 s.

   (c) Prove that for the same compression ratio, the efficiency of Otto Cycle is more than that of Diesel Cycle.

   (d) Find the percentage loss in dual efficiency of diesel engine with compression ratio of 15, by delaying the fuel cut off from 6% to 10% stroke. Sketch the P-V and T-S diagram of the cycle. 7+12+6+15

3. (a) Neatly sketch the P-V and T-S diagram of Brayton Cycle. Hence derive the expressions for efficiency and maximum work output.

   (b) What is an adiabatic process ? For an ideal gas, find out the expression of work done in adiabatic process.

   (c) Explain reversible process and irreversible process. State the conditions of reversibility.

   (d) A site evaluated for a wind farm is observed to have steady winds at a speed of 8.5 m/s. Determine the wind energy (i) per unit mass, (ii) for a mass of 15 kg. and (iii) for a flow rate of 1155 kg./s of air. 15+8+7+10

P. T. O.

4. (a) Determine the shape factor F_{14} for the surfaces shown in the figure-1 interms of the known shape factors for perpendicular rectangles with a common edge.

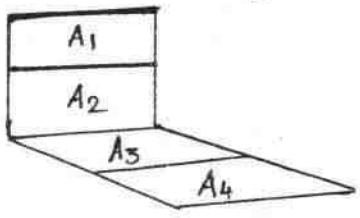

Figure-1

(b) Write short notes on parallel flow type and counter flow type heat exchangers.

(c) An alluminium (k = 204 W/m-K) rod 20 mm diameter and 200 mm long protrudes from a wall which is maintained at 300° C. The end of the rod is insulated and the surface of the rod is exposed to air at 30°C. The convective heat transfer coefficient between the rod surface and the air is 10 W/m^2-K. Calculate the heat lost by the rod. Also calculate the temperature of the rod at a distance of 100 mm from the wall. 12+8+20

5. (a) A power station supplies the following loads to the consumers :

Time in hour	0-6	6-10	10-12	12-16	16-20	20-24
Load in MW	32	70	85	62	100	70

(i) Draw the load curve and estimate the load factor of the power station.

(ii) What is load factor of a stand by equipment of 30 MW capacity if it takes up all loads about 70 MW ? What is its use factor ?

(b) Explain the effect of regeneration on steam cycle output and efficiency.

(c) When does reheating of steam become necessary ? Explain the effect of reheat on cycle output and efficiency.

(d) A single jet impulse turbine of 10 MW capacity is to work under a head of 500 m. If the specific speed of the turbine is 10, the overall efficiency is 80% and the coefficient of velocity is 0.98. Find the diameters of the jet and the bucket wheel. Assume the speed of the bucket wheel is 0.46 of the velocity of jet. 15+8+7+10

6. (a) Derive an expression of L M T D in connection with parallel flow heat exchanger.

(b) What is circulation ratio ? Mention the range in which the circulation should vary.

(c) Define draught. With the help of neat sketches explain the working principle of ID fan and FD fan. 20+6+14

7. (a) Give a neat sketch of a simple carburetor and explain it.

(b) Discuss the stages of combustion in CI engines. Give necessary sketches.

(c) A four stroke four cylinder gasoline engine has bore of 70 mm and stroke of 100 mm. On test it develops a torque of 66 N-m when running at 3000 rpm. If the clearance volume in each cylinder is 60 CC, the relative efficiency with respect to brake thermal efficiency is 0.5 and the calorific value of the fuel is 42 MJ/kg., determine the fuel consumption in kg./h and the BMEP. 12+12+16

Contd...P/3.

8. (a) Explain Joule-Thomson coefficient. What does it represent ? Describe the inversion line and the maximum inversion temperature.

(b) Why is the Carnot Cycle not a realistic model for steam power plants ? Explain.

(c) How do actual vapour power cycles differ from idealised one ? Compare the pressure at the inlet and the exit of the boiler for (i) actual (ii) ideal cycles.

(d) What is dew point temperature ? What is the difference between specific humidity and relative humidity ? Why are the chilled water lines always wrapped with vapour barrier jackets ?

(e) Can the water vapour in air be treated as an ideal gas ? Explain. 10+6+8+12+4

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2018

MANAGEMENT- PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Group - A

Answer any three questions

40x3

1. (a) What are the different Management Principles which are to be followed by any organisation? A thought from Henry Fayol - Illustrate.

   (b) Briefly narrate functions of Management.

2. (a) In a process of influencing people what are the leadership styles, generally seen in management practice.

   (b) Briefly illustrate with example Delegation and De-centralisation.

3. (a) What are the roles of a manager in the organisation?

   (b) Discuss concept of 'Span of Control' - mention 'Graicunas theory'.

4. (a) Give two 'Motivation Theory' in management practices - generally adopted by leader.

   (b) Briefly discuss difference between Herzberg's Hygiene theory and Mcclelland's Need theory.

5. (a) Prepare a job Analysis Information Sheet (Format).

   (b) What are the types of groups, seen in the organisation? Group behaviour is dependent on Belief and attitudes - discuss.

Group - B

Answer any two questions

40x2

6. (a) What are the steps to be adopted to implement TQM in organisation?

   (b) 'JIT system of Management help right materials at right time' - explain

7. (a) What is Conflict Management?

   (b) Is there any tool of finding the quality of a manager on Conflict Resolution.

8. (a) What is Business Process Re-engineering (BPR).

   (b) What are the steps to follow to implement BPR.

9. (a) Discuss why material management is termed now-a-days as SCM: (Supply chain management).

   (b) 'Six-Sigma' - is an improvement process of Quality achievement - Discuss.

2018

MANAGEMENT- PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Answer any five questions

1.a) Draw an outline of the evolution of the marketing concept so as to reach the concept of 'Modern Concept of Marketing'.

b) "Successful scanning of macro marketing environment is key to success in business". Explain with examples in Indian perspective. 15+25

2.a) What functions you are supposed to perform as Finance Manager of a corporate body? 'Equity Capital is the costliest capital'. Justify your answer with appropriate example.

b) For which reasons capital budgeting decisions are important? Elucidate them. Explain IRR and Pay Back Period with examples. 10+10+10+10

3.a) Suppose, you are appointed as HR Manager in a large modern organisation. What roles would you perform?

b) Compare and contrast between external and internal sources of recruitment highlighting their respective merits and demerits. 20+20

4.a) Make a diagrammatic presentation of life cycle of a consumer product with necessary explanation. Suggest suitable remedial strategies for each stage.

b) Discuss post purchase consumer behaviour with necessary examples. 30+10

5.a) How can employee involvement result in increased productivity? Justify Quality Circles as effective tool to increase employee involvement.

b) "Collective bargaining is probably the most effective method of settling industrial disputes". Explain with reasoning. 20+20

6.a) SWOT analysis is foundation for any strategy formulation. Explain.

b) M. Porter's Five Forces Framework teaches us how to formulate strategy to have competitive advantage over rivals. Justify your answer with analysis of Five Forces Framework. 10+30

7.a) Describe PERT and CPM and mention their applicability.

b) Illuminate on cultural dimension in international marketing. Compare between value pricing and perceived value pricing. 10+20+10

8. Write notes on the following :
(Answer any four)

i) 4Ps Vs. 4Cs.
ii) Break even analysis.
iii) Values and Ethics.
iv) Training and Development.
v) Grievance Redressal Mechanism in industrial organisation. 10x4

2018

MEDICAL SCIENCE – PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be written either in **English** or in **Bengali** but all answers must be in one and the same language

1. Answer any four Questions :- 10x4

a) Briefly describe the origin, insertion, blood supply, nerve supply and clinical anatomy of Deltoid muscle.

b) Enumerate the muscles of hand and mention their nerve supply and functions.

c) Describe briefly the pathway and tributaries of Saphenous vein.

d) Write a note on Arterial Circle of Willi's.

e) Give a summary of Krebs citric acid cycle.

f) Write a note on ketone body synthesis, utilisation and excretion.

2. Answer any four Questions :- 10x4

a) Briefly describe events of Cardiac Cycle.

b) Differentiate between Isotonic & Isometric muscle contraction.

c) Briefly describe the physiology of neuro-motor junction and mention the diseases associated with it.

d) Describe in brief how the Kidneys regulate water absorption in the body.

e) Mention the salient features of genetic code.

f) Give a brief note on formation, activation and regulation of Vitamin D in the human body.

3. Answer any four Questions :- 10x4

a) Write the classification of streptococcus. Add a note on group B streptococcus.

b) Describe the types of genetic transfer in a bacteria.

c) What is a granuloma ? Describe the mechanism of granuloma formation.

d) Describe the mechanism of cell injury.

e) What is paraneoplastic syndrome ? Enumerate some papaneoplastic sundomes.

f) Differentiate between chronic Bronchitis and Predominant emphysema.

4. Answer any four Questions :- 10x4

a) Mention adverse effects of phenytoin.

b) Classify Anti arrhythmic drugs.

c) Write a note on Cell Wall synthesis inhibitor antimicrobials.

d) Enumerate the uses of beta-blockers.

e) Differentiate between innate immunity and adoptive immunity.

f) Differentiate between Rickettsia, organism, mycoplasma and chlamydia.

P.T.O.

5. Answer <u>any four</u> Questions :- 10x4

a) Describe the clinical features and management of organophosphorous poisoning.

b) Write a note on Methyl Alcohol poisoning.

c) Briefly define rape and mention the punishment of rape in India.

d) Describe the difinite signs of death due to antemortem hanging.

e) What are the types of evident ? Differentiate between dying declaration and dying deposition.

f) What is hurt ? Describe grievous hurt.

2018

MEDICAL SCIENCE – PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be written either in **English** or in **Bengali** but all answers must be in one and the same language

1. Write short note any four of the following :- 10x4

a) Diagnosis and complications of Diabetes.
b) Liver Abscess.
c) Adverse Drug Reaction.
d) Definition of unstable Angina.
e) WHO classification of SLE Nephropathy.
f) Diagnostic criteria of Acute Kidney Injury.

2. Write Management Outline any four of the following :- 10x4

a) Organophosphorous Poisoning.
b) Acute Myocardial Infraction within 6 hrs.
c) Dengue Haemorrhagic Fever.
d) Complicated Malaria.
e) MDR Tuberculosis.
f) Hematotoxic Snake Bite.

3. Briefly Explain any four of the following :-

a) Portal Hypertension in a Liver Cirrhosis.
b) Tuberculosis in HIV patient.
c) Common Causes Atrial Fibrillation.
d) Hypertension in Pregnancy.
e) Vaccination in Adult.
f) Causes of Coma.

4. Differentiate any four of the following :- 10x4

a) Diabetic Ketoacidosis and Hyperosmolar Nonketotic Coma.
b) Brain Death and Minimally Conscious State.
c) Asymptomatic Hyperuricemia And Gout.
d) Inflamatory Bowel Disease And Irritable Bowel Syndrome.
e) Anal Fissure And Anal Fistula.
f) Hot vs. Cold Nodule of Thyroid.
g) Primary and Secondary Infertility.

5. Enumerate any eight of the following :- 5x8

a) Causes of Tremor.
b) Doctor Patient Relationship.
c) ARI in a child.
d) Causes of Alopecia.
e) Causes of Clronic Fatigue Syndrome.
f) Prusitus vulvae in a post menapausal women.
g) Newer Insulins.
h) Toxic Multinodular Goitre.
i) Medical Insurance.
j) Benign Paroxysmal Headache.
k) Choledocholithiasis.
l) Chronic Hepatitis C Infection.
m) Problems of Medical Education in India.
n) Transfusion Reactions.

2018

PALI – PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Candidates may use **Devanagari** or **Roman** or **Bengali** Script in their answers, quotations or expressions in Pali

GROUP - A

1. State and illustrate Verner's Law. 12

2. Write a comprehensive note on Māhārāstrī Prakrit.

   Or

   Write a note on the constant change in Language, Determine the causes for this change. 20

3. Explain any three of the following phonetic tendencies in Pali with suitable examples :

   (a) Dissimilation (b) Aspiration

   (c) Analogy (d) Cerebralisation

   (e) Syncope. 6x3

GROUP - B

4. State how the Comparatives and Superlatives are formed in Pali, give suitable examples. 18

5. Show the various uses either of the 3rd or the 7th case-endings in Pali. 12

6. (a) Decline fully any one of the following :

   Buddha, Nadi, Tumha. 5

   (b) Conjugate fully any one of the following √dis, in the optative Mood √tha in the Vattamānā √bhū in Bharvissanti. 5

   (c) Give the Pali equivalents of the following Sanskrit words (any five) :

   Nirvāna, mrdu, alpa, padma, Rajagrha, satya, Gautama, pratitya. 2x5

GROUP - C

7. Translate into English either of the following passages adding grammatical notes on the underlined words :

   (a) Idam kho pana, bhikkhave, dukkham Ariyasauam, jati pi dukkhā, jarā pi dukkhā, vyadhi pi dukkhā, maranam-pi dukkhaṃ, appiyehi sampayogo dukkho, piyehi vippayogo dukkho, yam-p' icchaṃ na labhati tam-pi dukkhaṃ, samkhittena pañc - upādānakkhaudhā pi dukkhā.

   (b) Tena kho pana samayena ā yasmā Aṅgulimālo Bhgavato avidure nisinno hoti, Atha kho Bhagavā dakkhina bā haṃ paggahetvā rājānaṃ Pasenadiṃ Kosalaṃ etad avoca : Eso, mahārājā, Aṅguli mālo-ti. Atha kho rañño Pasenadissa

P.T.O.

Kosalassa ahu-d-eva bhayam ahu chambifattam ahu lomahamso. 10+4

8. Translate into English either of the following verses adding grammatical notes on the underlined words :

(a) Akkodhena jine kodham, asādhuṃ sadhunā jine jine kadariyaṃ dānena, saccenālika vādinam.

(b) Atta hi attano nātho, ko hi nātho paro siyā ? attanā hi sudantena nātham labhati dullabham. 10+4

9. Translate into Pali either of the following passage :

(a) When the courtesan Ambapali, heard that the Blessed One was staying in her mango grove, she was exceedingly glad and went in a carriage as far as the ground was passable for carriages. There she alighted and thence proceeding to the place where the Blessed one was, she took her seat respectfully at his feet on one side.

(b) Menandar was a great patron of Buddhism. He gave valuable services to the cause of Buddhism. He was also known as Milinda of the Milindapañha which is a well-known Pali work. He accepted Buddhism as his religion. He built a monastery and gave it to Nagasena, a Buddhist monk, for the residence of monks. 22

GROUP - D

10. Write an essay in Pali on any one of the following :

(a) Ariya Aṭṭhaṅgikamagga

(b) Anicca

(c) Kammavāda 50

2018

PALI – PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Candidates may use Devanagari or Roman or Bengali Script in their answers, quotations or expressions in Pali

GROUP - A

Answer Question No. 5 and any two from the rest.

1. Give a brief account of the various texts constituting the Pali Abhidhammapitaka. 30

2. Estimate the contribution of Acariya Buddhadatta to the development of Pali Commontarial literature. 30

3. Give a short account of the religious conditions prevalent in Northern India during the advent of the Buddha. 30

4. State briefly the circumstances that led to the summoning of the Third Buddhist Council and estimate its effect on Buddhism. 30

5. Write short notes on any four of the following :
   (a) Theragāthā
   (b) Vimānavatthu
   (c) Patisambhidāmagga
   (d) Apadāna
   (e) Rūpārūpa-vibhāga
   (f) Pācittiya Pāli 10x4

GROUP - B

Attempt all questions.

Answers in this Group should be in Pali

6. (a) Summarise the contents either of the Appamāda-vagga or the Magga-vagga of the Pali Dhammapada. 30

   (b) Summarise the contents of the Padhāna-sutta of the Suttanipāta.

   Or

   Brief a brief account how the Sakiyas were annihilated. 30

7. (a) Write, in brief, about the author of Subodhālaṅkāra. 20

   (b) Explain with appropriate example any two of the following mitres :
   (i) Toṭaka
   (ii) Mālinī
   (iii) Vasantatilaka
   (iv) Indavaṁśā 10x2

2018

PSYCHOLOGY- PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP-A

Answer any three Questions :

1. Define attention. Narrate the determinants of attention. What is meant by "Fluctuation of Attention" ? Is it natural ? Coment. Why does it occur ?

5+20+5+5+5

2. Define learning. In what way learning by operant conditioning differs from learning by classical conditioning ? Compare the underlying psychological processes of these two kinds of learning.

5+20+15

3. What is sensation ? Validate : "Psychophysics deals with relationship between stimulation of senseorgans and corresponding psychological experience". In this context discuss what do you know about :

a) Fechner's law, b) Weber's law and c) Weber ratio along with mathematical formulae and appropriate diagrams.

5+20+15

4. Explain the words "memory" and "memory traces" ? How messages from internal and esternal environment are stored and how their retrieval occurs ? Delineate the theories of forgetting.

10+10+20

5. a) What is meant by intelligence ?

   b) Write what do you know about the different categories of intelligence.

   c) Explain the concept of IQ and how it is measured by Stanford-Binet test of intelligence. In this context briefly describe mentally challenged children.

5+10+25

6. State how emotions affect children's personal and social adjustments. Describe briefly different aspects of emotional development of children.

15+25

7. What is motivation ? Distinguish between intrinsic and extrinsic motivation. Give a comparative account of Maslow's and McClelland's theories of motivation.

5+10+25

GROUP-B

Answer any two Questions :

8. What is meant by the term "attitude" ? How does it differ from "beliefs" and "prejudices" ? How it is developed in humans ? Describe how it can be measured ?

5+10+10+15

9. Define morality. How does it differ from ethics ? Distinguish between "moral", "immoral" and "unmoral" behaviours. Enumerate in this context, how morality is learned.

5+5+15+15

P.T.O.

10. What is a "growth spurt" ? By what factors, from birth to adolesunce, physical development is governed in humans ? Decipher the impact of visible/prominent aberrations in physique, during the growing age, upon psychological well-being of the child.

5+15+20

2018

PSYCHOLOGY- PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP-A

Answer any three Questions :

1. Critically evaluate the development of personality as conceptionalised by Erikson. Compare his theoretical position with that of Sigmund Freud. 30+10

2. What are the major clinical features of Schizophrenia ? Critically discuss its etiological factors with the help of suitable research evidences. 16+24

3. Define a group. What are the major types of group ? Discuss the structure and function of a group. 6+7+27

4. Who is a delinquent ? Discuss the major causes of delinquency. What remedial measures can be taken up to manage the social evil of delinquency ? 8+12+20

5. Write short notes on any two : 20+20

   a) Criteria of adjustment.
   b) Client-centered Therapy.
   c) Psychological test construction.
   d) Occupational health hazard.

GROUP-B

Answer any two Questions :

6. What is the need for adequate personnel selection in an organization ? Discuss the different methods of personnel selection. How can organizational climate in India be improved ? 8+12+20

7. Explain the concept of individual differneces in the classroom. As a psychologist, explain how can you ensure effective teaching-learning in the classroom set up ? 15+25

8. What are research variables ? Discuss their different types and explain the concept of confounding. How can confounding of research be prevented ? 8+12+20

2018

PHILOSOPHY - PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Answer any five questions taking at least two from each group

Group-A

1. Explain Plato's doctrine of Form 40

2. What is first principle in Descortes' philosophy? Is it an inferential truth? Discuss. 40

3. What is substance? Explain in the light of Descortes, Spindza and Leibnitz. 40

4. Write notes on any two of the following :

   a) Aristotle's view of causation.
   b) Locke's distinction between primary and secendary qualities.
   c) Hume's distinction between impression and ideas.
   d) Kant's copernican revolution. 20+20

Group-B

5. a) How does Cārvāka reject anumāna as a valid source of knowledge?
   b) Why is Śabda not a valid source of knowledge? Discuss in the light of Cārvāka. 20+20

6. a) State and explain the laksana of pratyaksa given by Goutama.
   b) Discuss in this connection the different kinds of laukika and alaukika pratyaksa. 20+20

7. a) Explain, in details, the asotkāryavāda.
   b) How does sāṁkhya refute this theory and establish satkāryavāda? - Discuss 20+20

8. Write notes on any two of the following :

   a) Syādvāda
   b) Buddhist theory of apoho.
   c) Saṅkara's doctrine of māyā
   d) Vaiśesika view of Sāmānya. 20x2

2018

PHILOSOPHY - PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

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Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Group - A

Answer any three questions

1. "The history of hitherto existing societies is the history of class struggle"-Explain and examine the statement of Marx. 40

2. (a) What is the meaning of 'rights'
   (b) How can one differentiate rights as such from human rights?
   (c) Critically discuss the theories of natural rights. 10+10+20

3. What is justice? Discuss in detail Rawls' theory of justice. 40

4. Distinguish between subconscious and unconscious levels of mind. What are the arguments in favour of the existence of the unconscious - discuss after Freud. 15+25

5. Write short notes on any two of the following :
   (a) Interactionism.
   (b) Gandhian 'Satyagraha'
   (c) Person theory of Strawson.
   (d) Cittavrtti (Joga). 20+20

Group - B

Answer any two questions

6. Discuss Aristotle's virtue ethics in detail. 40

7. (a) What is Deontological theory of Morality?
   (b) Discuss critically Kant's Deontological theory. 10+30

8. Discuss the arguments given by the Jaina and Buddhist philosophers against the existence of God. 20+20

2018

POLITICAL SCIENCE - PAPER-I

Time Allowed : 3 Hours

Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali or in Nepali but all answers must be in one and the same language.

Group - A

Answer Question No.1 and any two from the rest

1. Discuss the concept of legal positivism as it relates to the writings of Jeremy Bentham. 40

2. Discuss the role of regional political parties in India. 30

3. Elucidate the concept of power. Relate it with the concept of authority. 30

4. Explain Rammohan Ray's concept of modernity. 30

Group - B

Answer Question No.5 and any two from the rest.

5. Explain the scope for judicial review in India. 40

6. Elucidate the concept of fundamental rights as enshrined in the Constitution of India. 30

7. Discuss the changing role of bureaucracy in post-colonial India. 30

8. Discuss the role of Chief Minister as enshrined in the Constitution of India. 30

2018

POLITICAL SCIENCE - PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali or in Nepali but all answers must be in one and the same language.

Group - A

Answer Question No.1 and any two from the rest.

1. Answer any five from the following :- 8x5

   (a) Examine the basic principles of the Time and Motion study as propounded by F.W. Taylor.

   (b) Explain the principle of Scalar Chain in an organization.

   (c) Make an assessment of Fred W. Riggs' contribution to Public Administration.

   (d) What are the advantages of lucremental Decision-making?

   (e) Distinguish between Line and Staff Agencies in an organization.

   (f) Discuss how Parliament of India can control the administration.

   (g) What are the functions of the P.M.O. in India?

2. Discuss how globalization has affected Public Administration. 30

3. Examine the efforts undertaken in India to tackle the problem of corruption. 30

4. Analyse the challenges faced by the district administration in its interface with Panchayat Bodies in West Bengal. 30

Group - B

Answer Question No.5 and any two from the rest.

5. Answer any five from the following :- 8x5

   (a) Identify the objectives of SAARC

   (b) What was the role of India in the formation of the Non-aligned Movement?

   (c) Examine the factors that led to the failure of the League of Nations.

   (d) What are the weaknesses of the European Union as a regional organization?

   (e) Identify the major trends in India - Bangladesh relations over the last two decades.

   (f) Discuss the significance of Doklam in Sino-Indian relations.

   (g) Examine the importance of the Kashmir factor in Indo-Pak relations.

6. What are the global implications of the collapse of the Soviet Union? Examine. 30

7. Discuss the role of the United Nations in promoting and protecting human rights. 30

8. Identify the determinants of India's foreign policy. 30

2018

PHYSICS - PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP - A

Answer any three questions

1. (a) Write the Maxwell's relations of thermodynamics.

   (b) Consider entropy to be a function of T and V.

   Show that

   $$Tds = C_v dT + T\left(\frac{\partial P}{\partial T}\right)_V dV$$

   The symbols have their usual meaning.

   (c) Now, take the entropy to be a function of T and P.

   Show that $Tds = CpdT - T\left(\frac{\partial V}{\partial T}\right)_p dP$

   The symbols have their usual meaning.

   (d) An ideal gas with pressure P_1, volume V_1 and temperature T is expanded isothermally to pressure P_2, volume V_2. Find the work done.

   (e) A diatomic gas ($\gamma = 1.4$) does 200J of work when it is expanded isobarically. Find the heat given to the gas in the process.

   (f) Briefly describe the operation of a Carnot cycle with the help of a P-V diagram and find its efficiency.

   8+6+6+5+5+10

2. (a) State Gauss's Law of electrostatics. Find both integral and differential forms of it.

   (b) Use Gauss's Law to find the field inside a charged sphere.

   (c) Find the potential due to a ring of charges at a point on the axis of the ring.

   (d) Show that the potential due to an electric dipole is

   $$\phi = \frac{\vec{p}.\vec{r}}{4\pi\epsilon_0 |\vec{r}|^3}$$ where the symbols have their usual meaning.

   Use this expression to find the components of electric field in spherical polar coordinates.

   (3+4+4)+5+8+(10+6)

3. (a) Set up the Lagrangian of a simple pendulum and obtain its equation of motion.

   (b) Suppose Hamiltonian of a system is

   $H = \sum_{i=1}^{N} p_i q_i - L$ (where the symbols have their usual meaning)

   Find the Hamilton's equations -

   (i) When H does not contain time explicitly

   (ii) When H contains time explicitly.

P.T.O.

(c) A particle moves in the x-y plane under the influence of a central force depending only on the distance from the origin.

(i) Set up the Hamiltonian of the system.

(ii) Write Hamilton's equation of motion. (7+5)+(8+8)+(6+6)

4. (a) State the basic postulates of special theory of relativity.

(b) Write down the Lorentz transformation relations.

(c) Use the Lorentz transformation relations to find expressions for time-dialation and length contraction.

(d) Find the relativistic velocity addition formula.

(e) Define covariant and contravariant vectors.

(f) Define space-like and time-like vectors.

4+6+(5+5)+6+(4+4)+(3+3)

5. (a) Two masses m_1 and m_2 travelling in the same straight line collide. Find the velocities of the particles after collision in terms of the velocities before collision.
(Take 'e' to be the coefficient of restitution)

(b) Discuss the above problem for the case -

(i) perfectly elastic collision

(ii) perpectly inelastic collision.

(c) Show that for a perfectly elastic collision of the particles the total kinetic energy before collision is equal to the total kinetic energy after collision.

(d) Consider a square plate of side 'a'. Find

(i) moments of inertia about an axis comuting with any edge.

(ii) products of inertia.

(iii) principal moments of inertia. 8+(3+3)+6+(6+6+8)

6. (a) For an A.C. given by $i = i_0 \sin(\omega t + \phi)$. Show that $i_{rms} = i_0/\sqrt{2}$.

(b) An A.C. circuit contains only a capacitor. Find the relation between peak e.m.f. and peak current. Hence find the reactance.

(c) State Faraday's and Lenz's Law of electromagnetic induction.

(d) A D.C. battery is connected in a circuit containing an inductor (with inductance 'L') and a resistor (with resistance 'R') in series. The e.m.f. of the battery is 'E'. Find the expression of current in the circuit after a time 't'.

(e) Explain self induction. Find the self inductance of a solenoid of length 'ℓ', number of turns per unit length 'n' and radius 'r'.

7+7+(3+3)+10+(3+7)

GROUP - B

Answer any two questions

7. (a) State and explain Biot-Savart's Law. Use it to find the magnetic field, due to current in a long straight wire, at a distance 'd' from it.

(b) Write the Maxwell's equations of electromagnetic theory, in the medium.

(c) Suppose a point charge 'q' is held at a distance 'd' from an infinite grounded conducting plane. Use the method of images to find (i) the potential, (ii) the induced surface charge density and (iii) the total induced charge.

Contd...P/3.

(d) From the Maxwell's equations find the wave equations for electric and magnetic field. (5+10)+6+(3+5+4)+7

8. (a) At time t = 0 a parachutist having weight 'mg' is at z=0 and travelling vertically downward with speed 'v_0'. If the force on air resistance acting on the parachute is proportional to the instantaneous speed find the (i) speed, (ii) distance travelled and (iii) accelaration ; at any time $t > 0$. (iv) Find also the limiting speed.

(b) Consider two simple harmonic motions perpendicular to each other given as

$$x = a \sin \omega t \text{ and } y = b \sin(\omega t - \alpha)$$

(i) Show that the resultant motion is elliptic

(ii) Find the direction of the major axis of the ellipse.

(iii) Find the motion for $\alpha = 0$ and $\alpha = \pi/2$. (8+6+3+3)+(10+5+5)

9. (a) For a particle moving in a central force field

(i) Show that the motion is in a plane
(ii) Show that the angular momentum is conserved.
(iii) Write the equation of motion.
(iv) Show that the force field is conservative.

(b) Consider a vector $\vec{A}$ observed in a fixed coordinate system and also in another coordinate system rotating with angular velocity $\vec{\omega}$ which is constant in time.

(i) Show that $\left.\frac{d\vec{A}}{dt}\right|_{fix} = \left.\frac{d\vec{A}}{dt}\right|_{rot} + \vec{\omega} \times \vec{A}$

(ii) Use the above expression to show that

$$\left.\frac{d^2\vec{r}}{dt^2}\right|_{fix} = \left.\frac{d^2\vec{r}}{dt^2}\right|_{rot} + 2\vec{\omega} \times \left.\frac{d\vec{r}}{dt}\right|_{rot} + \vec{\omega} \times (\vec{\omega} \times \vec{r})$$

(where $\vec{r}$ is the position vector) (6+4+6+4)+(10+10)

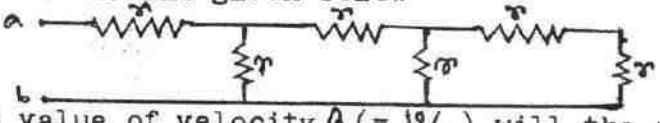
10. (a) Consider a source of sound (with velocity 'c') in relative motion with the observer. The original frequency is 'n'. Find the frequency measured by the observer when

(i) the source is moving with a velocity 'v'

(ii) the observer is moving with a velocity 'v'.

(b) Define extensive and intensive thermodynamic quantities. Give examples.

(c) Find the equivalent resistance between the points 'a' and 'b' for the circuit given below -



(d) For what value of velocity $\beta (= v/c)$ will the relativistic mass of a particle exceed its rest mass by a fraction 'f'.

(e) Two mercury drops each of radius 'r' merge to form a bigger drop. Calculate the surface energy released if 'S' is the surface tension.

(5+5)+(3+3+2)+7+7+8

§§§§§§§§§§§§§

2018

PHYSICS - PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP - A

Answer any six questions

1. (a) State de Broglie's hypothesis. What is the ratio of the kinetic energy of an electron to that of a proton if their de Broglie wavelengths are equal 2+3

   (b) Write down ground state wave function of hydrogen atom and show that radial probability density is maximum at the Bohr radius. 5

2. (a) Starting from time-dependent Schrolinger equation in one-dimension, derive the equation of continuity. 5

   (b) Obtain the spectral designation of the level whose degeneracy is 7 and the quantum numbers L and S are interrelated by L=3S. Why non-polar homonuclear molecules do not exhibit infrared rotation-vibration spectra ? 3+2

3. (a) Which statistics is obeyed by an atomic nucleas? What do you mean by classical limit of quantum statistics. 3+2

   (b) Two identical particles, each of them can be in one of the three possible states of energy 0, E and 2E. Find the number of micro-states of the system for MB, BE and FD-statistics. 5

4. (a) Define binding fraction of nuclei and sketch its variation with mass number of the nuclei. Which nuclear phenomenon can be explained from the lower-A part of the binding fraction curve. 2+2+1

   (b) If a nucleus with A=235 splits into two fragments with mass numbers in the ratio of 3:2, find the separation between the fragments at the moment of splitting. Given $r_0 = 1.4 \times 10^{-15}$ m 5

5. (a) Predict the characteristics of the ground state of $_8O^{17}$ using shell model. Find the Q-value of the nuclear reaction $^{14}N(n,\alpha)^{11}B$ is MeV. Given mass of ^{14}N =14.007550 u, ^{11}B=11.012811 u n=1.008987 u, ^4He=4.003879 and 1 u =931 MeV. 2+3

   (b) Identify the unknown particle in the reaction:

   $$\pi^- + p \longrightarrow K^0 + t \ldots$$

   Given an analysis of the nuclear reaction

   $\pi^- + p \rightarrow \Lambda^0 + K^0$ in terms of quarks. 2+3

6. (a) Find the reciprocal lattice of a sc lattice. Show that greater the diffraction angle, the greater is the accuracy in determining the lattice parameters. 2+3

   (b) Draw the different branches of the dispersion relation curve within 1st Brillouin Zone. Why are they so called? 2+3

P.T.O.

7. (a) Give a comparative study of conductor, semiconductor and insulator. What are the sources of electrical resistance in solids? 4+1

(b) State Curie-Weiss Law and discuss its significance. A paramagnetic material has 10^{28} atom/m^3. Its susceptibility at 350 K is 2.8×10^{-4}. Calculate the susceptibility at 300 K. 3+2

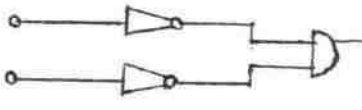
8. (a) Establish the relation between α and β of a transistor. (where symbols have their usual meaning) 5

(b) Draw the output voltage of the following op-amp circuit when 1V dc is applied to its input. Draw the output waveform upto 10 sec. 4+1

9. (a) Draw the drain characteristics of an n-channel MOSFET indicating operation in both modes.

The pinch-off voltage of a p-channel JFET is $V_p = 5V$ and IDSS = -40 mA. The drain to source voltage V_{DS} is such that a saturated drain current $I_{DS} = -15$ mA is maintained. Find the gate-source voltage V_{GS}. 3+2

(b) Convert the decimal number 263 in a code of base 5. Give the circuit symbol of the following logic circuit and mention the name of the gate (do not use de Morgan's theorem).



$Y = \overline{A} . \overline{B}$ 3+2

GROUP - B

Answer any seven questions

10. (a) Consider a linear harmonic oscillator for which total energy is $E = \frac{P_x^2}{2m} + \frac{1}{2} m\omega^2 x^2$, symbols have their usual meanings. The particle is assumed to be confined in a region $\sim a$. Using uncertainty principle, obtain ground state energy of the oscillator. 6

(b) Find the ground level ($^2S+1L_J$) of the atom having electronic configuration $2p^5 3s$. 4

(c) Consider a particle is an infinite square well of potential given by

Obtain energy eigen values and eigen functions. 10

11. (a) Give a theoratical account of energy splitting in anomalous Zeeman effect. 6

(b) The first rotational Raman line of hydrogen molecule appears at 346 cm^{-1} from the existing line. What is the bond length of hydrogen molecule.

Given $m(^1H) = 1.673 \times 10^{-27}$ Kg. 4

Contd..P/3.

(c) Show that for a single step potential, as defined by

$$V(x) = 0 \text{ for } x < 0$$
$$= V_0 \text{ for } x \geq 0$$

the probability of finding the particle (for $E > V_0$) at the boundary between two regions is conserved. 10

12. (a) Obtain an expression of Fermi-Dirac distribution function. 10

(b) Show that avarage kinetic energy of an electron at T=0K is $\frac{3}{5} E_F$, where E_F is the Fermi energy. 6

(c) Show that molar specific heat at constant pressure of a monatomic gas is $\frac{5}{2} R$. 4

13. (a) Show that for a 2D free electron gas, the number of electrons per unit area is given by –

$$n = \frac{4\pi m K_B T}{h^2} \ln \left(e^{E_F/K_B T} + 1\right)$$ 10

(b) In a solid, consider the energy level lying 0.01 eV below the Fermi level. What is the probability of this level not being occupied by an electron. Given $K_B T = 0.026$ at 300 K. 6

(c) Show that the Zero point energy of a solid according to Debye model is $\frac{9}{8} R\Theta_D$. Where symbols have their usual meaning. 4

14. (a) Write down semi-empirical mass formula for the mass of a nucleus and mention the different terms. Obtain mass parabola from it. Mention its importance. 8

(b) The masses of the different nuclei taking part in ${}^{7}_{3}Li\,(p,n)\,{}^{A}_{Z}Y$ reaction in h are as follows :

$$M\left({}^{7}_{3}Li\right) = 7.01822,\ M\left({}^{2}_{1}H\right) = 1.00814,\ M\left({}^{1}_{0}n\right) = 1.00898$$

and mass of product nucleus = 7.01 915. Calculate the Q-value of this reaction in MeV. Is it exergic or endoergic? What is the threshold of the reaction? 8

(c) What is neutrino hypothesis of pauli? 4

15. (a) Define hyperchange. Give the graphical plot of baryon ected and explain the diagram. 10

(b) Check whether the reaction is allowed or forbidden?

$$\pi^- + p \longrightarrow \Lambda^0 + \pi^0$$ 3

(c) Identify the perticle x in the following reaction

$$p + p \longrightarrow \pi^+ + n + \Lambda^0 + X$$ 3

(d) State CPT theorem. Which quantum number or property is not conserved is weak interactions. 4

P.T.O.

16. (a) In a crystal, a lattic plane cuts intercepts of 2a, 3b and 6c along three axes, whose a, b, c are primitive vectors of unit cell. Determine the Miller indices of the plane. 7

(b) Find the lowest energy band using Kronig-Penny model for $P \ll 1$. Given $P\frac{\sin \alpha a}{\alpha a} + \cos \alpha a = \cos ka$, terms have their usual meaning. 7

(c) State and explain Meissner effect in superconductor. 6

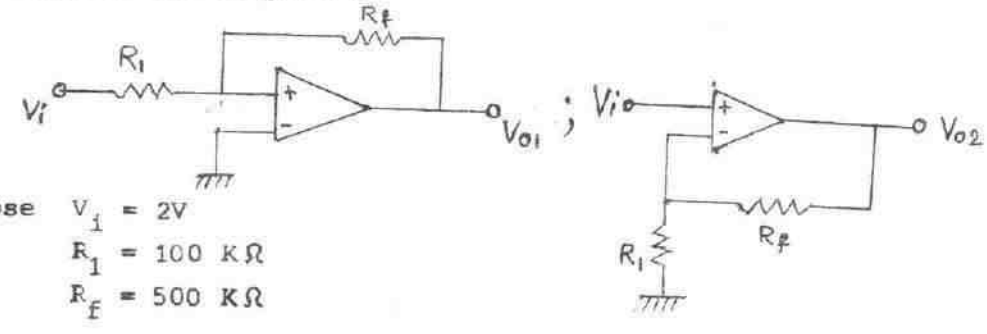
17. (a) Derive Curie's Law for susceptibility on the basis of Langevin's classical theory of paramagnetism. 10

(b) Nacl crystal has a cubic structure. If the molecular weight of Nacl is 58.46 and its density 2.71 gm/cc, find the distance between the two atoms of the same kind (2a) and the lattice constant (a) in the crystal. 7

(c) Show that for the free electron model, the effective mass of electron is equal to the free electron mass. 3

18. (a) Express the decimal number -23 in 8-G't 2's complement form. Hence perform the decimal subtraction (48-23) by 2's complement method. 4

(b) Compare the outputs :



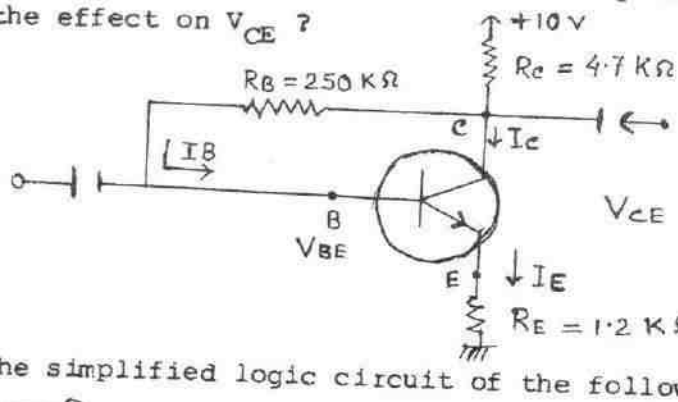
Whose $V_i = 2V$

$R_1 = 100\ K\Omega$

$R_f = 500\ K\Omega$ 6

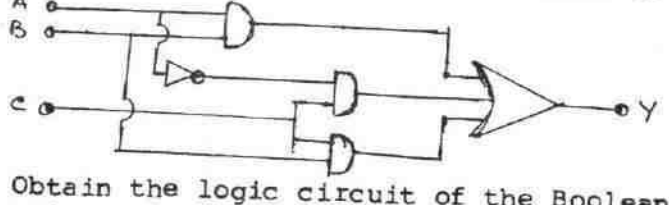
(c) In the equivalent circuit of a vibrating piezoelectric crystal, assuming R=0, obtain the expression of crystal impudence. Discuss its behaviour as inductive and capacitative. 10

19. (a) In the circuit, find the quiescent values of I_E and V_{CE}. Given $\beta = 90$, $V_{BE} = 0.7V$. If β is increased by 50%, what will be the effect on V_{CE} ?



10

(b) Obtain the simplified logic circuit of the following one:



5

(c) Obtain the logic circuit of the Boolean function F=AB+CD using two-input NAND gates only. 5

2018

PHYSIOLOGY- PAPER-I

Time Allowed : 3 Hours

Full Marks : 200

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Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Group - A

Answer any three questions

1.a) What is pH? Describe the chemistry of a deoxyribonucleotide.
b) Describe the structure and property of an aldo and a keto monosaccharide of physiological importance.
c) What is osmosis? Discuss the mechanism and importance of osmosis takes place at peripheral blood capillaries.
d) What is cholesterol? State its functions in human body.

(2+8)+(7+7)+(2+8)+(2+4)

2.a) What are polymorphonuclear leucocytes? State the role of neutrophil in phagocytic defence.
b) Describe the structure and function of adult haemoglobin in human.
c) What are amino acids? State the functions of any two essential amino acids in human body.
d) Describe the importance of iron (Fe) in human body.

(2+8)+10+(2+8)+10

3.a) Discuss the breakdown of glucose through Glycolysis.
b) Discuss the role of pyruvate as a central metabolite.
c) Discuss the role of Acetyl-CoA in the TCA cycle.
d) What do you mean by deamination? Give an example.

10+10+10+10

4.a) Vitamin D is considered as a prohormone - Justify
b) Explain in detail the food guide pyramid.
c) Discuss the dietary sources, requirement and functions of Zn in our body.
d) Name the anti-oxident vitamins and discuss their functions in human body.

10+10+10+10

5.a) Discuss the hazards of blood transfusion.
b) Discuss the mechanism of extrinsic and intrinsic pathway of blood coagulation.
c) Discuss the role of partial pressure of oxygen in RBC production.
d) Give an overview of innate and acquired immunity

6+10+6+(9+9)

Group - B

Answer any two questions

6.a) Discuss the sequence of events occurring in a cardiac cycle.
b) Discuss the various factors controlling venous return of blood to the heart.
c) Describe a method for determination of cardiac output.
d) State the salient features of cardiac muscle.

10+8+12+10

7.a) Discuss the Transport mechanisms of oxygen in blood.
b) What is hypoxia? Discuss about the different types of hypoxia.
c) What is vital capacity? Write about the different types of lung-volumes with definitions.
d) What is anaemia? Classify it.

12+(2+8)+(2+10)+6

P.T.O.

8.a) Discuss the mechanics of breathing.
b) Discuss the factors affecting O_2-dissociation curve of haemoglobin.
c) Draw and discuss the normal waves of human electrocardiogram.
d) Discuss the factors controlling cardiac cycle.

10+10+10+10

9.a) Draw and describe the ultra-structure of a nephron.
b) Discuss the process of formation of urine.
c) Discuss the role of kidney in acid-base balance.
d) State the role of nephron in urine formation of a person suffering from diabetes insipidus.

10+10+10+10

2018

PHYSIOLOGY- PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Group - A

Answer any six questions

1.a) What is current of injury?
b) Discuss the ionic events that take place during the various phases of the development of a nerve action potential.
c) What is synaptosome?
d) Discuss in brief about the end plate potential (EPP) and miniature end plate potential (MEPP) 2+8+2+8

2.a) Mention the differences between somatic and autonomic reflex arcs.
b) What are meant by superficial and deep reflexes?
c) What is sleep apnoea?
d) Discuss the molecular basis of sensitization. 6+4+3+7

3.a) Describe the auditory pathway with a suitable diagram.
b) What is umami taste modality?
c) Describe the mechanism of olfactory transduction. (7+3) +2+8

4.a) Describe with a suitable diagram the histological structure of human skin.
b) What is meant by heat stress and heat strain?
c) Distinguish btween hypothermia and hyperthermia. (3+7) + (3+3) +4

5.a) What are hypothalamic releasing factors?
b) Discuss the functions of PTH.
c) State the endocrinological cause of Cretinism and Diabetes Insipidus. 3+7+ (5+5)

6.a) Describe the changes in the ovary and uterus take place during different phases of a menstrual cycle.
b) Describe with a suitable diagram the histological structure of an ovary of adult female individual.
c) What is spontaneous Ovulation? (5+5) +7+3

7.a) Describe the basic concept and usefulness of lactate threshold and lactate tolerance.
b) What is physical fitness?
c) Discuss the assessment of physical fitness by modified Harvard Step Test method. (5+5) +3+7

8.a) What is noise?
b) Discuss brifly the non-auditory effects of noise on human body.
c) Discuss the causes of water pollution.
d) Discuss about the concept of safe drinking water. 2+8+5+5

Group - B

Answer any four questions

9.a) Write short notes on (any four) :

i) Habituation

ii) Sleep disorders

iii) Aldosterone escape

iv) Oogenisis

v) Chronaxie and rheobase

vi) Myopia 5x4

10. a) Discuss the pathophysiology of type I and type II diabetes mellitus.
b) "Insulin generally administered through intravenous injection" - explain with reasons why?
c) Describe the chemistry and functions of calcitonin (5+5)+4+6

11. a) Describe the histological structure of different layers of retina.
b) Describe the mechanism of accommodation of human eye. 10+10

12. a) Discuss the neurophysiological basis of long term potentiation.
b) What is somnogens?
c) Give a brief account about the roles of neurotransmitters in NREM sleep.
d) What do you understand by retro grade amnesia? 8+3+6+3

13. a) Describe with the help of suitable diagram the structure of a Spermatozoon.
b) Describe the process of maturation and capacitation of spermatozoa.
c) Discuss the endocrine functions of testis. 8+8+4

14. a) How does eccrine sweat gland differ from apocrine sweat gland?
b) Write in brief about insensible perspiration and core temperature.
c) What are meant by nuclear bag and nuclear chain fibres?
d) Write in brief about chemical synapse. 4+(3+3)+(3+3)+4

2018

SANSKRIT–I

Time Allowed—3 Hours *Full Marks—200*

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be evaluated and the remaining ones ignored.

*Answer may be written either in **English** or in **Bengali** or in **Sanskrit** but all answer must be in one and the same language.*

Group-A

1. Analyse the characteristic features of Avestan and old Indo-Aryan languages and distinguish the linguistic studies between these two languages. 30

Or,

Write a comprehensive note on the influence of Non-Aryan languages in Sanskrit.

2. Define and illustrate *any two* of the following: 10×2=20

   (a) Verner's Law

   (b) Haplology

   (c) Law of Cerebralization

   (d) Epenthesis

Group-B

3. Explain *any two* of the following sūtras in Sanskrit: 10×2=20

   (a) अभिनिविशश्च

   (b) साधकतमं करणम्

   (c) विभाषा गुणेऽस्त्रियाम्

4. Account for case ending in *any five* of the underlined words in the following sentences citing relevent Pāṇinian rules on each case: 4×5=20

   (a) पय: दोग्धि गाम्।

   (b) सरस्वति नमस्तुभ्यम्।

   (c) भार्यामीर्ष्यति देवदत्त:।

   (d) ब्राह्मणेषु अधोयानेषु गत:।

   (e) इदं मम मतम्।

   (f) पठनाय आगच्छति ग्रन्थागारम्।

   (g) हिमालयात् प्रभवति गङ्गा।

5. Name and expound the Samāsa *any five* of the following: 4×5=20

   (a) सहरि

   (b) उन्मत्तगङ्गम्

   (c) काकपेया

   (d) कण्ठेकाल:

   (e) मित्रावरुणौ

   (f) दण्डादण्डै:

   (g) पितरौ

6. Justify *any two* of the following (in Sanskrit): 10×2=20

   (a) एकादशीमुपवसति।

   (b) वदत्त्यपर्णामिति तां पुराविद:।

   (c) प्रणम्य शितिकण्ठाय।

   (d) गच्छत: वधूवरौ।

Group-C

7. Translate into English or Bengali *any two* of the following: 10×2=20

   (a) अग्निर्होता कविक्रतु:

   सत्यश्चित्रश्रवस्तम:।

   देवो देवेभिरा गमत्।।

(b) अहं रुद्राय धनुरा तनोभि
ब्रह्मद्विषे शर्वे हन्तवा उ।
अहं जनाय समदं कृणो -
म्यहं द्यावापृथिवी आ विवेश।।

(c) प्रजापते न त्वदेतान्यन्यो
विश्वा जातानि परि ता बभूव।
यत्कामास्ते जुहुमस्तन्नो अस्तु
वयं स्याम पतयो रयीणाम्।।

Group-D

8. Translate from English into Sanskrit : 30

Obey your parents, respect the learned, never speak one word of censure to others and be content with your position. Do not boast of your men, money and youth. For they are as unsteady as water on the leaves of lotus and time can kill them in a moment.

Or,

Translate into English from Sanskrit:

एकदा कश्चित् श्वा मुखेन मांसखण्डमेकमादाय नदीतीरस्थ पथि अगच्छत्। तदा नदीजले पतितं स्वप्रतिविम्बमालोक्य स मनसि अचिन्तयत् अयमपरः कश्चित् श्वा मांसखण्डमादाय गच्छतीति। अथ लोभपरवशात् नदीजले पतितः स यदा मुखव्यादानं कृतवान् तदा तस्य मुखस्थितं मांसखण्डमपिनीतं नदीजलवेगेन।

Group-E

9. Write a paragraph in Sanskrit *any one* of the following topics: 20

(a) संहतिः कार्यसाधिका।

(b) विश्वस्य उष्णायनम्।

(c) संस्कृतसाहित्ये परिवेशभावना।

2018

SANSKRIT–II

Time Allowed—3 Hours *Full Marks—200*

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

The candidates may use Devanagari or Bengali scripts in their answers, quotations and expressions in Sanskrit.

Answers may be written either in ***Bengali*** *or in* ***English*** *or in* ***Sanskrit****.*

All questions carry equal marks.

Answers question Nos. 1 and 2 and any three of the rest.

1. Write a note on Vedāngas. 40

Or,

Write a note on the Brāhmaṇa Literature.

2. What is Yoga? Discuss the eight angas of yoga (Yogāngas) 40

Or,

Write a note on Mīmāṁsā philosophy and its two Schools.

3. Discuss the character of Rama as a king as depicted in the Rāmāyaṇa. 40

4. Justify the statement: 'माघे सन्ति त्रयो गुणाः'. 40

5. Justify the significance of the curse of Durvāsas as found in the drama "अभिज्ञानशकुन्तलम्". 40

6. Describe the character of Duryodhana as an administrator according to the speech of Vanecar (वनेचर) in the Canto No. 1 of "किरातार्जुनीयम्". 40

7. Write note on गणs and 'वृन्त' chhandas with illustrations. 40

8. Write note on व्यसनs that are to be avoided by a king. 40

2018

SOCIOLOGY - PAPER-I

Time Allowed : 3 Hours

Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

All questions carry equal marks

GROUP-A

Answer **any three** Questions :

1. Discuss the emergence of sociology as an academic discipline. 40

2. What is a social fact ? Is suicide a social fact ? Discuss with reference to Emile Durkheim. 40

3. How would you estimate R. K. Merton as a sociologist ? 40

4. What do you understand by post-industrial Society ? Discuss its major dimensions. 40

5. a) Discuss the important issues of citizenship in post-independent India.

   b) Do you agree with the view that **'Civil society'** can play a significant role in forming public opinion ? Justify your answer. 20+20

GROUP-B

Answer **any two** Questions :

6. Is there any debate between religion and science ? Explain their significance in modern India. 40

7. Write an essay on Social responsibility of Science. 40

8. **'Survey method is one of the important methods of data collection'.** Explain. 40

2018

SOCIOLOGY - PAPER-II

Time Allowed : 3 Hours

Full Marks : 200

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Answers may be given either in English or in Bengali but all answers must be in one and the same language.

All questions carry equal marks

GROUP-A

Answer any three Questions :

1. Explain how India has portrayed the problems of Unity and diversity in its Socio-Cultural structure. 40

2. Discuss the distinctivness in G. S. Ghurye's Study of Indian Society and culture. 40

3. Who are the Scheduled Tribes in India ? Write a note on the problems of Scheduled Tribes in India. 40

4. Analyse the relationship between Social change and urbanization. 40

5. What is globalization ? How does globalization affect the nature of Social mobility in modern India ? 40

GROUP-B

Answer any two Questions :

6. Briefly discuss the causes and consequences of declining child Sex Ratio in India. Do you think that it is an extreme form of gender inequality ? Justify your answer. 40

7. How does marriage perform various functions in Indian Society ? Examine the causes and consequences of marital conflict in India. 40

8. What are the causes of Violence against Women ? Do you think that Domestic Violence Act is effective in reduceing Violence against Women ? Discuss. 40

2018

STATISTICS-PAPER-I

Time Allowed : 3 Hours

Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali or in Nepali but all answers must be in one and the same language.

GROUP - A

Answer any ten questions.

1. (a) What do you mean by 'statistical regularity' ? Define probability space and state Kolmogorov's axiomatic definition of probability.

(b) What do you mean by a symmetric probability distribution ? If X be a continuous random variable having distribution function F satisfying

$$F(x) + F(-x) = 1 \quad \text{for all } x$$

then show that $E(X)=0$ assuming $E(x)$ exists.

(c) Write down the properties of a distribution function. If F is a distribution function then show that for any natural number n F^n will also be a distribution function.

(d) Define best linear unbiased estimator (BLUE). Show that sample mean is the BLUE of population mean.

(e) Define a likelihood function and a maximum likelihood estimator (MLE) of a parametric function. Suppose $(x_1, x_2, \ldots, x_n)$ is a random sample drawn from uniform$(0,\phi)$. Find MLE of ϕ.

(f) Distinguish between critical value and p-value of a test.

(g) What do you mean by a most powerful test ? In this connection state fundament Neyman-Pearson Lemma.

(h) Define convergence in probability and convergence in distribution. Cite an example to show that the latter does not imply the former.

(i) Define multiple correlation coefficient and show that it always lies in the interval $[0, 1]$. Also interpret the cases when it assumes 0 and 1.

(j) Suppose $\underset{\sim}{X}$ is a p-component random vector with mean vector $\underset{\sim}{\mu}$ and nonsingular dispersion matrix Σ . Then show that

$$P\left((\underset{\sim}{x}-\underset{\sim}{\mu})' \Sigma^{-1} (\underset{\sim}{x}-\underset{\sim}{\mu}) > \lambda \right) < \frac{p}{\lambda}, \text{ where } \lambda > 0$$

(k) What are the basic principles of survey sampling ? Discuss.

(l) Distinguish between linear and circular systematic sampling.

(m) What are the minimal assumptions in analysis of variance technique ? Describe Gauss Markov model in this connection.

(n) What are uniformity trial data in an experimental design ? Write down the role of such a data set.

(o) Obtain the relative efficiency of a latin square design as compared to a completely randomised block design. 10x10

GROUP - B

Answer any five questions.

2. (a) Using axiomatic definition of probability show that P(0)=0 and P(AUB) = P(A) + P(B), where A B =

(b) Distinguish between pairwise independent and mutually independent events. Cite an example to show that the former does not imply the latter.

(c) Two fair dice are rolled together r (>6) times. Find the probability that each of the cases (i, i), $i = 1,2,\ldots,6$ will occur atleast once. (3+3)+(4+3)+7

3. (a) State and prove Chebyshev's inequality.

(b) Suppose $\{X_n\}$ is a sequence of independent random variables having probability distribution

$$P(X_n = -\frac{1}{2^n}) = \frac{1}{2} = P(X_n = \frac{1}{2^n}),\ n=1,2,3,\ldots.$$

Show that the sequence obeys weak law of large numbers.

(c) What is central limit theorem ? Write down its applications citing examples. 6+6+(2+6)

4. (a) Suppose $x_1, x_2, \ldots\ldots x_n$ is a random sample drawn from a continuous population having pdf

$$f_{\alpha,\theta}(x) = \begin{cases} \frac{1}{\alpha} e^{-\frac{(x-\theta)}{\alpha}} & \text{if } x > \theta \\ 0 & \text{elsewhere} \end{cases}$$

Obtain sufficient statistic of (α, θ).

(b) What do you mean by Blackwellisation in a problem of point extimation ?

(c) Suppose $X_1, X_2, \ldots, X_n$ is a random sample drawn from a Poisson(λ) population. Then find maximum likelihood estimator of $e^{-\lambda}$. 7+5+8

5. (a) Define uniformly most accurate confidence sets. How is it related to a uniformly most powerful test ?

(b) Obtain most powerful size α test based on a single observation X to test.

H_0 : X follows standard normal

Versus

H_1 : X follows standard Cauchy. (4+6)+10

6. (a) If $\underset{\sim}{X}' = (x_1, x_2, \ldots x_p)$ has a multivariate normal distribution with mean vector $\underset{\sim}{0}$ and dispersion matrix I_p. Then find the distribution of $\underset{\sim}{X}'\underset{\sim}{X}$ and $(x_1, x_2, \ldots, x_m), m < p$.

(b) If $\underset{\sim}{X}' = (x_1, x_2, \ldots, x_p)$ has a positive definite dispersion matrix, then for a matrix $B^{r \times p}$ ($r < p$) with full row rank, find the dispersion matrix of $B\underset{\sim}{X}$. Comment whether the resulting distribution will be singular or not.

(c) State and prove sum law of expectation with respect to a multivariate probability distribution. (4+4)+(6+2)+4

contd...p.3.

7. (a) A simple random sample of size n is drawn without replacement from a finite identifiable population with variate values $Y_1, Y_2, \ldots\ldots, Y_N$. Find unbiased estimator of $\sum_{\alpha=1}^{N} Y_\alpha$ and $\sum_{\alpha \in I} Y_\alpha$ together with the unbiased estimator of the variance of the estimators, where I consists of population units possessing a character 'A'.

(b) What do you mean by intra systematic sample correlation coefficient (ρ_s)? Obtain an unbiased estimator of population mean based on a linear systematic sample. Find the variance of the estimator in terms of ρ_s and comment. 12+(2+2+3+1)

8. Describe in detail analysis of variance technique in two way classified data with equal number of observations per cell. In this context define valied error. Here, if observed value of F statistic is less than unity we accept the null hypothesis of no difference among the effects trivially - Justify. 12+4+4

9. (a) Describe the analysis of a 2^3 experiment conducted in an RBD with randomised blocks.

(b) What do you mean by an observational contract and a treatment contract ? Show that in an RBD a block contract is orthogonal to a treatment contract. 10+(4+6)

2018

STATISTICS-PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Group -A

Answer any ten questions 10x10

1. (a) Distinguish between 3σ limits and probability limits.
   (b) Describe the technique of sampling inspection by variables for the normal distribution case.
   (c) Define, with examples, the following terms in theory of reliability : (i) Reliability and (ii) Stress and Strength.
   (d) Derive Gini's coefficient of concentration for log-normal distribution.
   (e) Describe the variate difference method for determining the order of polynomial.
   (f) Discuss, with examples, the different components of a time series.
   (g) Explain the important formulas for the calculation of price index numbers with merits and demerits.
   (h) Discuss the effect of eliminating trend by the moving average on the other components of a time series.
   (i) Discuss the different steps in the construction of wholesale price index number in India.
   (j) Explain the uses of index numbers with merits and demerits.
   (k) Distinguish between GRR and NRR.
   (l) Define CDR. Mention its defects. What is its remedy?
   (m) Discuss a method of estimation of forecasting the production of a crop, say, paddy in West Bengal.
   (n) Discuss the functions of CSO and mention some of its publications.
   (o) Explain the structure of a complete life table.

Group-B

Answer any five questions 20x5

2. What is relative growth rate of a population? Stating suitable assumption(s) on this rate, derive logistic equation and mention its important properties.

3. Define μ_x, the force of mortality at age x. Derive Makeham's formula in this connection, stating suitable assumptions and give an outline a method of fitting this formula.

4. Describe single and double sampling inspection plans for attributes in acceptance - rectification scheme. Discuss how the plan parameters are determined here.

5. Discuss the following :
   i) p-chart and c-chart when standards are not given.
   ii) p-chart for varying sample sizes.
   iii) R-chart when standards are given.

P.T.O.

6. Describe a sequential procedure for item-wise inspection from a lot having proportion of defectives $p\,(0<p<1)$ such that the probability of accepting the lot at quality $p=p_0$ is $(1-$ and that at $p=p_1$ is β, $0<p_0<p_1<1$ and $0<\alpha, \beta<1$. Discuss the merit of this procedure.

7. Describe link relative method for measuring seasonal fluctuations. What are its merits and demerits. Discuss different types of seasonal patterns and discuss one method for tackling them.

8. What is a chain index? Discuss its advantages and disadvantages over a fixed-base index number. Define Fisher's ideal index number. Show that it satisfies factor reversal test and time reversal test.

9. Write short note on :

   i) Abridged Life Table.

   ii) Lorenz Curves.

2018
URDU
PAPER-I

Time Allowed : 3 Hours *Full Marks: 200*

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to prescribed number shall be valued and the remaining ones ignored.

Answer should be written in Urdu

Group: A

1- اردو زبان کے آغاز وارتقاء سے منسلک مختلف نظریات کا جائزہ لیجئے۔ 30

یا

جدید ہند آریائی زبانوں کا تنقیدی جائزہ پیش کریں۔

2- ''قطب شاہی دور اردو زبان وادب کا عہد زرّیں کہلاتا ہے'' اس قول کی روشنی میں اپنے خیالات کا اظہار کریں۔ 30

یا

فورٹ ولیم کالج کی ادبی خدمات کا تفصیلی جائزہ پیش کریں۔

Group: B

3- فیضؔ احمد فیضؔ کی غزل گوئی کا ناقدانہ جائزہ لیں۔ 30

یا

میر انیسؔ کی مرثیہ نگاری کی فنّی خوبیوں سے بحث کریں۔

4- نظم ''مسجد قرطبہ'' کی روشنی میں اقبال کی شاعرانہ عظمت کا جائزہ پیش کریں۔ 30

یا

مرزا محمد رفیع سوداؔ کی قصیدہ نگاری سے بحث کریں۔

5- کسی دو پر مختصر نوٹ لکھئے۔ 10×2=20

(الف) پرویز شاہدی بحیثیت نظم نگار

(ب) شہریار بحیثیت غزل گو

(ج) قصیدہ کے فنی لوازم

6- مثنوی ''سحر البیاں'' کا تنقیدی جائزہ پیش کریں۔ 30

یا

اردو ادب میں ترقی پسند تحریک کے مثبت یا منفی اثرات پر اپنے خیالات کا اظہار کیجئے۔

7- درج ذیل اشعار میں سے کسی تین کی ناقدانہ تشریح کیجئے۔ 5×3=15

(الف) نقش فریادی ہے کس کی شوخیِ تحریر کا
کاغذی ہے پیرہن ہر پیکرِ تصویر کا

(ب) اس کا منھ دیکھ رہا ہوں سو وہی دیکھوں ہوں
نقش کا سا ہے سماں میری بھی حیرانی کا

(ج) رات یوں دل میں تری کھوئی ہوئی یاد آئی
جیسے ویرانے میں چپکے سے بہار آجائے

(د) عرض کیجئے جوہرِ اندیشہ کی گرمی کہاں
کچھ خیال آیا تھا وحشت کا کہ صحرا جل گیا

8- درج ذیل رباعی کا مرکزی خیال واضح کیجئے۔ 15

اک فتنہ ہے ناقصوں میں کامل ہو نا
اک قہر ہے وابستۂ منزل ہو نا
تاریخ کے اوراق جو الٹے تو کھلا
اک جرم ہے احمقوں میں کامل ہو نا

2018

ZOOLOGY - PAPER-I

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

Group - A

Answer any ten questions

1. a) Give the distinctive characters of Ophidia.
   b) Comment on the significance of ascidian tadpole in the chordate phylogeny.
   c) Would a blinded bat blunder against large obstacles and die of starvation?
   d) State the differences between protostomia and deuterostomia with examples.
   e) Comment on the aortic arches of teleost.
   f) Comment on the accessory respiratory organs in Clarias and Channa.
   g) Distinguish pronephros and opisthonephros.
   h) How niche can be considered as 'n' dimensional hypervolume?
   i) The human survivorship curve is highly convex'-explain.
   j) Write short note on 'ground water pollution'.
   k) Write short note on account of conjugation in Paramoecium sp.
   l) What is coefficient of correlation? State the importance of 't' test in statistical analysis.
   m) Comment on the migratory restlessness. 4x10

Group -B

Answer any four questions

2. Distinguish between :
   a) Wolffian and Mullerian duct.
   b) Schizocoelom and Enterocoelom.
   c) Ductus caroticus and ductus arteriosus.
   d) Physostomous and physocleistous swimbladder. 5x4

3. Writes notes on the following :
   a) Notochord.
   b) Setae.
   c) Statocyst.
   d) Lateral line sense organ.
   e) Mammalian hair. 4x5

4. a) Discuss affinities of Limulus to justify its systemic position. 10
   b) Briefly elucidate the polymorphism in Cnidarians. Add a note on the functional significance of polymorphism. 6+4

5. a) Give explanatory note on 'Role of microfibrils in amoeboid movement'
   b) Write on the characteristic features of ctenophore.
   c) Describe poison apparatus of snakes with diagram. 8+4+8

6. a) How birds locate their migratory routes?
   b) Discuss biting mechanism of snakes.
   c) Describe the structure and function of ruminant stomach. 6+8+6

P.T.O.

7. a) Discuss about the basic differences in gross morphology of gills in Chondrichthyes and Osteichthyes.
   b) Write notes on Axolotl larva and its significance.
   c) Mention the characteristic properties of Cyclostomata. 8+6+4

8. a) What is sexual trimorphism? How castes are formed in a bee colony?
   b) Justify the inclusion of Balanoglossus under nonchordates in an independent phylum.
   c) Describe the structure of Organ of Bojanus. 6+8+6

Group - C

Answer any four questions

9. Distinguish between :

   a) r-selected and k-selected species.
   b) Autogenic and allogenic succession.
   c) Detritus and grazing food chain.
   d) Monoclimax and polyclimax theory. 5x4

10. Differentiate between :

   a) Alpha and Beta diversity.
   b) Ecotype and ecocline.
   c) National Park and Biosphere Reserve.
   d) Habitat and Niche. 5x4

11. a) Write notes on :
      i) Central tendency.
      ii) Standard error and standard deviation with example.
   b) State briefly the formation and effects of photochemical smog.
   c) Discuss resource partitioning with the help of suitable graphical models.
   d) Distinguish between acute and chronic toxicity. (5+5) +4+4+2

12. a) Distinguish between :
      i) Density independent and density dependent regulation.
      ii) In situ and ex situ conservation.
   b) Differentiate BOD and COD.
   c) Discuss on demerits of mass utilization of ground water resource.
   d) Discuss about rules of Zoological nomenclature. (3+3) +4+5+5

13. a) Add a brief note on Rhinoceros conservation.
   b) Discuss about schedules under wild life (protection) act.
   c) State different measures of water pollution.
   d) Discuss about the depletion of ozone layer. 5+5+5+5

14. a) Elaborate Holotype and paratype.
   b) Add a note on remote sensing for sustainable diversity.
   c) Describe different steps in the formation of allopatric species.
   d) What is Chi-square? What is ANOVA? 4+4+6+6

2018

ZOOLOGY - PAPER-II

Time Allowed : 3 Hours | Full Marks : 200

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Bengali but all answers must be in one and the same language.

GROUP - A

Answer any ten questions

1.a) What is GERL? State its function.
b) What is Bombay phenotype?
c) State criss-cross mode of inheritance with an example from human.
d) Discuss catabolite repression.
e) State Origin and Symptoms of albinism.
f) Delineate two cell theory of sex-steroid biosynthesis.
g) State the histological structures of adrenal cortex.
h) Distinguish between Bohr's effect and Haldane effect.
i) Discuss R - and T - State of haemoglobin.
j) State the principle of PCR.
k) State the role of cortical granules in prevention of polyspermy.
l) Discuss biological control of pests.
m) State principles of vaccination. 4x10

GROUP - B

Answer any four questions

2.a) Discuss distribution of marker enzymes in different mitochondrial compartments. 8

b) Discuss the ultra structure of mitochondrion. State its role in ATP generation. 7+5

3.a) Classify eukaryotic chromosomes based on position of centromere. Discuss the nucleosome model of chromatin. 4+6

b) What is MPF? Discuss the steps of cell-cycle progression from G1 to M-phase. 2+8

4.a) Discuss in brief the Prokaryotic transcriptional initiation complex. 10

b) Discuss 5'- capping of Pre-mRNA mentioning the enzymes involved. 5

c) Describe primary sex-determination mechanism in man. 5

5.a) What do you mean by operon concept? Discuss regulation of trp-operon by attenuation mechanism. 2+8

b) Discuss GPCR pathway of hormone action. What are GEF and GAP? 6+4

6.a) State the major cell-types of anterior pituitary. Mention the major hormones secreted by them mentioning target sites.

b) State the principle of cloning. Discuss the process of transgenic animal production from embryonic stem cells. 4+6

P.T.O.

7.a) Differentiate between :

i) PCR and cloning
ii) Proto-oncogene and tumor-suppressor gene. 5x2

b) Make notes on :

i) Urea Cycle.
ii) Role of haemoglobin in O_2-transport. 5x2

GROUP - C

Answer any four questions

8. Differentiate between :

a) Induction and Competence.
b) Holoblastic and neuroblastic cleavage.
c) BCR and TCR.
d) Batesian and Mullerian mimicry.
e) Primary and secondary adaptive features of aquatic vertebrates. 5x4

9. Give notes on :

a) Antigen - antibody reaction.
b) Range, climate and faunal of Ethiopian and Neo-tropical realms.
c) T-Cell and B-Cell co-operation.
d) Biogemy. 5x4

10. a) State the causative agent, life-cycle, pathogenicity and symptoms of Kala-a-Zar. 2+5+3+3

b) Enlist the major adaptive features for volant mode of life in birds. 7

11. a) Briefly discuss the process of spermiogenesis. 10
b) What are Hardy-Weinberglimitations? Calculate the number of carrier albino persons when the frequency of albino phenotypeis 4 out of 40,000 individuals? 5+5

12. a) State composition and uses of Silk. 6
b) State the causative agents, symptoms and remedial measures of pebrine and flacherie diseases of Silk moth. 2+4+4
c) Add a note on functions of Cytokines. 4

13. a) Compare the gastrulation Process in frog and Chick. 5
b) "Eye-development is the consequence of repeated reciprocal induction events" - Explain 8
c) State the role of complements in MAC formation. 7

2018

PERSIAN

Paper–I

Time Allowed—3 Hours *Full Marks—200*

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Persian unless otherwise mentioned in the question.

Group–A

Attempt *any two* of the following questions:

1. Distinguish between "language" and "dialect". Give suitable examples to illustrate your answer. 25

2. Discuss the part played by the Avesta in the development of Persian language. 25

3. Write notes on the following: 25

(a) Modern Persian and its relation with the language Dari

(b) Literary and linguistic divisions of Philology

(c) Influence of Persian on Bengali Language

Group–B

Attempt *any four* of the following questions: 10×4=40

4. Give the opposite number of *any five* of the following:

حور -اقوام -روح-ملائک -اوزان - بدن -قاضی

5. Illustrate with example *any two* of the following:

حرف ربط- اسم ضمیر -زمانہ -صفت تفضیل

6. Explain the formation of *any five* of the following:

گلزار- شاھرخ-دانشگاہ -نیکبخت-رنگریز -آتشکدہ -چمنستان- خانوادہ

7. Give *any four* uses of ب or ی

8. Form words with *any five* of the following:

جہان - دار - دان - سار - گین - سر - گار

Please Turn Over

Group–C

9. Translate the following passage into English: 30

چرا تصمیم گرفتم که به اصفهان بروم؟ نمی دانم، ولی دیر زمانی بود که آنچه عکس از اصفهان دیده بودم و وصفی که از آن شنیده بودم این شهر را به طرز افسانه آمیزی به نظرم جلوه داده بود۔ مسجدها، پلها، کوشکها، مناره ها، کاشی کاریها، نقاشیها، و شهر پر استعداد هنرمندان که گزشتهٔ تاریخی دارد و در زمان صوفیه بزرگترین، شهر دنیا بشمار می آمده و هنوز شکوه و عظمت دیرین خود را از دست نداده است۔ همهٔ اینها کافی بود که مرا به سوی خود بکشاند۔

ساعت دو و نیم به شهر رسیدم۔ من از همسفر ها خداانگهداری کردم و به مهمانخانه رفتم۔ عصر به قسد تماشای شهر بیرون آمدم۔ خیابان چهار باغ، خیابان پهن و بزرگی است۔ این خیابان گردشاه معظم شهر بشمار می آید۔ مسجد چهار باغ گنبدهای آبی آسمانی دارد۔ این مدرسه از بناهای زمان شاه سلطان حسین است۔

گنبد تالار از پر کاری و لطافت نقش و نگار چشم را خیره می کند۔ در قسمت بالای دیوارهای تالار صحنه های نقاشی شده است که یکی از آنها جنگ شاه اسماعیل را نشان می دهد و یکی مجلس بزم شاه عباس را۔

10. Translate the following passage into Persian: 30

Sayyid Ahmad Khan, also Known simply as Sir Sayyid, was born in Delhi, the capital of Inidia. His ancestors originally hailed from Arabia and settled in Herat, before moving t Delhi. Khwajah Farid-al-Din Khan, the maternal grandfather of Ahmad Khan served the Mughals as a Minister of State.

While Ahmad Khan was a child, his father, Sayyid Muhammad Muttaqi Khan adopted Sufism; thus he retreated from worldly affairs and became an ascetic. Young Ahmad was, therefore raised by his maternal grandfather. He received a thorough education in Arabic, Persian, Urdu and Islamic sciences.

After the successive deaths of his older brother and father, he was forced to look for a job. Thus, at the age of ninteen, he secured a job as a record-keeper at the courts in Delhi.

11. Define *any three* of the following and give suitable example: 10×3=30

تلمیح-تشبیه - تجاهل عارفنه-استغراق -مراعات النظیر -وزن-علم عروض

12. Scan *any two* of the following verses and name the metre: 10×2=20

(الف) مرا در منزل جانان چه امن و عیش چون هردم
جرس فریاد می دارد که بر بندید محملها

(ب) تن زجان و جان زتن مستور نیست
لیک کس را دید جان دستور نیست

(ج) زکوشش به هر چیز خواهی رسید
به هر چیز خواهی کماهی رسید

2018

PERSIAN

Paper–II

Time Allowed—3 Hours *Full Marks—200*

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answers may be given either in English or in Persian unless otherwise mentioned in the question.

The figures in the margin indicate marks for each question.

Group-A

Answer *any four* of the following questions.

1. Give an account of the different views regarding the origin of Persian poetry. 25

2. What is Qasida? Describe in brief the origin and development of Qasida writing in Persian. 25

3. Describe the historical literature produced under the Seljuq period of Iran. 25

4. Determine the place of Nizami Ganjavi as a Masnavi writer. 25

5. Describe the historical and literary value of the Chahar Maqala of Nezami Uruzi Samarqandi. 25

6. Describe the chief characteristics of the ghazals of Hafiz Shirazi and determine his position among the ghazal writers. 25

Group-B

7. Explain *any four* of the following: 10×4=40

(الف) بدم گفتی و خرسند مخاک اللہ نکو گفتی
جوابِ تلخ می زیبد لب لعلِ شکر خارا

(ب) بسیار سفر باید تاپختہ شود خسامی
صوفی نشود صافی تادر نکشد جامی

(ج) شاید باید کہ در مجلس محاورت خوش گوئی بود در محفل معاشرت خوش ردی۔ و باید شعر او بہ آن درجہ رسیدہ باشد کہ در صحیفۂ روزگار مسطور بود۔

(د) اگر عقل را اسیر شہوت و غضب گرداند، مملکت ویران شود، و پادشاہ بخت گردد، و ھلاک شود

(و) توانا بود دھر کہ دانا بود ز دانش دلِ پیر بر نا بود

Please Turn Over

8. Write short notes in Persian on *any four* of the following: 15×4=60

فیروز مشرقی۔ نظام الملک طوسی۔ بوستانِ۔ کشف المحجوب۔ کیمیای سعادت۔ خیام۔ ایرج مرزا۔ پروین اعتصامی
