2019
ARABIC
PAPER-I

Time Allowed—3 Hours *Full Marks—200*

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The figures in the margin indicate marks for each question.

Section–A

أجب عم أي و احد من الأسئلة الآتية: 25

١ـ ماذا تعرف عن اللسانيات ؟

٢ـ بيّن أهمية اللسانيات ؟

Section–B

أجب عن أي اثنين من الأسئلة الآتية: 25×2=50

١ـ اكتب ملا حظة حو ل المنادى

٢ـ ما ذاتعرف عن المفعول به

٣ـ ألق الضوء على الاسم الموصول

Section–C

ترجم أي اثنين من اللغه العربية الى الانجليزية: 25×2=50

١ـ الاسلام دين الأمن و السلام، هذه حقيقة واضحة لا شك فيهاـ و هو دين الحرية

والمساواة والا خاء ولذلك دخل الناس في دين اللّٰه أفواجاً، ورفرف لواء ه على مشارق الأرض و مغاربها، انما يؤ من ايما ناً عميقاً بضرورة نشر الأمن بين الناس، ويسعى في تحقيق السلام ، مااستطاع الى ذلك سبيلاً، فجاء في القرآن : الذين آمنوا ولم يلبسوا ايما نهم بظلم ، أولئك هم الأمن۔

٢۔ تزوّح الر سول محمّد عليه السلاة والسلام من خديجة بنت خويلد، و هو في عمر الخامن والعشرين، وأنجب منها أبناء و القاسم و عبد اللّٰه، و بناته زينب و رقية و أم كلثوم و فاطمة الزهراء، ثّم تزوّج الر سول عليه السلاة والسلام ببعض النساء، و هنّ: سودة بنت زمعة، و حفصة بنت عمر بن الخطاب، و ميمونة بنت الحارث، و أم حبيبة، و جو يرة بنت الحارث ، و زينب بنت جحش، وصفية بنت حيي ، وزينب بنت خزيمة، و أم سلمة، وماريا القبطية التي أنجبت له ابنى ابراهيم، و عائشة بنت أبي بكر۔

٣۔ أراد ابراهيم عليه السلام أن يبني بيتا للّٰه فتعاون اسماعيل عليه السلام لوالده في بناء الكعبة۔ نقل ابراهيم و اسماعيل الحجارة من الجبال القريبة و بنى ابراهيم الكعبة بيده وبعد بنا ئها ذكر ابراهيم و اسماعيل اللّٰه كثيرا حول الكعبة و دعا بهذه الكلمات" ربّنا تقبل منا انك أنت السميع العليم" ۔ان اللّٰه تقبل هذا الدعاء و بارك في الكعبة حيث نتوجه اليها في الصلاة و نذهب اليها لا داء فريضة الحج۔

Section–D

ترجم عن أي اثنين من اللغة الانجليزية الى العربية : 25×2=50

1. Muhammad ﷺ was born in Makkah in the year 570. since his father died

before his birth and his mother died shortly thereafter, he was raised by his uncle was from the respected tribe of Quraysh. He was unable to read or write, and remained so till his death. His people, before his mission as a prophet, were ignorant of sience and most of them were illiterate.

2. The most beautiful word on the lips of mankind is the word"Mother" , and the most beautiful call is the call" My Mother" . It is a word full of hope and love, a sweet and kind word coming from the depths of One's heart. The mother is everything–She is our consolation in sorrow, hope in misery and strength in weakness. She is the source of love, mercy, sympathy, and forgiveness.

3. The word " Islam " is derived from " salaam" , a word meaning peace. It also relates a person submitting himself to the will of The Mightiest in order to seek eternal peace and tranquility. The crux of his observation is that the very origins of Islam are inclined towards peace and harmony. The Holy Quran -- the holy words of none other than Allah Almighty.. can best bear the witness for Islam's inclination towards peace, justice, and harmony amongst human beings while negating and discouraging violence, terrorism, and injustice.

Section-E

25 أجب عن أي واحد من الأسئلة الآتية:

١ـ اكتب ملا حظة حول البلاغة

٢ـ بيّن التشبيه و أركانه و أقسامه

2019
ARABIC
PAPER-II

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Section–A

العصر الجاهيي:

أجب عن أي خمسة من الأسئله الآتية: 30×5=150

١ـ اكتب ملا حظة حول الأدب العربي في العصر الجاهلي ـ

٢ـ ألق الضوء على تطور النثر العربي في العصر الاسلامي ـ

٣ـ لماذا سُمّي العصر العباسى بالعصر الذهبي؟ اكتب بالتفاصيل ـ

٤ـ ماذا تفهم عن شعر النقائض ؟ بيّن مفصلا ـ

٥ـ من كان المتنبي؟ نا قش حياته و مساهماته في الشعر العربي ـ

٦ـ ماذا تفهم عن الأدب المهجري؟ اكتب بالتفاصيل ـ

٧ـ من اشتهر بأمير الشعراء في العصر الحديث؟ ألق الضوء على اسهاماته في الشعر العربي ـ

٨ـ من كان شاعر النيل؟ نا قش حياته و خدماته في الشعر العربي ـ

Section–B

1. بيّن معنى الكلمات التي تحتها خط: 10

أَرَجُ النَّسيمِ سَرَى مِنَ الزَّوراءِ سَحَراً فَأَحيا مَيِّتَ الأَحياءِ
أَهدى لَنا أَرواحَ نَجدٍ عَرفُهُ فَالجَوُّ مِنهُ مُعَنبَرُ الأَرجاءِ
وَرَوَى أَحاديثَ الأُلى حَبَّةٍ مُسنِداً عَن إِذخِرٍ بِأَذاخِرٍ وَسِخاءِ
فَسَكِرتُ مِن رِيّا حَواشي بُردِهِ وَسَرَت حُمَيّا البُرءِ في أَدوائي
يا رَاكِبَ الوَجناءِ بُلِّغتَ المنى عُج بِالحِمَى ان جُزتَ بالحَرعَاءِ

2. من أي معلقة تم أخذ هذه الأبيات؟ ماذا يناقش الشاعر في هذه الأبيات؟ 10

مِكَرٍّ مِفَرٍّ مُقبِلٍ مدبِرٍ مِعاً كَجُلمُودِ صَخرٍ حَطَّهُ السَّيلُ مِن عَلِ
كُمَيتٍ يَزِلُّ البَدُ عَن حالِ مَتنِهِ كَمَا زَلَّتِ الصَّفواءُ بِالمُتَنَزَّلِ
عَلى الذبلِ جَيَّاشٍ كَأَنَّ اهتِزامَهُ اذا جاشَ فيهِ حَمِيُهُ غَلَيُ مِرجَلِ
مِسَحٍّ اذا ما السَّابِحَاتُ على الوَنَى أَثَرنَ غُبَاراً بِالكَدِيدِ المُرَكَّلِ

3. اشرح العبارة مع ذكر السياق و السباق : 15

وَكَانَ سَبَبُ خُرُوجِ عَمْرِو بْنِ عَامِرٍ مِنْ حَدِّ ثَنِي أَبُو زَيْدٍ الْأَنْصَرِيّ۔ أَنَّهُ رَأَى كُرْدًا يَحْفِرُ فِي سَدِّ مَأْرِبٍ سَدِّ مَأْرِبٍ، الَّذِي كَانَ يَحْبِسُ عَلَيْهِمْ الْمَاءَ. فَيُصَرِّفُونَهُ حَيْثُ شَاءُوا مِنْ أَرْضِهِمْ فَعَلِمَ أَنَّهُ لَا بَقَاءَ لِلسَّدِّ عَلَى ذَلِكَ فَاعْتَزَمَ عَلَى النَّقْلَةِ مِنْ الْيَمَنِ، فَكَادَ قَوْمَهُ فَأَمَرَ أَصْغَرَ وَلَدِهِ اذَا أَغْلَظَ لَهُ وَ لَطَمَهُ أَنْ يَقُومَ إِلَيْهِ فَيَلْطِمَهُ فَفَعَلَ ابْنُهُ مَا أَمَرَهُ بِهِ فَقَالَ عَمْرٌو : لَا أُقِيمُ بِبَلَدٍ لَطَمَ وَجْهِي فِيهِ أَصْغَرُ وَلَدِي، وَعَرَضَ أَمْوَالَهُ . فَقَالَ أَشْرَافٌ مِنْ أَشْرَافِ الْيَمَنِ: اغْتَنِمُوا غَضَبَةَ عَمْرٍو، فَاشْتَرَوا مِنْهُ أَمْوَالَهُ .وَانْتَقَلَ فِي وَلَدِ وَلَدِهِ.

4. أشكّل العبارة و بيّن من أي قصة تمّ أخذ هذه الفقرة؟ 15

وعلامة هذا الصنف من البشر أن توجد هم في حال الوحي غيبة عن الحاضرين معهم مع غطيط كأنها غشي أو اغماء في رأي العين وليست منهما في شيء، و انما هي في الحقيقة استغراق في لقاء الملك الروحاني با دراكهم المناسب هم الخارج عن مدارك البشر بالكلية .ثم يتنزل الى المدارك البزرية: اما بسماع دوي من الكلام فيتفهمه، أو يتمثل له صورة شخص يخاطبه بما جاء به من عند اللّٰه .ثم تنجلي عنه تلك الحال وقد وعي ما ألقي اليه .قال صلى اللّٰه عليه وسلم وقد سئل عن الوحى: " أحيانا يأتيني مثل صلصلة الجرس و هو أشده علي فيفصم عني وقد وعيت ما قال ، وأحيانا يتمثل لي الملك رجلاً فيكمني فأعي ما يقول.

2019

AGRICULTURE

PAPER-I

Time Allowed—3 Hours *Full Marks—200*

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Group A

Answer **any three** *questions.*

1. (a) What is greenhouse effects?
   (b) Describe in brief about global warming and its effects on crop production.
   (c) State the use of Remote Sensing technology in agriculture. 10+20+10=40

2. (a) What is the difference between soil fertility and productivity?
   (b) What are the major soil nutrient as essential elements in plant growth?
   (c) What to you know about micronutrients and its necessity in plant growth?
   (d) What do you know about the Law of Minimum?
   (e) Describe the amelioration of acid soils in different parts of this state. 8+10+10+4+8=40

3. (a) What are the different soil forming factors? Describe in brief.
   (b) Discuss in details on the methods on soil and water conservation.
   (c) Describe the role of Agro Forestry in such conservation methods. 8+20+12=40

4. Write in brief on ***any five***: 8×5=40
   (a) Precision agriculture
   (b) Rainwater harvesting
   (c) Jute rating
   (d) Vermi compost

(e) Farm planning and budgetting

(f) Bio-fertilizers

(g) Organic farming

5. (a) Describe in details package and practices of rice cultivation during kharif season.

(b) Write down scope of growing rabi maize under West Bengal situation. 20+20=40

Group B

Answer **any two** *questions.*

6. (a) What are the different types of problem soils in this State? State the methods of reclamation of this types of problem soils.

(b) Describe the major physiological role of N, P, K for plant nutrition and their deficiency symptoms. 20+20=40

7. (a) Describe in detail on the role of KVK in technology transfer system.

(b) Discuss in details about weed management practices in organic farming.

(c) What do you know about sustainable agriculture? 10+20+10=40

8. Write short notes on ***any five***: 8×5=40

(a) Crop insurance

(b) Dry land farming

(c) Soil erosion and its control

(d) Green manure crops

(e) Reinforcing manures

(f) Field capacity and permanent wilting point

(g) Sheet Erosion

(h) Effective rainfall and its measurement

9 (a) What do you know about rainfed agriculture? What is the differences between rainfed agriculture and dry land farming?

(b) Write down about the rainwater harvesting and recharge of groundwater.

(c) What do you know about shifting cultivation? 20+10+10=40

2019

AGRICULTURE

PAPER-II

Time Allowed — 3 Hours *Full Marks — 200*

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Answer **any five** *questions.*

1. (a) Why meiotic cell division is required? Briefly state about different phases of meiotic cell division.

   (b) Clearly state about molecular basis of crossing over.

   (c) A male person is having one pair of homologous chromosomes — A_1A_2 along with one additional chromosome 'B' without pairing. What will be chromosomal constitution of each of the four gametes produced after one meiotic division? (5+20)+5+10=40

2. (a) Classify different types of polyploids with its chromosomal formulae and genetical significance.

   (b) Schematically represent the relation between flower structures of plants and its breeding behaviour.

   (c) What is backcross breeding? State its genetic basis. Clearly discuss on the procedures followed in backcross breeding. 10+10+20=40

3. (a) How male sterility differs from self incompatibility? Classify different types of male sterility with its practical utility.

   (b) Discuss about 'Gametophytic system' of self incompatibility. How it could be differentiated from 'Sporophytic system'?

   (c) Briefly enumerate different types of hybrid seed production in maize. (3+12)+(10+5)+10=40

4. (a) What is meant by quality seed? Discuss about probable reasons for quality deterioration during seed production system with its prevention.

   (b) Clearly describe the breeder seed production procedure of self pollinated crops with special reference to a particular crop.

(c) How seed production in cross-pollinated crops differs from that of vegetatively propagated crops?

(d) Outline the most important aspects of hybrid rice seed production. (2+10)+12+6+10=40

5. (a) Discuss stepwise about the propagation procedure followed for different citrus species.

(b) Compare the seed production technology of cabbage and cauliflower.

(c) Write in brief about medicinal uses, cultivation and propagation methods for 'Ashwagandha'. 15+15+10=40

6. (a) What are the causes of insect pests outbreaks in agro ecosystem? What is pesticide residue?

(b) Briefly discuss about the major criteria for implementing 'IPM' technology in crop cultivation.

(c) What are the major insect pests of banana crops? Mention nature and symptoms of damage caused by them and specify rational management parctices against them. 15+10+15=40

7. (a) Briefly discuss the principles of disease management in crops.

(b) Describe in detail on symptoms, epidemiology and management of major diseases of cruciferous vegetables.

(c) Write a short account on insect transmitted viral diseases of some horticultural crops. 15+15+10=40

8. (a) Define protected cultivation of horticultural crops and mention its advantages and limitations.

(b) Narrate briefly about the protected cultivation practices of any cut flower.

(c) Discuss about national programmes and initiatives related to nutrition and food security in India. 15+15+10=40

2019

ANIMAL HUSBANDRY AND VETERINARY SCIENCE – PAPER-I

Time Allowed — 3 Hours *Full Marks — 200*

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*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. 40×3=120

1. (a) Describe salient contribution of Mendel's Principles of Inheritance. Briefly discuss the Mendel law of Independent Assortment with suitable example. How do you view the contribution of G.J. Mendel in understanding the mechanism of Inheritance? 15

   (b) What are the most available dry fodder in India? What are the main limitations of these fodder for animal feeding? Describe how these fodder need to be treated to overcome some of these constraints with most suitable technologies for Indian situation. 15

   (c) Write, in details, the factors causing infertility in bull. 10

2. (a) Classify goat zoologically. Name indigenous goat breeds available in different agro-climatic zones. Write percentage of increase of goat population in different livestock census. Describe, in details, about best goat breed of India. 15

   (b) What is artificial egg and how to differentiate the artificial egg and natural egg? 10

   (c) Define sociology. Describe the history of man-animal relationship in terms of their association and interaction for the development of society. 15

3. (a) What is CIP? Describe its important role in modern dairy processing plant. 15

   (b) Name the method of hand milking. Prepare a flowchart of milking method. Draw lactation curve. What are the different factors affecting quality of production? Write elaborately. 15

   (c) What is genetic engineering? What are the two main discoveries which led the birth of this field of molecular Genetics? Discuss its application in livestock improvement programmes with special references to immunogenetics and cloning of embryos. 10

4. (a) How cross breeding is useful in increasing the milk production in our country? Draw the cross breeding plans with exotic breeds adopted by AICRP for dairy cattle. 15

   (b) Describe different energy evaluation system for livestock animals. How will these energy evaluation system be adopted for determination of energy requirements of animals of different physiological stages? 15

   (c) What is adulterated milk and describe the different adulterant used in milk and milk products. 10

Group-B

Answer *any two* questions. 40×2=80

1. (a) What is extension education? What are the basic phylosophies of extension education? Discuss the principles of extension education. 15

   (b) What are the benefits and disadvantages of using antibiotic growth promoters in poultry feeding? What are the different options to improve productivity in poultry industries, if antimicrobial feed additives are restricted in India? Write, in details, of these options with mechanisms and limitations. 15

   (c) Classify forage crops based life span/growth cycle based on seasons. Write, in details, about agronomic practices of Sorghum. 10

2. (a) Define inbreeding. Briefly describe the consequences and measurements of inbreeding in Animal Breeding experiences. Calculate inbreeding coefficient of an individual produced by a dammated to its son. 15

   (b) What are the different elements for hygienic meat production and what is the role of a veterinarian for clean meat production. 15

   (c) Draw a flow diagram of hatchery operation. What are the types of incubator for artificial incubation? Write the environments in setter and hatcher for incubation. 10

3. (a) What are the methods for determination of proximate principles in feeds and their limitation? What are the advantages of Van Soest method of feed analysis? What are the advantages and disadvantages of NIRS for estimating chemical composition and nutritive values of feeds? 15

   (b) Describe Hardy-Weinberg law. Proof Hardy-Weinberg Equilibrium frequencies are approched by single generation of random mating irrespective of the genotype frequencies in the parent generation. Describe practical importance of H-W law in livestock improvement programme. 15

   (c) Write, in details, preservation of semen and artificial insemination in cow. 10

2019

ANIMAL HUSBANDRY AND VETERINARY SCIENCE

PAPER-II

Time Allowed — 3 Hours *Full Marks — 200*

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Group-A

Answer the ***Questions No. 1*** *and* ***any two*** from the rest.

1. Write in brief on *any ten* of the following: 10×10=100

   (a) Enumerate five zoonotic diseases of livestock. Discuss their mode of transmission. 5+5=10

   (b) Write the most pathogenic coccidiosis of poultry bird. How it will diagnosed? What measure you will adopt in a coccidiosis outbreak in a poultry firm? 1+2+7=10

   (c) Which virus is responsible for Bird flu? What is the preventive measure for Bird flu infection? Mention the clinical symptoms of it. 1+3+6=10

   (d) Discuss briefly the biology, pathogenesis of intracellular blood protozoan parasite of Livestock. What measure and treatment you will adopt for prevention of the disease? 4+6=10

   (e) What is the common Haemoprotozoa, Haemofilariae, Haemoricketsia in canine? Write separately their clinical symptoms and treatment. 3+3+4=10

   (f) Discuss the common filarial nematodes occurring in human and animals. Mention the name of said filaria and their site of predilection. Mention their mode of transmission. 2+2+6=10

   (g) State the name of the Haemoprotozoa causing haemolysis followed by Haemoglobinuria in canine. Write down their etiology, clinical symptoms and modern line of treatment of the said Haemoportozoa. 1+4+5=10

   (h) Difference between oedema, abcess, hernia, tumour, cyst. 2+2+2+2+2=10

   (i) Difference between anaesthesia and euthanasia. 5+5=10

   (j) What is the main cause of haematoma? Give the line of treatment of it. 2+8=10

   (k) State the parts of female reproductive tract of fowl and their role in egg formation. 3+7=10

   (l) State the factors influencing ricket in pup. 10

2. Classification of shock. Write down briefly the pathophysiology of shock. 20

3. What is Urolithiasis? How it will be diagnosed? Describe briefly the procedure of surgical intervention for removal of the calculi from bladder. 20

4. Write down the surgical condition for performing ceasarian section in bitch. Describe briefly the operative procedure in a 5 years bitch. 20

Group-B

Answer *any two* questions. 30×2=60

5. Write in brief about the followings: 6×5=30
   (a) Dental fistula
   (b) Dermoid cyst
   (c) Libido
   (d) Importance of Monkey as a laboratory experimental model
   (e) Swine flue

6. Mention different types, symptoms and mode of transmission of Anthrax from animal to man. Outline the laboratory diagnosis of anthrax in man and animal. 30

7. Discuss the epidemiology of Brucellosis stating symptoms in animal. Give the diagnostic procedure of the said disease. Mention the concept of the disease in a herd with economic losses due to brucellosis in India. 30

2019

ANTHROPOLOGY

Paper-I

Time Allowed — 3 Hours *Full Marks — 200*

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Group-A

Answer **any three** questions

1. Define linguistic Anthropology and discuss its importance in Anthropology. Give an account of the linguistic groups of India and their distribution with suitable example of two ethnic populations from each of the linguistic groups. Write a note on variation of head shape of any one of the linguistic groups of India. 8+12+10=30

2. Give an account of health and disease in relation to communicable and non-communicable disease. Discuss the association of socio-demographic variables and communicable and non-communicable disease with suitable examples. Enumerate briefly the effect of vitamin deficiency in nutrition. 10+12+8=30

3. Give an account of Darwinian Theory of organic evolution. Discuss the evolutionary biology with reference to the skull in the context of human evolution. Briefly enumerate the neutral theory of evolution. 10+10+10=30

4. Enumerate the relationship of marriage and kinship. Discuss incest and consanguinity in relation to kinship system. Give an account of possibility of genetic disorder in consanguinity. 10+10+10=30

Group-B

Answer **any three** questions

5. Compare and contrast between power and authority. Discuss the characteristics of state society. Give an account of the post independence socio-political movements of tribal population. 8+10+12=30

6. Define growth and development with suitable examples. Enumerate different methodologies of growth study with their merits and demerits. Discuss the different factors affecting growth with suitable examples. 8+10+12=30

7. Define Neolithic. Which were the most relevant Neolithic changes? Briefly discuss about the Neolithic culture in India. 8+10+12=30

8. Define Jajmani systems. Enumerate briefly the theory of the origin of caste system. State the salient features of caste system in India. 8+12+10=30

Group-C

Write short on **any two**: 10×2=20

(a) Genealogy and pedigree

(b) Kula Ring

(c) Testing of hypothesis

(d) Religion and Magic

2019

ANTHROPOLOGY

PAPER-II

Time Allowed—3 Hours *Full Marks—200*

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

The figures in the margin indicate marks for each question.

Group A

Answer any three *questions.*

1. What is Ethnoarchaeology? What is the difference between Ethnoarchaeology and ethnographic analogy? Discuss the Ethnoarchaeological studies in India with special reference to megalithic burials and mortuary practices in India. 5+10+25=40

2. (a) Is ramapithecus a hominin? Who discovered ramapithecus? What are the characteristic features of ramapithecus?

   (b) Who discovered Narmada man? What are the major characteristics features of Narmada man? State briefly about significance of Narmada man in human evolution. (6+2+12)+(2+8+10)=40

3. Define the term demography. Compare and contrast between

   (a) demography and population studies

   (b) rates and ratios

   (c) fertility and fecundity

   (d) mortality and morbidity 4+(9×4)=40

4. (a) Define 'great and little tradition'. Give an account of the Redfield's concept of civilization.

   (b) What do you mean by Sanskritization? What are the characteristics of Sanskritization? Discuss the different models of Sanskritization with suitable examples. (5+15)+(4+8+8)=40

5. Write a short notes on *any two* of the following: 20+20=40

   (a) Concept of SC and ST

   (b) Development of village study in India

   (c) Health and Human rights

   (d) Social-cultural dimensions of health

Group B

Answer any two *questions.*

6. Define Tribes. What is ethnicity? Write a brief note on Jharkhand movement. 4+6+30=40

7. What is sustainable development? What are the major cultural factors of sustainable development? Write a brief note on 'role of anthropology in development'. 5+10+25=40

8. Write short notes on: 20+20=40

   (a) Geographical distribution of ABO blood group in Indian tribes

   (b) Economic distribution of Indian tribes

2019

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.

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

ক-বিভাগ

(*যে কোনো একটি* প্রশ্নের উত্তর লিখুন) ৫০×১=৫০

১। (ক) রেখাচিত্রসহ ইন্দো-ইওরোপীয় থেকে বাংলা ভাষার উদ্ভব ও বিকাশ প্রক্রিয়াটি আলোচনা করুন। প্রসঙ্গত প্রতিটি স্তরের কালসীমা ও সাহিত্যিক নিদর্শন উল্লেখ করুন।

(খ) উদাহরণসহ সংজ্ঞা লিখুন এবং উদাহরণগুলি বিশ্লেষণপূর্বক বৈশিষ্ট্য প্রতিষ্ঠা করুন ঃ
অপিনিহিতি, অভিশ্রুতি, স্বরভক্তি বা বিপ্রকর্ষ, স্বরসংগতি, সমীভবন।

খ-বিভাগ

(*যে কোনো দুইটি* প্রশ্নের উত্তর লিখুন) ৫০×২=১০০

২। সময়সীমা এবং উল্লেখযোগ্য সাহিত্যিক নিদর্শনের তালিকাসহ বাংলা ভাষা-সাহিত্যের যুগবিভাগ করুন। আদিতম সাহিত্যিক নিদর্শনের রচনাকাল, রচয়িতা (বৃন্দ) এবং সামাজিক মূল্য বিষয়ে আলোচনা করুন।

৩। 'মঙ্গলকাব্য এবং অনুবাদ সাহিত্য পরস্পরের পরিপূরক' — উক্তিটির পক্ষে বা বিপক্ষে আপনার মতামত লিপিবদ্ধ করুন। প্রসঙ্গত মঙ্গলকাব্যের বিভিন্ন ধারার উল্লেখ করে রচনাকারদের নাম লিখুন এবং যে কোনো একজন মঙ্গলকাব্য রচয়িতার সম্পর্কে সংক্ষিপ্ত আলোচনা করুন।

৪। উনিশ শতকীয় বাংলা সাহিত্যের ইতিহাসে আখ্যানকাব্য-মহাকাব্য ধারার উদ্ভব-বিকাশ-পরিণতি সম্পর্কে বিস্তারিত আলোচনা করুন।

৫। বাংলা গদ্যসাহিত্যের সূচনালগ্নে শ্রীরামপুর মিশন এবং ফোর্ট উইলিয়াম কলেজের গুরুত্ব ও অবস্থান ব্যাখ্যা করুন।

গ-বিভাগ

(*যে কোনো একটি* প্রশ্নের উত্তর লিখুন) ৫০×১=৫০

৬। বিশ শতকের প্রথমার্ধের বাংলা কাব্যসাহিত্য রবীন্দ্রানুসারী এবং রবীন্দ্রবিরোধী বা রবীন্দ্রনিরপেক্ষ কবিসমাজের দ্বিমুখী কাব্যচর্চার ইতিহাস — এই বিষয়ে সংক্ষেপে আপনার মতামত জানান এবং দুই ধারার দুজন কবি সম্পর্কে আলোচনা করুন।

৭। সমকালে রবীন্দ্রনাথ ঠাকুরের তুলনায় শরৎচন্দ্র চট্টোপাধ্যায় নির্দ্বিধায় অধিকতর জনপ্রিয় কথাসাহিত্যিক ছিলেন — মন্তব্যটির যথার্থতা নির্ণয় প্রসঙ্গে শরৎসাহিত্যের বিভিন্ন বৈশিষ্ট্য উদাহরণসহ প্রতিষ্ঠা করুন।

৮। আধুনিক বাংলা উপন্যাসের প্রেক্ষিতে মহাশ্বেতা দেবীর সমাজ-রাজনীতি সচেতন রচনার মূল্যায়ন করুন।

2019

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 up to 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=১২০

১। বৈষ্ণব পদাবলীতে 'প্রার্থনা' পর্যায়ের গুরুত্ব কতখানি? এই পর্যায়ের শ্রেষ্ঠ পদকর্তা কে? এই পর্যায়ের আরো দুজন পদকর্তার পদ রচনার সঙ্গে তাঁর পদের তুলনামূলক আলোচনা করে এই শ্রেষ্ঠত্বের কারণ নির্ণয় করুন।

২। কবি কঙ্কন মুকুন্দরামের চণ্ডীমঙ্গল কাব্যের প্রকৃত নামটি কী? এই কাব্যের গ্রন্থোৎপত্তির কারণ অংশটি সমকালের সমাজ ইতিহাসের এক দলিল কীভাবে হয়ে উঠেছে, বিশ্লেষণ করুন।

৩। "মেঘনাদবধ কাব্যের প্রথম সর্গেই 'চিত্রাঙ্গদা' চরিত্রটির এক বিশেষ উক্তির মাধ্যমে সমগ্র কাব্যটির মূল সুরটি গাঁথা হয়ে গেছে।"— মন্তব্যটির প্রেক্ষিতে চিত্রাঙ্গদা চরিত্রটির পরিচয় দিন।

৪। 'কপালকুণ্ডলা' উপন্যাসে কাহিনীকে ছাপিয়ে যে এক বিশেষ ধরনের রোমান্টিক-মিস্টিক পরিবেশ তৈরি হয়ে উঠেছে— সেটি বিশ্লেষণ করুন।

৫। "বিচিত্র প্রবন্ধ"-এর 'কেকাধ্বনি' প্রবন্ধটিতে রবীন্দ্রনাথের যে এক বিশেষ মানসিকতার প্রকাশ ঘটেছে, উপযুক্ত উদ্ধৃতিসহ তার বিশ্লেষণ করুন।

খ - বিভাগ

(যে কোনো *দুটি* প্রশ্নের উত্তর লিখুন) ৪০x২=৮০

১। নারায়ণ গঙ্গোপাধ্যায়ের "টোপ" গল্পটিতে টোপ-অনুষঙ্গটি যে বিশেষ তাৎপর্যে প্রত্যক্ষে এবং পরোক্ষে ব্যবহৃত হয়েছে সেটি বিশ্লেষণ করুন।

২। "পথের পাঁচালী" উপন্যাসটির প্রকৃত নায়ক হল 'সময়'; উপন্যাসটির পর্ব-বিভাগের মাধ্যমেই লেখকের এই মনোভাবটি স্পষ্ট হয়েছে;— উপযুক্ত তথ্য সহযোগে বিশ্লেষণ করুন।

৩। প্রেমেন্দ্র মিত্রের 'আমি কবি যত কামারের' কবিতাটিতে শ্রেণিবিভাজনের নির্দিষ্ট গণ্ডীটিকে কীভাবে অস্বীকার করা হচ্ছে তা কবিতাটি সম্যক বিশ্লেষণ করে বুঝিয়ে দিন।

2019

MSC(O)BO-I/19

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

Group - A

Answer any four of the following questions:

1. Write a brief note on any four of the following :-

   (a) (i) Cell wall composition of angiosperms.

   (ii) Types of pits (with diagram and examples). 5x2

   (b) (i) Fusiform initial and Ray initials of vascular cambium.

   (ii) Structural variation of sieve elements. 5x2

   (c) Compare between : (with Diagram)

   (i) Amphicribral & Amphivasal Vascular Bundle.

   (ii) Monosporic and Tetrasporic types of megasporogenesis and embryo sac development. 5x2

   (d) Write a brief note on anomalous secondary growth of Boerhaavia sp. and Bignonia sp. 10

   (e) Development of male and female gametophytes of Angiosperm. 10

2. Answer any four of the following :

   (a) What is Pili? Write a brief note on the role of Pili in bacterial reproduction. How it is differ from a flagellum? 2+6+2

   (b) Depict the Chemical Composition of an eubacterium. Distinguish between Gram positive and Gram negative bacterial Cell wall. 6+4

   (c) Write a brief note of "Archaea Cell structure". How it is differ from eubacteria? 7+3

   (d) Illustrate with diagram the formation of endospore of Bacillus subtilis. Why it is high temperature registant? 8+2

   (e) Explain with diagram "Generalized transduction" and "Specialized transduction". 10

3. Answer any four :

   (a) Different types of Peristome teeth of mosses. 10

   (b) (i) Describe the leaf arrangement of acrogynous Jungermanniales.

   (ii) Compare between Elaterophore and elaters. 5x2

   (c) (i) Enumerate the stelar evolution in early land plants citing examples from Lycopodium sp.

   (ii) Mention the salient features of pseudospermatophytes of fossil Lycopsid. 5x2

P.T.O.

(d) Define homospory, incipient heterospory and heterospory from the evolutionary perspective of early land plants citing one example in each case. 10

(e) Write a brief note on NPC classification of pollen and spore wall. 10

4. Answer any four :

(a) Define mycorrhiza. Mention a brief role of mycorrhiza in agriculture and forestry. 10

(b) Write a brief note on different sterile structures of fungal hymenial layer which have taxonomic significance. 10

(c) Name the plant disease related to the "Irish famine of 1845". Name the causal organism and host plant. Explain with diagram the life cycle and disease cycle of this pathogen. 10

(d) Write a short note on Industrial uses of fungi. 10

(e) Name the causal organism of the disease "Citrus Canker". Write a note on symptom and control measures of this disease. 10

5. Write a brief note on(any four) :

(a) Auxospore formation of Pennales and centrales diatom. 10

(b) (i) Anatomical details of the reconstructed stem of a cycadofilicales member.

(ii) Trunk with flower on dwarf shoot of a cycadeoidales member. 5x2

(c) Algal toxins and Mycotoxins. 5x2

(d) Sexual reproduction of Lichen. 10

(e) Apogamy, Apospory and Apomixis in Pteridophytes. 10

Group - B

Answer any two questions

6. Answer briefly :

(a) Characterise the following families with at least four important diagnostic features : Fabaceae and Poaceae. 5+5

(b) (i) Enumerate with example the different stages of Hydrosere.

(ii) Write a brief note on ex situ & in-situ conservation of endangered species. 5x2

7. (a) Write a brief note on allogenic and autogenic succession of a Natural waterbody. 10

(b) Explain "Endemism" with reference to Sundarban Biodiversity Reserve. 10

Contd..P/3.

8. (a) Describe with diagram the anatomical peculiarities of hydrophytes and xerophytes for adaptation. 10

(b) Distinguish between : (with example)

(i) Amentum and Locusta.

(ii) Pome and pepo

(iii) Cohesion and adhesion of stamen.

(iv) Aestivation and Placentation.

(v) Coenanthium and Cyathium. 2x5

2019

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

Answer any five Questions

1. Answer any four questions :

(a) Answer the following in brief :-

(i) What is oncogene give an example.

(ii) Mention the types of gametes expected from the genotype AABBCa.

(iii) What are phagmid vectors?

(iv) What is florigen?

(v) What is Richmond Lang effect? 2x5

(b) Explain the role of :-

(i) Gibberellin in seed germination.

(ii) Helicase & primase in DNA replication. 5+5

(c) Distinguish between :-

(i) Paracentric & pericentric inversion.

(ii) Cyclic & noncyclic electron transport of photosynthesis. 5+5

(d) (i) Given Km=2.0 $mmol^{-1}$, $[S_o]$=1.0 $mmol^{-1}$ & V_o = 70nimol $L^{-1}mes^{-1}$ Calculate V_{max} using narehaclis- Mention equation. 5

(ii) Mention five applications of micropropagation. 5

(e) (i) Give an account of Agrobacterium mediated gene transfer. 5

(ii) Discuss the structure & properties of nitrogenase. 5

2. Answer any four questions :-

(a) Answer the following in breif :-

(i) What is rebozyme? Give an example.

(ii) Name the termination codons of protein synthesis.

(iii) What structal component is common to ATP, NADP, RNA.

(iv) Define crude drug.

(v) Write the full form of ELISA. 2x5

(b) Justify the following :-

(i) 'Crossing over involves a physical exchange between segments of homologous chromosomes'.

(ii) 'Photorespiration is a necessary evil'. 5+5

(c) Distinguish between :-

(i) Mass selection & pureline selection.

(ii) Oxidative phosphorylation & photophasphorylation. 5+5

P.T.O.

(d) (i) Give an breif account of mode of enzyme action. 5

(ii) Calculate mean, variance & standard deviation of the following data of plant height in cm.

161, 183, 170, 155, 191, 162, 167, 150, 210, 201, 211, 179, 188. 5

(e) (i) Discuss the importance of pharmacognosy in modern medicine. 5

(ii) State the principles & application of confocal microscopy. 5

3. Answer any four questions :-

(a) Answer the following in brief :-

(i) Differentiate between dominonce & epistasis.

(ii) When photosynthesizing plants are deprived of light, PGA contents morease - Justify why?

(iii) Define abenzyme. Give an example.

(iv) How many type of primary & secondary trisomies can be produced in an organism with 2n=10chromosomes.

(v) What is NOR? State its function. 2x5

(b) Explain the following in brief :-

(i) Concept of RNA world

(ii) Morphological evidence of evlution. 5+5

(c) Write short notes on :-

(i) Laws of probability.

(ii) Concept of biological clock. 5+5

(d) (i) Discuss the structure & flow of electrons through PS II. 5

(ii) Discuss the process of aminoacylation of t-RNA. 5

(e) (i) Find out the allelic frequencies (of blood group AB & O) from the sample in Hardy Weinberg equilibrium A=25, B=20, AB=5 & O=50. 5

(ii) Mention the oxidative decarboxylation reactions of krebs cycle. Name the substrate, product and enzyme of each. 5

4. Answer any four.

(a) Answer the following in brief :-

(i) What are 'Okazaki' fragments?

(ii) Define 'null hypothesis'.

(iii) Name the Co_2 acceptors in C_3 & C_4 plants.

(iv) What is lectin? What role does it have in 'symbiotic' N_2 fraction.

(v) What is biolistic gun? 2x5

(b) Explain the following :-

(i) Role of MPF in cell cycle. 5

(ii) Role of ABA in stomatal closing. 5

(c) Distinguish between :-

(i) Reversible & Irreversible enzyme inhibition. 5

(ii) Lamarckism and Darwinism. 5

Contd..P/3.

(d) (i) How will you show Km value corresponds to the substrate concentration which is half of the concentration of the substrate concentration where velocity is maximum (V max). 5

(ii) Gove a brief account of overlapping genes in ϕx174. 5

(e) (i) Discuss the type of RNA present in an eukaryotic cell. 5

(ii) Discuss the species name, farmly, order and bioactive compound of Adhatoda. 5

5. Answer any four of the following

(a) Answer the following in brief :-

(i) What do you understand when a fatty acid is abbreviated as 20:2Δ9,12?

(ii) A plant has chromosome number 2n=14. What are the member of linkage groups present?

(iii) What is Wobble hypothesis?

(iv) Why pH 7.0 considered as neutral pH?

(v) Draw the structure of 1AA. 2x5

(b) Commen on :-

(i) Role of cold treatment in flowering.

(ii) Henderson - Hasselbalch equation. 5+5

(c) Explain in brief :-

(i) Levels of packaging of eukaryotic DNA.

(ii) Primary, secondary, tertiary structure of proteins. 5+5

(d) (i) There are two adjacent living cells A & B. Cell has an osmotic potential (U) of - 10 bars and pressure potential (U) of 5 bars, whereas cell B has an osmatic potential of - 5 bars and a pressure potential of 2 bars. State the direction of water flow in the cells with explanation. 5

(ii) Mention the criteria of an ideal cloning vector. 5

(e) (i) Discuss the triplet binding technique of deciphering genetic code. 5

(ii) Discuss the 'Mass flow' hypothesis of organic translocation. 5

6. Answer any four of the following :-

(a) Answer the following in brief :-

(i) State the role of Rec A.

(ii) Define'goodnes of fit'.

(iii) What do you understand the dual role of RuBISCO.

(iv) What are palindromic sequesnces? Give example.

(v) Define proteomics. 2x5

(b) Distinguish between :-

(i) Rho dependent & Rho independent termination of transcription.

(ii) Structure and function of DNA And RNA.

Contd..P/4

(c) Explain the following :-

(i) Nomenclature of enzymes.

(ii) SDP should rightly be called long night plants. 5+5

(d) (i) Calculate the number of ATP molecules produced by complete oxidation of a saturated 16 C fatty acid. 5

(ii) Give a brief note on heterosis. 5

(e) (i) Give a brief account of 'split gene concept'. 5

(ii) Discuss allosteric regulation of enzyme. 5

7. Answer any four of the following :-

(a) Answer the following in brief :-

(i) Give an example of nucleic acid sequence data base.

(ii) What is OEC.

(iii) Why is TCA cycle named so.

(iv) Give an example of a buffu system.

(v) Give one example each of a gene coded by cpDNA mtDNA.

(b) Distinguish between :-

(i) Genomic DNA library & cDNA library. 5

(ii) Preparatory phase & payoff phase of photosynthesis. 5

(c) Give a brief account of :-

(i) oxidative pentose phosphate pathway. 5

(ii) Sex linked inheritance. 5

(d) (i) Give a brief account on frameshift mutation. 5

(ii) Mention the role of ethylene in fruit ripening. 5

(e) (i) A test cross between F_1 plant CcSs heterozygous for colour and full endosperm with a corn homozygous and recessive for colourless shrunken show the following results.

Colour full - 4000 Colourless full - 40

Colour shrunken - 100 Colourless shrunken - 4500.

Calculate the map distance between the two genes. 5

(ii) Give a brief account of cytoplasmic inheritance. 5

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 same language.*

Answer one question each from the following five groups :-

GROUP – A

1. (a) "Accounting is a means and not an end" – examine the statement.

   (b) "Accounting is a financial information system" – justify the statement with example.

   (c) Distinguish between Accounting Standards (AS) and Indian Accounting Standards (Ind AS).

   (d) What is 'Suspense Account' ? What is the nature of Suspense Account ?

   (e) A trader closed his books of accounts for the year ended 31st March, 2019 with difference in the Trial Balance carried forward. However, the following errors were detected subsequently :-

   (i) ₨.15,000 being the total of discount column on the credit side of the Cash Book was not posted to the ledger.

   (ii) ₨.60,000 being the cost of furniture purchased, was entered in the Purchase Book.

   (iii) Return outward book was undercost by ₨.1,500.

   (iv) A credit sale of ₨.8,700 was wrongly posted as 7,800 to the customer's account in the sales ledger.

   (v) Closing stock was overcasted by ₨.90,000.

   Pass the necessary rectification entries, prepare Suspense Account and find the effect of correction on profit as on 31st March, 2019. (5+5+5+5)+20

2. From the following Trial Balance, prepare a Trading and Profit & Loss Account for the year ended 31st March, 2019 and also a Balance Sheet as at that date :-

Trial Balance as at 31st March, 2019

Debit Balances	(₨.)	Credit Balances	(₨.)
Cash in hand	4,800	Sales	11,90,600
Debtors	3,00,000	Capital	4,25,000
Bad debts	17,200	Provision for doubtful debts	10,500
Rent & Rates	32,000	Return outward	29,100
Wages	24,000	Bank overdraft	12,000
Drawings	71,000	Creditors	1,00,000
Plant & Machinery	95,000		
Opening Stock	1,46,000		
Purchases	10,36,200		
Return Inward	21,000		
General Expenses	20,000		
	17,67,200		17,67,200

Other information :-

(i) Prove depreciation on Plant and Machinery @ 10%.

(ii) Provision for deubtful debts is to be maintained at 5% of debtors.

(iii) Stock as on 31st March, 2019 has been valued at ₹.1,73,000. It does not include the Plant and Machinery purchased on 31st December, 2018.

(iv) A credit sale of ₹.20,000 was omitted from the books .

(v) Plant and Machinery of ₹.10,000 purchased on 31st December, 2018, has been included in Purchases.

(vi) Goods, cost price ₹.7,200, minimum sales price ₹.9,000 was consigned to an agent, which remained still unsold.

(vii) Wages includes ₹.2,000 for installation of plant.

(viii) Goods costing ₹.6,000 have been stolen by an employee.

(ix) ₹.5,100 received from a customer, which was written off as bad, has been recorded as cash sale.

(x) A sales return of ₹.5,000 was not taken in the accounts, though it was duly taken in the stock. 40

GROUP - B

3. (a) Discuss how a Company can utilise Security Premium for different purposes as per Company's Act, 2013.

(b) Following are the extracts of Balance Sheet of X Ltd. as at 31st March, 2019 :-

Redeemable Preference Share Capital	₹.10,00,000
Calls-in-arrear (Redeemable Pref. Shares)	₹. 20,000
General Reserve	₹. 7,00,000
Securities Premium	₹. 80,000

The Company decided that : Preference Shares are of ₹.200 each fully called, to be redeemed at a premium of 10%. Calls-in-arrears are on account of final call on 500 shares held by four members, were not traceable. Balance of General Reserve and Securities premium to be fully utilised for the purpose of redemption and short fall to be made good by the issue of equity shares of ₹.20 each at par.

The redemption of preference shares was duly carried out.

Give Journal entries and the relevant extracts from the liabilities items of the Balance Sheet as they would appear after the redemption is carried out. 10 + 30

4. (a) From the following information, calculate the maximum number of shares that can be bought back, and pass the relevant journal entries in the books of Y Ltd.

(figures in ₹. Lacs)

10% Redeemable Pref.Shares of ₹.20 each fully paid	200
Equity shares of ₹.20 each fully paid	600
Securities Premium	100
General Reserve	500
Profit & Loss Account	600
Capital Redemption Reserve	40
Plant Revaluation Reserve	1000
Capital Reserve	1200
Export Reserve (Statutory Reserve)	1400
Secured loans	2000
Unsecured loans	1280
Current liabilities	200
Investments (Face value ₹.400 lacs)	800

Market Price per share ₹.80

Buy back price offer 25% over the Market Price

Sufficient investments were realised at Market Price, which was 125% of the Face Value.

Contd...P/3.

Later, the Company issued one fully paid up Equity share of ₨.20 each by way of bonus shares for every four equity shares held.

(b) Discuss the provisions for Debenture Redemption Reserves (DRR) as per the Company's Act, 2013, Rule 18(7) and Rule 18(7)(c). 25 + 15

GROUP - C

5. (a) During the month of January, 2019, a manufacturing company produced 1,400 units of its product in process I and transferred to the next process II, 460 units were remained incomplete and 140 units had been scrapped. Incomplete units had reached a stage in production as follows :-

Material 75% ; labour 50% and overheads 50% completed.
Total cost of 2,000 units was ₨.58,000.
Direct material introduced during the process ₨.14,400.
Direct wages amounted to ₨.33,400.
Production overheads incurred ₨.16,700.
Unit scrapped realised ₨.10 each.
Unit scrapped passed through the process, so were 100% completed with regard to material, labour and overhead.
Consider normal loss @ 5% on input.

Calculate (i) Equivalent production and cost per unit ; and show

(ii) Process account and Abnormal loss Account.

(b) What is unrealised profit in process account? 35 + 5

6. (a) You are given the following information of Z Ltd. for the year ended 31st March, 2019 @ 50% capacity utilisation producing 5,000 units :-

(i) Fixed expenses and sales remain constant for all levels of activity.

(ii) Selling price between 50% to 75% capacity is ₨.250 per unit.

(iii) Semi-variable expenses will remained unchanged at 50% to 65% capacity, but will increase by 10% between 65% to 80% capacity and 30% between 80% to 100% capacity levels.

(iv) At 90% level, material cost will go up by 5% and selling price will be 5% less.

(v) At 100% level, material and labour cost will increase by 10%, but selling price will come down by 8%.

(vi) Semi-variable expenses and fixed expenses are ₨.5,00,000 and ₨.5,80,000 respectively.

(vii) Per unit expenses are for material ₨.50, labour ₨.20 and direct expenses ₨.10.

Prepare flexible budget at 60%, 75%, 90% and 100% capacity levels and forecast profit.

(b) A factory produces a number of different products each having a number of components. Product A takes 10 hours to produce on a particular equipment which works at full capacity. The selling price and variable cost of the product A are ₨.2,000 and ₨.1,200 per unit respectively. A Component P-100 can be made in the same equipment in four hours incurring variable cost ₨.200 per unit. The factory purchases the component at a price of ₨.500 per unit.

Evaluate and advise the management whether the company should buy the component P-100. 30 + 10

P. T. O.

GROUP - D

7. (a) From the following information supplied to you, compute total income of Mr. A, for the Assessment Year 2018-'19 and also the tax liability :-

		(Rs.)
Income from Salary		3,00,000
Income from House Property		40,000
Business loss	(-)	1,90,000
Loss from specified business u/s 35AD	(-)	60,000
Short-term capital loss	(-)	60,000
Long-term capital gain		2,40,000

(b) Mr. B, provides you the following particulars of his income for the previous year 2017-'18.

(i) Business income before depreciation	Rs. 72,000
(ii) Income from house property	Rs. 60,000
(iii) Income from other sources	Rs. 6,000

Consider depreciation amount is Rs.94,000, compute the taxable income of Mr. B for the Assessment Year 2018-'19.

(c) Discuss the provisions for deduction in respect of investment in new Plant and Machinery as per section 32AC.

(d) Discuss the provisions for Amortisation of preliminary expenses u/S 35D and expenditure on amalgamation or demerger u/S 35 DD.

(e) What are the tax treatment of recognised Providend Fund and Public Providend Fund in respect of Assessment Year 2018-'19.

10+5+5+10+10

8. (a) Mr. C, an employee of DK Ltd., gives you the following information for the Assessment Year 2018-'19 :-

(i) Salary received Rs.25,000 p.m. including conveyance allowance @ Rs.2,500 p.m. for official purpose.

(ii) He deposited Rs.2,500 p.m. in a Pension Scheme notified by the Central Govt.

(iii) He paid a sum of Rs.60,000 during the year as interest on loan taken April, 2015 from bank for children's higher studies.

(iv) Paid health insurance premium for himself and family members Rs.8,500 in cash and Rs.9,000 by credit card.

(v) He invested Rs.40,000 in notified bond u/S 80C.

(vi) Equity shares having fair market price of Rs.1,00,000 were allotted to him by D K Ltd. at a concessional price Rs.20,000 on 30.05.2017, which he sold for Rs.1,80,000 on 28.02.2018.

Compute the total income of Mr. C, for the Assessment Year 2018-'19 and also the tax liability.

(b) "Income Tax is one Tax, but not aggregate of Taxes" - Critically examine the statement with example.

30 + 10

GROUP - E

9. (a) What are the taxes that GST replaces ?

(b) Why is dual GST required ?

(c) Discuss the justification of GST in India.

Contd...P/5.

(d) X Ltd. was given a contract in July, 2018 for providing interior decoration services in respect of a building in Delhi by Y Ltd. As per terms of contract, X Ltd. was to provide all the required material for completing the contract. However, Y Ltd. also provided a portion of the material.

Discuss whether the services provided by X Ltd. are subject to GST. If yes, calculate the tax liability of X Ltd., from the following information :-

(i)	CGST 6% and SGST 6%	
(ii)	Gross amount charged by X Ltd.	₹.12,00,000
(iii)	Fair Market value of material supplied by Y Ltd.	₹. 2,00,000
(iv)	Amount charged by Y Ltd. for material (included in (ii) above)	₹. 1,20,000

(e) Who are the persons not eligible to avail Composition Scheme in GST ?

(f) Z Ltd. covered under the Factories Act, 1948. Government Authorities have certified the factory is safe for the workers to carry their work and charged Government fee of ₹.20,000. The Company owned another factory in different place, which is not covered under the Factories Act, 1948. But the Company obtained safety certificate for the Company from the Government Authorities by paying ₹.30,000 voluntarily.

Is it taxable supply and attract GST ? If so, who is liable to pay GST, when applicable GST rate is 18% ? 5+5+5+10+5+10

10. (a) What are the main features of the Cash Flow Statement ? Explain with reference to relevant Accounting Standards.

(b) What do you mean by 'Free Cash Flow' ? Give example.

(c) Discuss, with examples the disclosure requirements of 'Events occuring after the Balance Sheet Date'.

(d) What do you mean by Prior-Period items ? Give examples.

(e) Discuss, with examples the need for convergence and adoption of Accounting Standards with recent years experienced in India.

(f) What are the obstracles for introducing IFRS in India ?

10+5+5+5+10+5

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2019

MSC(O)CA-II/19

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 same language.*

GROUP-A

Answer **Question No.1** and **any ONE** from the rest.

1. a) What do you mean by Financial System ? Discuss in details about the major components of the Indian Financial System. 4+12

   b) What is Insurance ? Discuss the objectives and functions of LICI. 16

   c) Critically evaluate the functions of NABARD. 8

2. a) Define Money Market. Define Call Money Market. Discuss the influence of unorganised sector on Indian Money Market. 4+4+8

   b) Discuss the structure of the Indian Money Market. 16

3. a) Discuss the role of SEBI in relation to investor protection. 16

   b) What are the grievances of Investors relating to the stock market ? What are the remedial measures to these grievances ? 8+8

4. a) Define Capital Market. Distinguish between Capital Market and Money Market. 6+10

   b) What do you mean by listing of Securities ? Is listing Compulsory ? Discuss the advantages of Listing of Securities. 16

GROUP-B

Answer **any TWO** Questions.

5. a) Discuss about the essential elements of a valid contract. What are void and voidable contracts ? 16

   b) Discuss the general rules regarding offer and acceptance. 16

6. a) Define the terms
   i) Consumer
   ii) Complaint
   iii) Manufacturer
   iv) Unfair Trade Practices
   4+3+3+6

   b) Discuss about formation, composition and jurisdiction of the National Commission. What are the qualification of members of the National Commission ? 12+4

P.T.O.

7. a) What are the stages of Incorporation of a Company ? Discuss the clauses of the memorandum of Association. 8+8

b) Discuss the provisions relating to Statutory meeting of a Company. Discuss briefly, the conditions for appointment of Directors of a Company. 8+8

8. a) What is "Industrial Dispute" ? What are the 'methods of settlement' in Industrial Dispute Act, 1947. 16

b) What do you mean by Workers Particepation in management ? What is Collective Bargaining ? What are the consequences in Collective Bargaining ? 4+4+8

GROUP-C

Answer any ONE Question.

9. a) "Evaluation of Internal Control System is quite important." — Discuss. 16

b) Discuss the objectives of Internal Audit. Distinguish between Internal Audit and Statuatory Audit. 8+8

10. a) Discuss the rules regarding declaration and payment of final dividend. 16

b) Explain the special points to be kept in view while auditing the books of accounts of a Commercial Bank. 16

GROUP-D

Answer any ONE Question.

11. a) Discuss about the different types of Leadership Styles as proposed by the Managinal Grid Theory of Leadership. 16

b) Discuss the qualities/traits that a good leader is expected to possess. 16

12. a) What is Motivation ? Discuss its features and importance. 16

b) Discuss Maslow's Need Hierarchy Theory. Explain some common non-financial Motivators. 10+6

2019

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 remaining ones ignored.

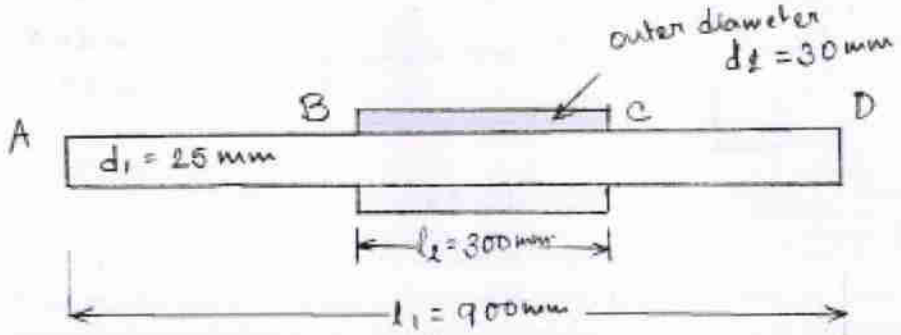
The figures in the margin indicate marks for each question.

Group-A

Answer *any four* questions.

1. (a) A 25mm diameter steel rod of length l_1 = 900 mm has a bronze sleeve of external diameter 30 mm and of length l_2 = 300 mm. The sleeve is shrunk on that rod so that the two components are securely bonded as shown in figure 1.a below. Find the total elongation of the steel rod due to a rise in temperature of 200°C.

Take, $E_s = 2 \times 10^5 N/mm^2$, $E_b = 1 \times 10^5 N/mm^2$, $\alpha_s = 1{\cdot}2 \times 10^{-5}$ per °C, $\alpha_b = 2{\cdot}03 \times 10^{-5}$ per °C. 15



(b) Draw shear force and bending moment diagram for the beam shown below in figure 1.b. 20

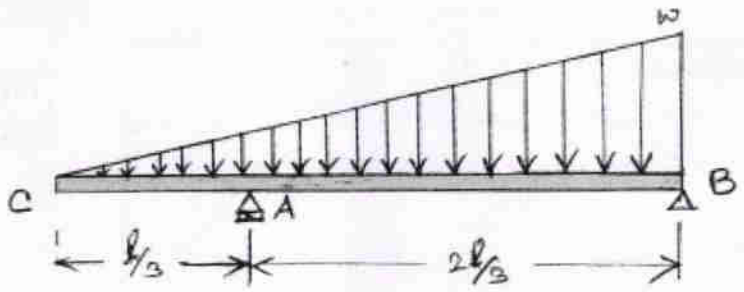


Fig. 1. b

2. (a) A layer of clay of thickness 12·5 m is underlian by sand. The saturated unit weight of the clay is 18·5 KN/m^3. When the depth of an open trench excavated in the clay reached a depth of 8m the bottom cracked and the water started entering the trench below. Determine the height to which water would have risen from the top of sand in the bore hole if it were drilled into sand prior-to the excavation.

Take, $\gamma_w = 10\,KN/m^3$ 10

(b) In the laboratory test on a clay sample of thickness 25 mm drained at top only, 50% consolidation occured in 11 minutes. Find the time required for the corresponding clay layer in the field 3m thick and drained at top and bottom, to undergo 70% consolidation.

Assume $T_{50} = 0{\cdot}197$, $T_{70} = 0{\cdot}405$. 25

3. (a) Plot (not to scale) the active earth pressure distribution on the retaining wall shown in figure 3.a, by Rankine's theory, for the data given.

Take, $\gamma_w = 10\,KN/m^3$ 15

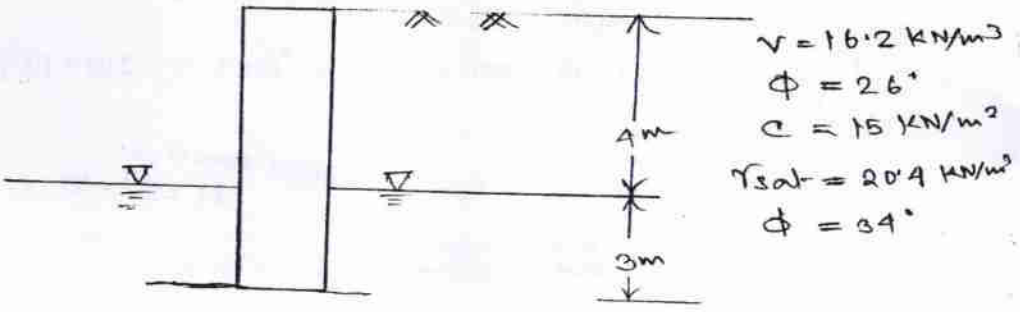


Fig. 3.a

(b) A square footing is to be established in a clayey soil at a depth of 2m where water table has risen upto the ground level as shown in the figure 3.b below. Determine the width of the footing if it is permitted to settle by 120mm for the data given. Assume that the net load given is a constant and that the same is dispersed into clay.

Take, $\gamma_w = 10\,N/m^3$ 20

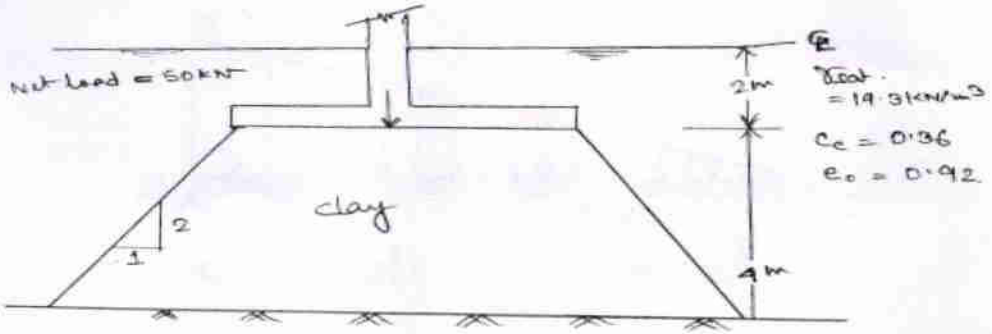


Fig. 3.b

4. (a) Using Terzaghi theory determine the ultimate bearing capacity of a strip footing 1·5m wide resting on a saturated clay ($C_u = 30\ kN/m^2$, $\phi_u = 0$, $\gamma_{sat} = 20\ kN/m^3$), at a depth of 2m below ground level. The water table is also at a depth of 2m from the ground level. If the water table rises by 1m, calculate the percentage reduction in the ultimate bearing capacity. 10

(b) An anchored sheet pile wall is to retain soil to a height of 5·5m. The soil including that into which the pile is driven, is cohesionless with $\phi = 30°$ and $r_b = 20{\cdot}8\ kN/m^3$. The surface of the retained soil is horizontal and level with top of the wall. Tie rods are fixed at 1·83m below the top of the wall. Determine the minimum penetration depth of the pile to achieve free earth support condition. 25

5. (a) A cohesionless soil with a void ratio of e = 0·6 and specific gravity of soil solids, $G_s = 2{\cdot}65$ exists at a site where the water table is located at a depth of 2 meters below the ground surface. Assuming a value of coefficient of earth pressure at rest, $K_0 = 0{\cdot}5$. Calculate the following quantities at a depth of 5 metres below the ground surface, total stresses σ_V and σ_H, effective stresses, σ_V' and σ_H' and pore water pressure U.
Assume soil to be dry above the water table and saturated below the water table.
Use $r_w = 9{\cdot}81\ kN/m^3$. 18

(b) Compute the size of fillet weld for a bracket connection with ISMB 300 column as shown in figure 5.b below. Permissible shear stress in weld = 110MPa. 17

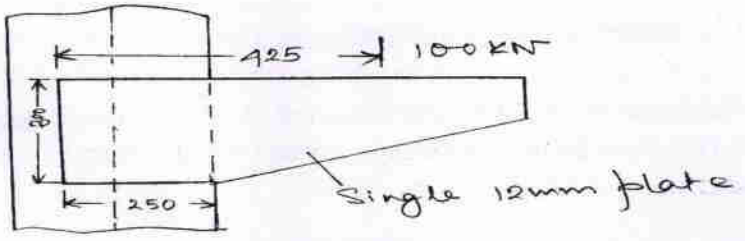


Fig. 5.b

Group-B

Answer *any four* questions.

6. A compression member of 500mm effective length consists of a solid aluminium rod of 25mm diameter. In order to reduce the weight of the member by 25%, the solid rod is replaced by a hollow aluminium rod of 25mm external diameter. Determine the critical loads for the two members. Find also the percentage reduction in the critical load when the hollow member is provided.
Take $E = 7{\cdot}28 \times 10^4\ N/mm^2$. 15

7. Design a rectangular beam section subjected to a moment of 80kN–m. Take M20 mix & Fe 415 grade steel. 15

8. Granular soil deposit is 7m deep over an impermeable layer. The ground water table is 4m below the ground surface. The deposit has a zone of capillary rise of 1·2 m, with a saturation of 50%, plot the variation of total stress, pore water pressure and effective stress with the depth of deposit given for the granular soil e = 0·6 and G = 2·65. 15

9. Using free earth support method, calculate the depth of embendment of the sheet pile and the pull in the anchor rod for the anchored bulkhead system shown in Fig. 9 below. 15

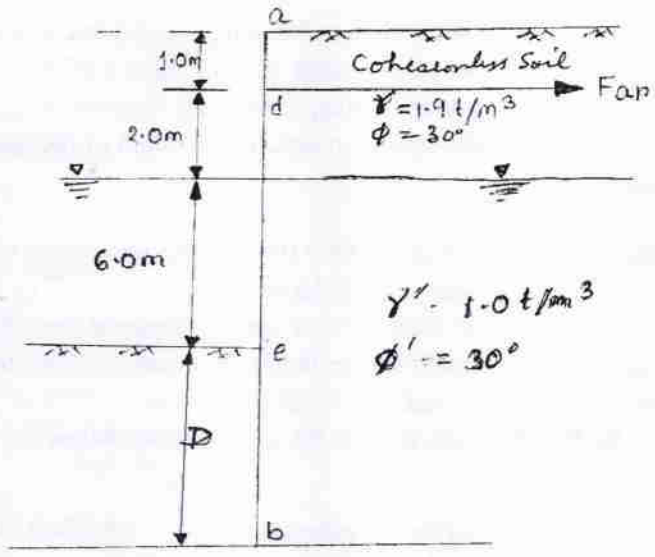


Fig. 9

10. (a) A 1000 CC core cutter weighing 946·80 g was used to find out the in situ unit weight of an embankment. The weight of core cutter filled with soil was noted to be 2770·60g. Laboratory test on the sample indicated a water content of 10·45 per cent and specific gravity of solids of 2·65. Determine the bulk unit weight, dry unit weight, void ratio and degree of saturation of the sample.

If the embankment becomes saturated due to rains, calculate the water content and the saturated unit weight. (Assume there is no volume change in sample on saturation.) 8

(b) The undisturbed soil at a borrow pit has a water content of 15 per cent. Void ratio of 0·60 and specific gravity of solids 2·70. The soil from the borrow pit is to be used for construction of an embankment with a finished volume of 40,000 Cu.m. The specifications for the embankment require a water content of 18 per cent and dry unit weight of 1·76 gm/cc. Calculate the quantity of soil required to be excavated for the embankment. 7

2019

CIVIL 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.

Answer 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 30m long at 18°C when supported throughout its length under a pull of 8 kg. A line was measured with the tape under a pull of 12kg and found to be 801m. The mean temperature during the measurement was 26°C. Assuming the tape to be supported at every 30m, compute the true length of the line, given that the cross-sectional area of the tape = 0.04 cm^2, the weight of 1 cubic centimetre is 0.0077 kg, the coefficient of expansion for steel = 0.0000117 per °C and the modulus of elasticity for steel = 2.1×10^6 kg/cm^2. 15

(b) An observer standing on the deck of a ship just sees a lighthouse. The top of the lighthouse is 35m above the sea level, and the hight of the observer's eyes is 6m above the sea level. Find the distance of the observer from the lighthouse. 5

(c) The following notes refer to the reciprocal levels taken with one level:

Instrument at	Staff reading on		Remarks
	A	B	
A	1.156	2.597	Distance between A and B = 1200m
B	0.987	2.418	R. L. of A = 625.555

Find (i) the true reduced level of B, and (ii) the error in the collimation adjustment of the instrument. 6+9=15

2. (a) What is hydrologic cycle? What are the stages of hydrologic cycle? Explain. 10

(b) Define the terms: Isohyet, Unit storm, Inter-flow, Runoff and Unit Hydrograph 10

(c) The peak of a flood hydrograph due to a six hour storm is 470 m^3/sec. The average depth of rainfall is 8 cm. Assume an infiltration loss of 0.25 cm/hour and a constant base flow of 15m^3/sec. Estimate the peak discharge of a 6 hour unit hydrograph for this catchmesnt. 10

(d) Explain the effects of water-logging on land. 5

3. (a) Calculate the diameter required for a single-stage trickling filter which is to yield as effluent BOD_5 of 20 mg/l, when treating settled domestic sewage with BOD_5 of 120 mg/l. The waste water flow is 2200 m^3/day and the recirculation is constant at 4000 m^3/day. The filter depth is 1.5m. 15

(b) Design a septic tank for a hostel having 50 students with probable peak discharge of 63 litres/minute. Assume suitable data. 10

(c) Enumerate the processes that are employed to purify water before supplying to the consumers. 10

4. (a) (i) Give a list of any five principal building stones. 5

(ii) What are the characteristics of good building stones? 10

(b) Explain briefly the following terms:

Activity, Event, Total float, Free float, Independent float, Earliest start time, Earliest finish time, Critical activities, Optimistic time, and Slack. 20

5. (a) Classify roads according to location, purpose and connectivity and also according to mode of construction. 10

(b) With a neat sketch describe the different layers of road and explain briefly how a road is constructed. 10

(c) Calculate the length of transition curve needed on a two lane highway having a longitudinal circular curve of radius = 300m. Design speed = 80kmph, length of wheel base of largest vehicle = 6m. 15

6. (a) For the distribution main of a city water supply a 30 cm main is required. As pipes above 25 cm are not available, it is decided to lay two parallel mains of same diameter. Determine the diameters of the parallel mains. 20

(b) What treatments are done to remove undesirable and objectionable taste and odour before water is supplied to public use? 15

Group-B

Answer **any two** *questions.*

7. (a) Enumerate the methods of irrigation. 10

(b) Define 'Duty' and 'Delta'. Derive the relationship between duty and delta for a given base period. 10

(c) The gross command area for a distributory is 10,000 hectares, 75% of which can be irrigated. The intensity of irrigation for Rabi season is 60% and that for Kharif season is 30%. If the average duty at the head of distributory is 2500 hectares per cumec for Rabi season and 1000 hectares per cumec for Kharif season, determine the discharge required at the head of the distributory from average demand consideration. 10

8. (a) The bearing of one side of a plot in the shape of a regular pentagon is 80°. Find the bearings of the remaining sides taken in a clockwise order the same way round. 15

(b) The coordinates of two points C and D are as follows:

Point	Coordinates	
	N	E
C	982.5	825.2
D	1198.6	576.4

Find the length and bearing of the line CD. 15

9. (a) (i) What do you understand by the term 'workability' and how is it measured?

(ii) Define water-cement ratio and indicate its effect on strength of the concrete.

(iii) Can concrete be always made stronger by mixing more cement without any regard to water, compaction, or curing? 5×3=15

(b) (i) What are the advantages of a CPM chart over Gantt Bar Charts?

(ii) Discuss the difference between CPM and PERT networks. 8+7=15

10. (a) (i) What is meant by composting? What are the steps of composting?

(ii) What will make compost break down faster? 7+8=15

(b) Describe the procedure for carrying out the plaster in cement mortar (1:4) in two coats on the external surfaces of a residential building. 15

2019

CHEMISTRY

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.

The figures in the margin indicate full marks for each question.

SECTION – I

[*This section comprises 15 questions in three groups. Answer any* ***ten*** *questions taking at least* ***three*** *questions from each group.*]

Group – A

4×5=20

1. PF_5 exists, but PH_5 does not exist. — Explain.
2. Predict the shapes of
   (a) TeF_5^-
   (b) SF_4 molecules.
3. Determine the lowest possible energy for the electron in the He^+ ion. HeH exists. — Explain.
4. Cuprous ion is not stable in solution. — Explain.
5. Zinc(II) salts are colourless, while nickel(II) salts are coloured. — Explain.

Group – B

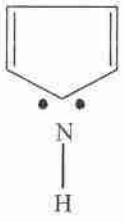
4×5=20

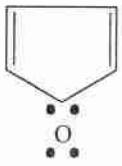
6. Calculate the reversible PV work when an ideal gas undergoes a polytropic expansion (PV^k = Const) and show that as $k \rightarrow 1$, the work takes on the form of an isothermal reversible expansion.
7. The Maxwell's speed distribution function dependent on the molar mass of the gas and the temperature. Show that, in terms of the reduced speed, defined as $C_r = \frac{C}{C_{mp}}$, the distribution function is independent of M and T.
8. Calculate the viscosity coefficient of O_2 at 0°C and 1 atm from the kinetic theory expression. Given σ = 2·5 Å.
9. Find the ratio of wall collision frequency Z_{wall} and binary collision frequency Z_A. What will be the value for O_2 molecules at 1 atm and 27°C?
10. What is the expression for the Joule co-efficient μ_J? Obtain μ_J for n moles of a Van der waals gas.

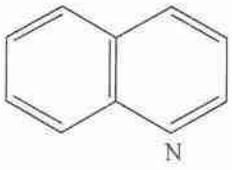
Group – C 4×5=20

11. Select ring compounds of the following which obeys the Huckel's rule.

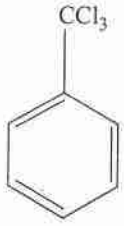
(a) $C_{12}H_{12}$ (b) $C_{12}H_{12}^{-2}$

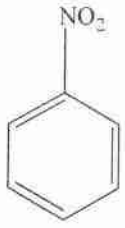
(c) $C_{20}H_{20}$ (d) 

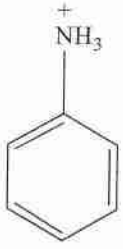
(e) 

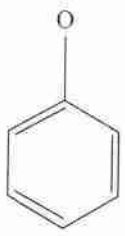
(f) 

12. In which cases of the following, electrophile NO_2^+ ion preferentially attacks metaposition? Cite reasons.

(a) 

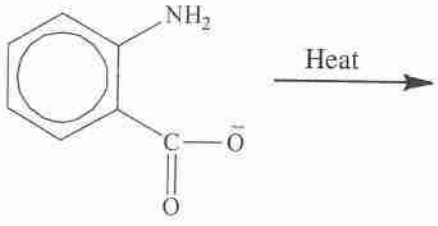
(b) 

(c) 

(d) 

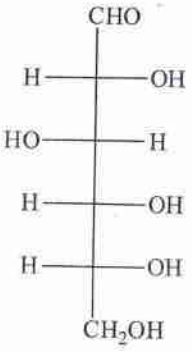
13. Identify the reactions of the following which proceeds via generation of Carbene:

(a) $CH_2N_2 \xrightarrow{\text{UV light}}$ (b) $CH_2I_2 + Zn \longrightarrow$

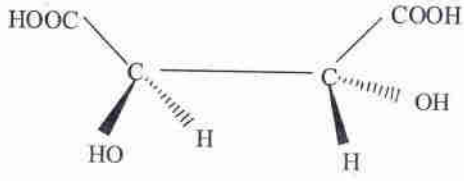
(c) $CH_2CO \xrightarrow{\text{UV light}}$ (d) 

14. Designate R, S configuration of the following structure:

(i)



(ii)



15. Predict the products giving mechanism when azulene reacts with acetyl chloride in the presence of anhydrous $AlCl_3$.

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) Define 'inert pair effect' with examples. 6

(b) Compare the 0–0 bond length of H_2O_2 with O_2F_2 and explain. 8

(c) Analyze the dimeric structures of $Al(CH_3)_3$ and BH_3. 6

(d) Calculate the spin states and bond orders of C_2, C_2^- and C_2^{2-}. 9

(e) Establish the expression of lattice energy defining all the terms involved in it. 7

(f) Explain the nature of conducting electricity in water and gaseous state of PCl_5. 4

17. (a) Illustrate the MO diagram of NO and predict the spin states of NO, NO^+ and NO^-. 6

(b) Illustrate the structures of N_2O_5. 4

(c) For the following cell,

$$Zn(s) \mid ZnSO_4(aq) \parallel CuSO_4(aq) \mid Cu(s)$$

when the concentration of Zn^{2+} ion is 10 times the concentration of Cu^{2+} ion, find the expression for ΔG(in J mol^{-1}). 6

(d) Compare the hydrolysis reactions of NF_3 and NCl_3. 4

(e) Compare the reactivities of borazine with benzene. 6

(f) Find the expression of pH of the aqueous solution of sodium acetate. 6

(g) Construct the Frost diagram considering the following Latimer diagram: 8

$$MnO_4^- \xrightarrow{0.89} MnO_4^{2-} \xrightarrow{2.10} MnO_2 \xrightarrow{0.95} Mn^{3+} \xrightarrow{1.51} Mn^{2+} \xrightarrow[(V)]{-1.18} Mn$$

Group – B

18. (a) Justify 'At 60 K, $C_{v,m}$ measurements revealed that H_2 resembles the behaviour of a monoatomic gas'. 5

(b) At what temperature of a gas will the number of molecules within a speed range dc, be the greatest?
Start from a 3-dimensional speed distribution. 6

(c) One mole of water at 20°C is converted into steam at 250°C at 1 atm pressure. Given: $Cp,m(l)$ = 75·6 JK^{-1} mol^{-1}, $\frac{C_{p,m}(vap)}{R} = a + bT$ with a = 3·634 and b = 1·195 × 10^{-3} K^{-1} and ΔH_{vap} = 40·68 kJ mol^{-1} at 373 K. Calculate ΔS_{sys}, ΔS_{sum}, ΔS_{univ}. 10

(d) Show that for a van der Waals gas, $C_P - C_V = R\left\{1 + \frac{2aP}{R^2T^2}\right\}$.
Starting from the general relation of $C_P - C_V$. 8

(e) Calculate the dissociation pressure of $CaCO_3$ at 25°C. Given:
$\mu^0_{CaCO_3} = -1128{\cdot}8\ kJ\ mol^{-1}$, $\mu^0_{CO_2} = -394{\cdot}36\ kJ\ mol^{-1}$ and $\mu^0_{CaO} = -604{\cdot}03\ kJ\ mol^{-1}$. 6

(f) Chromium crystallises as a body-centered cubic structure with a density of 7·20 $g\ cm^{-3}$ at 20°C. Calculate the length of a unit cell and the distance between successive 110 and 111 planes. 5

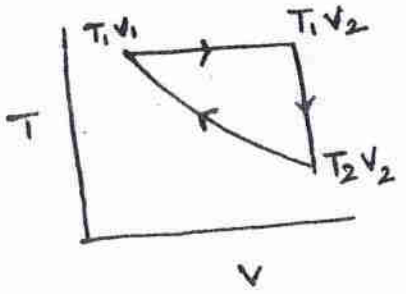
19. (a) Show that, $\frac{d\ ln\ K_c}{dT} = \frac{\Delta u^0}{RT^2}$. 4

(b) Obtain an expression for excess pressure across a curved surface. Consider a soap bubble where there are two interfaces. 6

(c) Calculate the entropy change of the source, sink, engine and of the universe for
(i) a reversible Carnot cycle.
(ii) an irreversible Carnot cycle. 4+4=8

(d) A 3-step reversible ideal gas cycle consists of
(i) an isothermal expansion at T_1,
(ii) constant volume cooling to T_2 and
(iii) an adiabatic compression to the initial state. Show that the efficiency is

$$\eta = 1 - \frac{(T_1 - T_2)}{T_1\ ln\frac{T_1}{T_2}}.$$ 8



(e) Consider the dissociation of $PCl_5 \rightleftharpoons PCl_3 + PCl_3$. Obtain an expression for ξ, the extent of the reaction given $K_P = 0{\cdot}46$ at 300°C, show that the percent dissociation of PCl_5 decreases from 56 to 21 on increasing the pressure from 1 to 10 atm at 300°C. 4+4=8

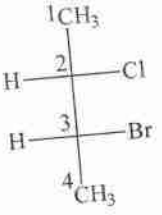
(f) Consider an orthorhombic unit cell with dimensions $a = 487$ pm, $b = 646$ pm, $c = 415$ pm. Calculate the perpendicular distance between

(i) the 110 planes; and

(ii) the 222 planes of this crystal. 6

Group – C

20. (a) Write Sawhorse projection and Newman projection of the following compound having Fischer projection. 4



(b) Arrange the following Carbocations in the increasing order of stability. — Justify.

(i) $C_6H_5CH_2^+$

(ii) $C_6H_5\overset{+}{C}H\,CH_3$

(iii) $(C_6H_5)_2\overset{+}{C}H$

(iv) $(C_6H_5)_3\overset{+}{C}$ 6

(c) 'Haloalkanes undergo nucleophilic substitution reactions whereas halo arenes undergo electrophilic substitution reactions'. Illustrate with suitable examples. 10

(d) Describe the following reactions giving mechanisms of each conversion of your choice. 4×5=20

(i) Claisen condensation

(ii) Reimer-Tiemann reaction

(iii) Diels-Alder reaction

(iv) Beckmann rearrangement

(v) Hofmann rearrangement

21. (a) Explain why S_N1 leads to racemic mixture whereas S_N2 gives rise to inverted product. 8

(b) Describe the conformational isomers of *n*-butane. Draw the potential energy diagrams of various conformations of *n*-butane and comment on the relative stabilities of the conformers. 8+8=16

(c) How quinoline can be synthesised from aniline by SKraup method stating the functions of each reagent? 4

(d) (i) Furan undergoes Gatterman reaction followed by hydration. 4×2=8

(ii) Anthracene is subjected to photochemical reaction in presence of oxygen and Na_2SO_3.

(e) Mention the products obtained by room temperature photolysis of acetone via Norrish type 1 cleavage. 4

2019

CHEMISTRY

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 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

4×5

1. Explain the reaction of $Mn_2\,(Co)_{10}$ with molecular Hydrogen. Discuss the type of reaction involved.

2. Carry out the reaction of ferrocene with dilute nitric acid. How would you perform the nitration of ferrocene?

3. Cyanide occupies very high position in the Nephalauxetic series of ligands.—Explain.

4. Discuss the role of [4Fe, 4S] Ferredoxins in electron transport.

5. Draw the possible geometrical isomers of $\left[\overset{IV}{\text{Pt}}\,Cl_2\,(NH_3)_2\,Br_2\right]$ and hence explain which of them will be optically active.

Group – B

4×5

6. Draw a labelled phase diagram of a two component solid-liquid equilibrium system and hence explain what is meant by an eutectic mixture.

7. Briefly explain the difference between Fluorescence and Phosphorescence.

8. What is a zero order reaction? Explain with an example.

9. Why the word 'average' is used in the molecular weight of a polymer?

10. Write down the basic assumptions of collision theory.

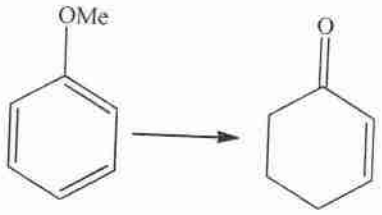
Group – C

4×5

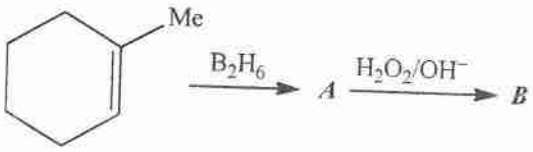
11. *Trans*-cyclo octene is chiral. Explain its nature of chirality.

12. Draw the enantiomers of *trans*-2-methylcyclohexanol. Assign R/S configuration to the asymmetric centres.

13. How can you carry out the following conversion?



14. Identify the products ***A*** and ***B*** of the following reactions. Indicate their stereochemistry.



15. Treatment of active *threo* isomer of 3-bromo-2-butanol with HBr gives d*l*-2,3-dibromobutane exclusively. Explain.

Section-II

This section comprises six questions in three Groups. Answer *any four* questions taking *at least one* questions from each Group.

Group - A

16. (a) Explain why $[CoCl_4]^{2-}$ and $[Co(H_2O)_6]^{2+}$ complexes have magnetic moment higher than the spin only valve. 8

(b) Give the IUPAC names of 2×4=8

(i) $[Co\ (bpy)_3]_2\ (SO_4)_3$

(ii) $[Fe\ (\eta^5 - C_5H_5)_2]$

(iii) $[Ir\ (Co)Cl\ (PPh_3)_2]$

(iv) $[(Co)_3\ Fe\ (Co)_3\ Fe\ (Co)_3]$

(c) Discuss the structure and bonding in $k[Pt\ Cl_3(\eta^2 - C_2H_4)]$ with suitable experimental evidences. 8

(d) Explain the term 'Stereochemical Control of Valence' with respect to nitrosyl complexes. Discuss the reaction of $[Ir\ (Co)Cl\ (PPh_3)_2]$ with nitrosonium tetrafluoroborate. 8

(e) Draw the active site structure of Hemerythrin and illustrate its role in O_2 transport. 8

17. (a) Construct the Orgel diagram for $[Ni\,(NH_3)_6]^{2+}$ and hence assign the possible spectral transitions. 8

(b) Discuss the nature of metal-metal bonds in $Cr_2(OAc)_4\,.\,2H_2O$ by using suitable model. 8

(c) Explain using suitable splitting diagrams, why $Cu(II)$ complexes are subject to tetragonal elongation rather than tetragonal compression. 8

(d) Calculate the CFSE of the following complexes: 2×4=8

(i) $[Cr\,(H_2O)_6]^{2+}$

(ii) $[Co(NH_3)_6]^{3+}$

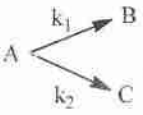
(iii) $[Fe\,(CN)_6]^{4-}$

(iv) $[Pt\,Cl_6]^{2-}$

(e) Discuss the role of NaKATPase in the transmission of nerve impulses across the membrane of cells. 8

Group - B

18. (a) Derive thermodynamically the Clausius Claperon equation for a liquid ⇌ vapour equilibrium, stating the assumption involved. 8

(b) Show that if A undergoes simultaneous reactions 

, then the activation energy 'E_a' for the above reaction is $E_a = \frac{k_1E_1+k_2E_2}{k_1k_2}$

where E_1, E_2 — activation energy of the two reactions. 6

(c) State the differences between physical and chemical adsorption. Explain how the number of occupied sites (θ) can be calculated using Langmuir adsorption isotherm. 9

(d) Derive the selection rule for a diatomic molecule undergoing rotational spectroscopy. 7

(e) What do you mean by an azeotrope? Calculate the degree of freedom for an azeotrope in a two component liquid vapour equilibrium. 4

(f) State Franck Condon principle. Mention its significance. 6

19. (a) Draw the concentration vs. time graph for three species A, B, C undergoing the following first order consecutive reaction

$$A \rightarrow B \rightarrow C$$

Explain the nature of the plot. 4

(b) The reaction $2NO + O_2 \rightarrow 2NO_2$ follows the following pathway.

$$2NO \rightleftharpoons N_2O_2 \text{ (Fast)}$$
$$N_2O_2 + O_2 \rightarrow 2NO_2 \text{ (Slow)}$$

Find the order of the reaction. 6

(c) State the differences between step growth and radical polymerization mechanism. Give an example of each type. 8

(d) Derive the relation between elevation of boiling point of a solvent and molal concentration of the solution of a non-volatile, non electrolyte solute stating the assumptions and approximations. 8

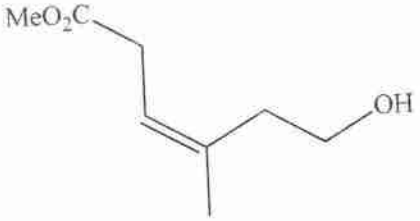
(e) Define a harmonic oscillator. Draw and explain the potential energy (v) versus displacement (x) curve of a harmonic oscillator. 5

(f) State Lambert Beers Law explaining the terms involved. Explain its physical significance. 4

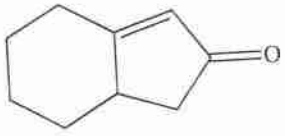
(g) State with the characteristic energy profile, the basic assumptions of Transition State Theory. 5

Group - C

20. (a) Outline the synthetic route for each of the following compounds: 4×5=20

(i) 

(ii) 

(iii) 

(iv) $Me_3C - CO_2H$

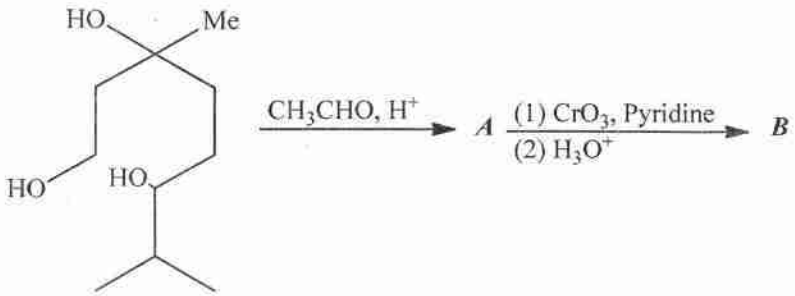
(v) $CH_3 - CH(OH) - CO_2H$

(b) Draw the preferred conformer of 1-methyl-1-phenyl cyclohexane. Explain.

(c) Identify the symmetry elements present in the following cases. Assign point group ar symmetry number to each structure. 4×4=

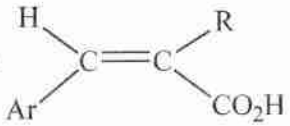
Allene, boat conformation of cyclohexane, *trans*-decalin, benzene.

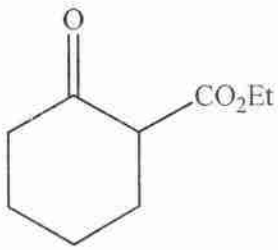
21. (a) Identify the products ***A*** – ***F*** of the following reactions: 1½×6=9

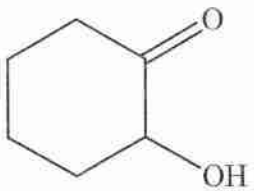
(i) 

(ii) 

(b) Carry out the following conversions. Explain the reactions involved. 4×3=12

(i) ArCHO ⟶ 

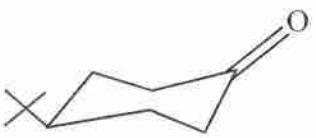
(ii) $EtO_2C(CH_2)_5CO_2Et$ ⟶ 

(iii) $EtO_2C(CH_2)CO_2Et$ ⟶ 

(c) Explain the stereochemistry of the following reactions. Indicate stereochemistry of the major products of each reaction. 5×3=15

(i) Maleic acid $\xrightarrow{Br_2}$

(ii) *Threo*-3-methoxy-2-bromobutane $\xrightarrow[Ag^+]{H_3CCO_2H,}$

(iii) 

$\xrightarrow[t\text{-BuOH}]{Li,\ NH_3}$

(d) Find out the symmetry elements present in Twistane and point group. 4

2019

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.

Answer 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) Find the 10's-complement of 63918.

   (b) Convert $(54{\cdot}45)_{10}$ into its binary equivalent.

   (c) Explain the following types of numerical errors with an appropriate example of each:

   round-off error, chopping and truncation error.

   What do you understand by absolute error and relative error? Give examples.

   (d) What do you mean by SOP, POS and min-term in Boolean algebra? What are the different types of SOP? State with appropriate examples. 2+4+(3×4+4)+(3×2+12)=40

2. (a) Find whether each of the following is true or false (given reasons):

   (i) $f(n) = 1$ $\in O(n)$

   (ii) $f(n) = 1gn$ $\in O(n^2)$

   (iii) $f(n) = n^2$ $\in O(n)$

   (iv) $f(n) = 3n + 10$ $\in O(1\text{g } n)$

   (v) $f(n) = n \lg n$ $\in O(n^2)$

   (vi) $f(n) = n$ $\in O(n^2)$

   (b) Show that $1 + \sqrt{n} \in O(n)$

   (c) Express $T(n)$ using big-O notation (with brief explanation):

$$T(n) = 500n + \frac{n^5}{10} + 80\log n$$

(d) We have two algorithms A and B with n input values that solve one problem. Algorithm A takes time $T_A(n) = n^3 + 5n^2 + 100n$ and algorithm B takes time $T_B(n) = 1000n^2 + 1000n$. When is B more efficient than A? (6×2)+10+4+14=40

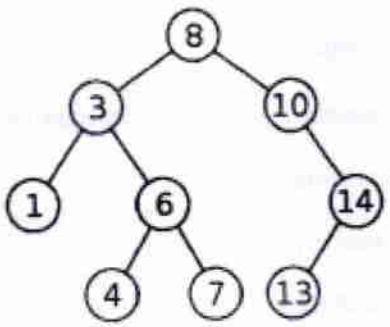
3. (a) Solve the recurrence: $T(n) = 2T(n/2) + cn$; $T(1) = 1$ [c is a constant].

(b) Snapshot of two separate recursive algorithms are given below. Let $T(n)$ be the time to solve each problem. Represent $T(n)$ recursively.

(i)
```
function B1(n){
for (i=1, i<=n, i++)
   x = x + i
B1 (n/2)
B1 (n/2)
}
```

(ii)
```
function B(n){
   x = x + i
   B (n/2)
   }
```

(c) List the order of visiting vertices for in order, post order, preorder and level order traversal of the binary tree below.

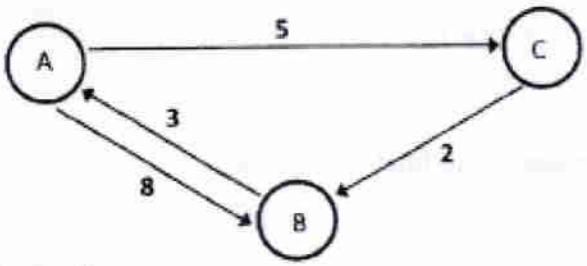


(d) Prove that the worst case behaviour of Quicksort is $O(n^2)$. What is the average case behaviour? With what types of file it happens? 8+(4+4)+(4×3)+(6+2+4)=40

4. (a) What is a complete graph? How many edges are there in K_n (where K_n is a complete graph of n nodes)?

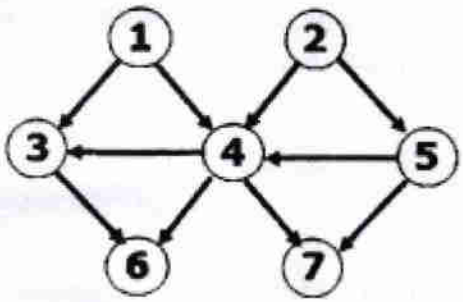
(b) Describe Floyd's all-pair shortest path alogorithm using pseudocode. Clarify the steps with appropriate comments.

Apply Floyd's algorithm on the following graph:

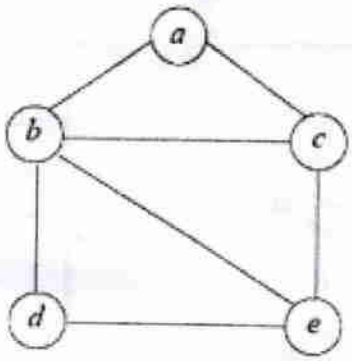


Enumerate the steps.

(c) Find three topological ordering for the following graph:



(d) Use backtracking to solve the 3-coloring problem with the following graph. Show the full state space search tree. (2+2)+(4+6)+6+20=40



5. (a) Using the following tabular values for a function $y = f(x)$, obtain its second degree polynomial approximation using Lagrange's Interpolation formula:

i	0	1	2
x_i	0·10	0·16	0·20
$f(x_i)$	1·12	1·24	1·40

Also, find the approximate value of the function at $x = 0{\cdot}13$.

(b) A company manufactures two products : X and Y. There are three machines (resources) M_1, M_2 and M_3 and the available capacities are 50, 25 and 15 hours respectively. Product X requires 1 hour of machine M_2 and 1 hour of machine M_3. Product Y requires 2 hours of machine M_1, 2 hours of machine M_2 and 1 hour of machine M_3. The profit contribution of products X and Y are Rs. 5.00 and Rs. 4.00 respectively. Formulate a LP resource allocation model, along with the objective function and necessary constraints.

(c) Compare and contrast: Transportation problem and Assignment problem. (12+6)+12+10=40

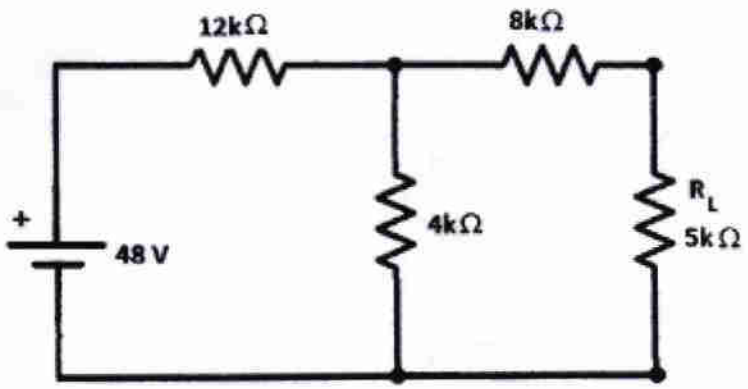
6. (a) Give the truth table, output Boolean function and a gate level circuit diagram of 4×1 multiplexer.

   (b) Implement an 8×1 multiplexer using 4×1 multiplexers and 2×1 multiplexers. Show the block diagram and truth table. Briefly justify how the combination operates as an 8×1 multiplexer.

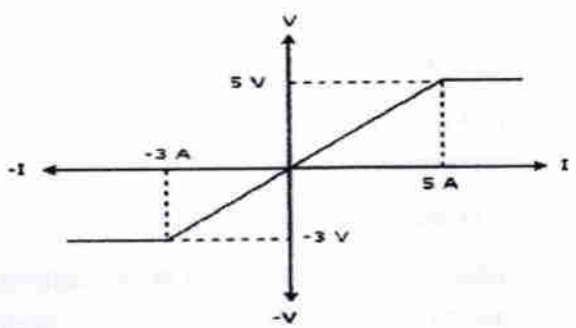
   (c) Design a 3-bit asynchronous binary up counter using T flip-flops. Explain in brief how the counter works. (4+2+4)+(4+4+6)+(10+6)=40

7. (a) State Kirchhoff's current law and Kirchhoff's voltage law.

   (b) Find the Thevenin Voltage (V_{TH}), Thevenin Resistance (R_{TH}) in the following figure.



   (c) The V-I characteristics of a network element is shown below:

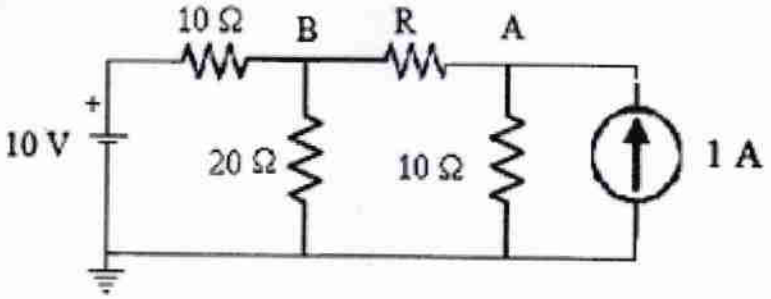


   Find the following information for the network element.—Give proper justification:

   (i) type (linear or non-linear) and

   (ii) active or passive.

(d) Find the voltages U_A and U_B at points A and B, respectively, in the figure below (R = 10 Ω) (2+2)+(6+6)+(2×2)+20=40



8. Write short notes on *any four*: 10×4=40

(a) Finite state machines

(b) Asynchronous communication

(c) TCP/IP protocol

(d) AVL rotations

(e) Linked list data structure

(f) Modems

2019

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.

The figures in the margin indicate full marks for each question.

Answer any five *questions.*

1. (a) State the major activities of an operating system in regard to process management. 5

(b) What is the main advantage of the layered approach to system design? 5

(c) Describe the differences among short-term, medium-term and long-term scheduling. 5

(d) Suppose that the following processes arrive for execution at the times indicated. Each process will run the listed amount of time. In answering the questions, use non-preemptive scheduling and base all decisions on the information you have at the time the decision must be made.

Process	Arrival Time	Burst Time
P_1	0·0	8
P_2	0·4	4
P_3	1·0	1

(i) What is the average turnaround time for these processes with the FCFS scheduling algorithm?

(ii) What is the average turnaround time for these processes with the SJF scheduling algorithm? 6+6=12

(e) Explain the concept of demand paging. 5

(f) When do page faults occur? Describe the actions taken by the operating system when a page fault occurs. 3+5=8

2. (a) Differentiate between class and structure. With an example, explain the syntax for defining a class. 2+3=5

(b) Explain the visibility of base class members for the access specifiers: private, protected and public while creating the derived class and also explain the syntax for creating derived class. 8

(c) List the characteristics of a constructor. Write a C++ program to define a suitable parameterized constructor with default values for the class distance with data members feet and inches. 3+7=10

(d) Define exception handling. Explain the use of try, catch and throw for exception handling in C++. 4+6=10

(e) Differentiate between early binding and late binding. Explain how late binding can be achieved in C++. 3+4=7

3. (a) Explain the different factors affecting the processing speed of CPU. 5

(b) A digital computer has a memory unit with 24 bits per word. The instruction set consists of 150 different operations. All instructions have an operation code part (opcode) and an address part (allowing for only one address). Each instruction is stored in one word of memory.

(i) How many bits are needed for the opcode?

(ii) How many bits are left for the address part of the instruction?

(iii) What is the maximum allowable size for memory?

(iv) What is the largest unsigned binary number that can be accommodated in one word of memory? 8

(c) What is the average access time of a system having three levels of memory hierarchy: a cache memory, a semiconductor main memory and magnetic disk secondary memory. The access times of these memories are 20 ns, 200 ns and 2 ms respectively. The cache hit ratio is 80 per cent and the main memory hit ratio is 99 per cent. 5

(d) Suppose that a bus has 16 data lines and requires 4 cycles of 250 nsecs each to transfer data. The bandwidth of this bus would be 2 Megabytes/sec. If the cycle time of the bus was reduced to 125 nsecs and the number of cycles required for transfer stayed the same, what would be the bandwidth of the bus? 5

(e) Explain the advantages of pipelined processing. State the various hazards that can happen in a pipeline with suitable examples. 3+9=12

(f) Discuss on the key features of Shared-Memory Multiprocessor Architecture. 5

4. (a) Differentiate between bit-rate and baud rate. List three main functions of data link layer. 2+3=5

(b) Show the NRZ and NRZI encoding for bit pattern given below: 5

1001 1111 0001 0001

(c) Why does error occur in a computer network? Explain the general principle of error detection. Briefly describe the method of Cyclic-Redundancy Check (CRC) for error checking. 2+3+6=11

(d) Explain how a message exchange takes place between two machines A and B using TCP connection. 6

(e) Explain the key principles of

(i) Circuit Switching

(ii) Packet Switching 4+4=8

(f) A host in a organization has an IP address 150.32.64.34 and subnet mask 255.255.240.0, what is the address of this subnet? What is the range of IP addresses that a host can have on this subnet? 2+3=5

5. (a) Discuss the following terms: 10

(i) Candidate key

(ii) Primary key

(iii) Super key

(iv) Composite key

(b) What is the difference between Strong and Weak entity? What do you mean by terms Aggregation and Generalization? Explain them with the help of example. 4+6=10

(c) What do you mean by Normalization? Explain BCNF, 3NF and 2NF with a suitable example. 10

(d) Write SQL queries for the given database:

Employee (eid, emp-name, street, city)

Works(eid, cid, salary)

Company(cid, comp-name, city)

Manager(eid, manager-name)

(i) Find the names of all the employees having 'S' as first letter in their names.

(ii) Display the annual salary of all the employees.

(iii) Find the name, street and city of all employees who work for "Accenture" and earn more than 30,000.

(iv) Give total number of employees. 10

6. (a) Explain the necessity of a Program Counter, Stack Pointer and Status Flags in the architecture of 8085 microprocessor. 10

(b) Explain the direct addressing modes and indirect addressing modes of 8085 with example. 4

(c) Write a program to perform the following functions and verify the output steps: 8

(i) Load the number 5CH in register D.

(ii) Load the number 9E H in register C.

(iii) Increment the Contents of register C by one.

(iv) Add the contents of register C and D and Display the sum at output port 1.

(d) Write an assembly language program to find out the largest number from a given array of 8 bit numbers. The numbers are stored sequentially from a known address. 6

(e) Explain the difference between a JMP instruction and CALL instruction. What is meant by interrupt? Explain the signals HOLD, READY and SID in connection with 8085 microprocessor. 3+3+(2+2+2)=12

7. (a) With reference to Assembler, explain following tables with suitable example: 10

(i) POT

(ii) MOT

(iii) ST

(iv) LT

(b) What is Parsing? Explain any one parsing technique. 5

(c) Explain the role of code optimization in compiler designing? Explain Peep-hole optimization along with an example. 5+5=10

(d) State the different functions of loader. 5

(e) Explain Design of Dynamic Linking Loader along with example. 10

8. (a) Explain in detail the Cohen-Sutherland line clipping algorithm with an example. 10

(b) Explain two dimensional translation and scaling with a 2D object. 6

(c) Briefly explain RGB and YIQ color models in detail. 8

(d) Explain the terms 3+3=6

(i) Motion tweening

(ii) Morphing

(e) Discuss on the key operations performed in JPEG compression. 10

2019

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.

The figures in the margin indicate full marks for each question.

Group-A

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

(a) Literature and violence.

(b) Literature and ecological awareness.

(c) Globalization and culture.

(d) "For poetry makes nothing happen, it survives... a way of happening, a mouth."

(e) Literature and popular culture.

Group-B

2. Answer *any two* of the following questions: 40×2=80

(a) Consider how the theme of appearance and reality shapes the tragedy of *Macbeth*.

(b) In what way does the sexual politics of English history shape the tragedy of Marlowe's *Edward II*?

(c) Andrew Marvell's "The Garden" attempts to achieve a balance between a sensuous and an intellectual view of nature. Do you agree? Give reasons for your answer.

(d) Discuss "Lycidas" as a pastoral elegy.

(e) Would you agree with the view that memory and desire constitute the major themes of Wordsworth's poetry. Answer with reference to the poems in your syllabus.

(f) Analyze the structure of "Ode to the West Wind" as a prayer to a superior power.

(g) Show how Elizabeth Barrett Browning's use of the sonnet form contributes to the expression of her desire and devotion to her beloved in "How Do I Love Thee!"

Please Turn Over

Group-C

3. Answer *any two* of the following questions: 40×2=80

(a) Jane Austen's artistic mastery overcomes the limitations of subject matter and the poverty of spiritual profundity in her fiction. Do you agree? Give reasons for your answer with reference to *Pride and Prejudice*.

(b) Comment on the validity of the ending of Dicken's *Great Expectations*.

(c) Discuss the significance of the two houses, the Heights and the Grange, in Emily Bronte's *Wuthering Heights*.

(d) Examine how the theme of death and rebirth structures the narrative of *The Adventures of Huckleberry Finn*.

(e) Consider Mary Shelley's *Frankenstein* as a Gothic novel.

2019

ENGLISH– Paper-II

Time Allowed- 3 Hours *Full Marks – 200*

If the questions attempted are in excess o 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.

1. **Critically evaluate the following poem :** 50

I found a dimpled spider, fat and white,
On a white heal-all, holding up a moth
Like a white piece of rigid satin cloth —
Assorted characters of death and blight
Mixed ready to begin the morning right,
Like the ingredients of a witches' broth —
A snow-drop spider, a flower like a froth,
And dead wings carried like a paper Kite.

What had that flower to do with being white,
The wayside blue and innocent heal-all ?
What brought the Kindred spider to that height,
Then steered the white moth thither in the night ?
What but design of darkness to appall ? —
If design govern in a thing so small.

2. **Answer <u>any One</u> of the following :-** 50

(a) Why does Yeats champion art as superior to nature in "Sailing to Byzantium"? Discuss with close textual reference

(b) In what ways are the images used by T.S.Eliot in "The Love Song of J.Alfred Prufrock" modern ? Explain with close reference to the text.

(c) Comment critically on Kamala Das's stand on identity and language as represented in the poem "An Introduction".

(d) Explain how W.H.Auden demonstrates a Confrontation between love and war in "The Shield of Achilles".

3. **Answer <u>any One</u> of the following :-** 50

(a) How does Derozio envisage a better future for India in "To India My Native Land" ? Discuss.

(b) Explain the significance of Helena's role in the plot structure of <u>Look Back in Anger</u>.

(c) How will do you think the dialogues in the play <u>Waiting For Godot</u> synchronize with its action ? Discuss.

(d) Comment on the title of Sylvia Plath's poem "Mirror". How effectively does it project the theme of the poem.

4. **Answer <u>any One</u> of the following :-** 50

(a) Discuss the relationship between memory and story telling as demonstrated by Amitav Ghosh in <u>The Shadow Lines</u>.

(b) Comment on Chinua Achebe's representation of the conflict between tradition and change in a colonial Igbo Society.

(c) Analyse Joyce's use of symbols in <u>A Portrait of the Artist as a Young Man</u>.

(d) How does Virginia Woolf complicate the notion of 'truth' in <u>A Room of One's Own</u> ? Discuss.

2019

MSC(O)EC -I/19

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 same language.*

Answer any five questions taking at least two from each group:

Group A

1. a) What is the relationship between GNP and Personal Disposable Income?
   b) How does a proportional income tax act as an automatic stabilizer in a Simple Keynesian Model?

   20 + 20

2. a) What is the difference between a normal good and an inferior good? Is an inferior good always a Giffen good? Explain your answer with diagrams.
   b) In a two commodity framework, draw the indifference curves and find the equilibrium consumption bundle when
   i) the commodities are perfect substitutes
   ii) the commodities are perfect complements

   20 + 20

3. Define
   a) production function
   b) isoquants
   c) ridge lines
   d) returns to scale

   4 x 10

4. a) What determines the slope of the IS curve?
   b) What does a point below the IS curve signify?

   20 + 20

5. a) What are reaction functions in duopoly models?
   b) Derive the equilibrium price in a Bertrand model of duopoly for a homogenous good.

   20 + 20

Group B

6. a) Differentiate between public goods and private goods.
   b) What is the relation between Average Tax Rate and Marginal Tax Rate for
   (i) Proportional Income Tax
   (ii) Progressive Income Tax

   20 + (10+10)

P.T.O.

7. a) What are the two components of gains from trade? Explain with the help of a diagram.

   b) Does an export subsidy improve the welfare of the country giving subsidy to its exportable sector? Explain your answer.

   20 + 20

8. Explain the concepts of
   a) physical definition of factor abundance
   b) price definition of factor abundance
   c) factor intensity reversal
   d) optimum tariff

   4 X 10

9. a) The mean of 20 observations was recorded as 30. Later it was found that one observation was wrongly recorded as 35 and the correct observation would be 15. What is the mean after making the necessary corrections?

   b) An urn contains 8 white and 3 red balls. If two balls are drawn at random, find the probability that
   (i) both are white
   (ii) both are red

   20 + (10+10)

10. a) Find k such that the function f defined by

$$f(x) = kx^2 \quad 0<x<1$$
$$= 0 \quad \text{elsewhere}$$

    is a probability density function.

    b) Find the expectation and standard error of sample proportion under SRSWR when the population proportion is given as ***p***.

    20 +20

2019

MSC(O)EC-II/19

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 same language.*

GROUP-A

Answer any THREE Questions.

1. What do you understand by the term "Economic Drain" ? To what extent were the Britishers justified in drawing India her wealth and resources ? Why were not the Indians able to stop this loot ?

10+20+10

2. In what sense Lewis regards surplus labour as unlimited in supply ? What are the difficulties in using this labour for development ?

30+10

3. Explain the statement that Green-Revolution enabled the Government to procure sufficient foodgrains to build its stocks that could be used during times of shortage.

40

4. Make out a case for economic planning for an underdeveloped country. Discuss the importance of economic planning in a developing country.

20+20

5. Give a brief account of the present position and progress made by railways in India. What main shortcomings are to be found in the country's rail system ?

30+10

GROUP-B

Answer any TWO Questions.

6. "Financial inclusion is one of the most essential components of inclusive growth" — Comment.

40

7. In what particular ways has 'foreign-aid' helped the Indian economy ? Also refer to the main problem and difficulties that have arisen because of its use.

20+20

8. Discuss the recent performance of West-Bengal economy indicating the major initiatives taken by the West-Bengal Government to make it an industrial destination.

40

2019

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.

The figures in the margin indicate marks for each question.

All symbols have their usual significance.

Group-A

Answer **any three** *questions.*

1. (a) Use superposition theorem to find the value of voltage 'v' in the network of Fig.- 1. 10

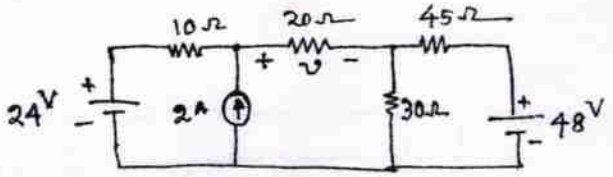


Fig.-1

(b) Use Millman's theorem to find the current through R_4=5Ω in the network shown in Fig.- 2. 10

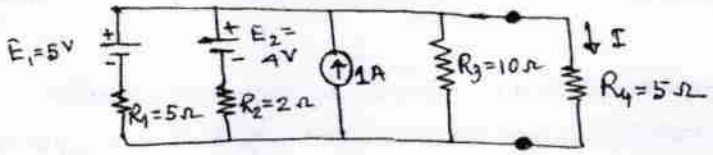


Fig.-2

(c) Find the Y parameters for the network shown in Fig.-3. 10

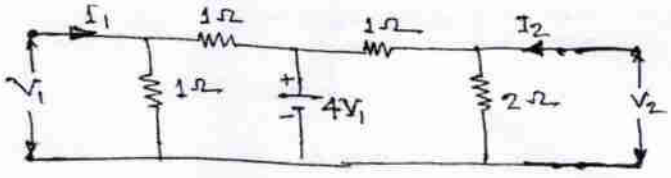


Fig.-3

(d) The resistivity of a ferric-chromium-aluminium alloy is $51\times10^{-8}\Omega$.m. A sheet of the material is 15cm long, 6 cm wide and 0·014cm thick. Determine the resistance between (i) opposite ends and (ii) opposite sides. 5+5=10

2. (a) A balanced star-connected load of $(8+j6)\Omega$ per phase is connected to a balanced 3-phase 400 volt supply. Find the line current, power factor, power and total volt-amperes. 10

   (b) A discharged battery is charged at 8A for 2 hours after which it is discharged through a resistor R. If discharge period is 6 hours and the terminal voltage remains fixed at 12 volt, find the value of R assuming the Ah efficiency of the battery as 80%. 10

   (c) Two coils A and B have a coupling coefficient of 1/3. When connected cumulatively in series, the total inductance is 8·5 mH and when connected differentially, the total inductance is 4.5 mH. Find (i) the self-inductance of each coil and (ii) the mutual inductance between the coils. 10

   (d) A resistance R, an inductance L=0.01H and a capacitance C are connected in series. When a voltage $v = 400 \cos(3000t - 10°)$ volts is applied to the series combination, the current flowing is $10\sqrt{2} \cos(3000t - 55°)$ amp. Find R and C. 10

3. (a) Find the laplace transform of a train of pulses of width a, amplitube A and periodic time T as shown in Fig.-4. 10

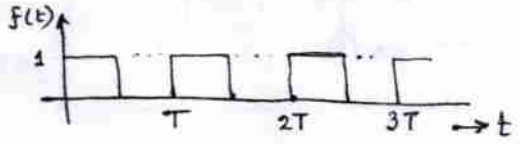


Fig.-4

   (b) Test the stability of a system having characteristic equation, $F(S)=S^3+6S^2+12S+8=0$, use routh array. 10

   (c) The pole-zero configuration of a transfer function is given below (Fig.- 5) of which the value of the transfer function at S=1 is found to be 5. Determine the transfer function and gain value K. 10

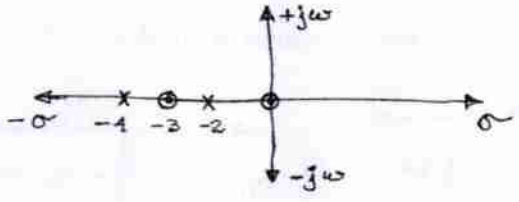


Fig.-5

   (d) Find the Z-transform of $f(t) = e^{at}$. 10

4. (a) Show that $\nabla \times \overline{H} = \overline{J}$. 10

   (b) Explain $\nabla \cdot \overline{B} = 0$ and $\nabla \cdot \overline{J} = 0$. 10

(c) A (+ve) charge is situated at (0, 2) of magnitude $4 \times 10^{-6}C$. Another charge of $-2 \times 10^{-6}C$ is located at $(0, -2)$. Find $\overline{E}$ and V at the point $(0, -1)$ as shown in Fig.-6. 10

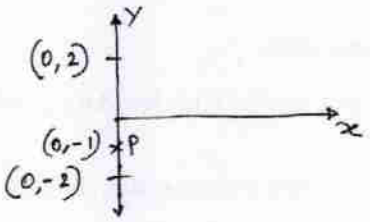


Fig.-6

(d) Establish $\nabla \times \overline{E} = \frac{-\partial \overline{B}}{\partial t}$. 10

5. (a) Show that, $\nabla \times \overline{H} = \overline{J} + \frac{\partial \overline{D}}{\partial t}$. 10

(b) Stating Maxwell's Equations, derive electromagnetic wave equations in a lossy medium. 10

(c) What do you understand by E.M. wave polarisation? 10

(d) Establish 'Poynting Theorem'. 10

Group-B

Answer **any two** *questions.*

6. (a) A half-wave rectifier is used to supply 50V dc to a resistive load of 800Ω. The diode has a resistance of 25Ω. Calculate ac voltage required. 10

(b) Draw the equivalent circuit of UJT and discuss its working from the circuits. 10

(c) The following parameters are available of a FET.

$$I_{DSS} = 18\text{mA};\ V_{GS(off)} = -9\text{V};\ V_{GS} = -5{\cdot}5\text{V}.$$

Find the value of drain current. 10

(d) Draw the static characteristics of JFET. 10

7. (a) Describe the working principle of MOSFET. 10

(b) A change of 250 mV in the base-emitter voltage causes a change of 100 μA in the base current. Find the input resistance of the transistor. 10

(c) For a single stage amplifier the data is as under:

Collector load, $R_L = 8$ KΩ

Input resistance, $R_L = 800\Omega$

Current gain, $\beta = 50$

Determine the voltage gain of the amplifier. 10

(d) Find the decimal equivalent of the binary number $(1111.101)_2$. 10

Please Turn Over

8. (a) Find the DFT of the sequence $x(n) = \{1, 1, 0, 0\}$ 10

   (b) The measured value of a capacitor is 205.3 μF, whereas its true value is 201.4 μF. Determine the relative error. 10

   (c) Describe the principle of thermocouple. 10

   (d) What is the use and importance of feedback in closed loop control systems? Describe. 10

9. (a) The block diagram of a unity feedback control system is shown in Fig.-7.

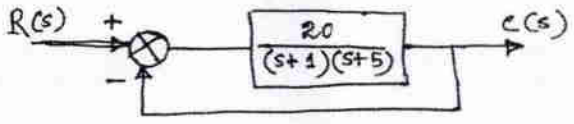


Fig.-7

Determine the characteristic equation of the system, w_n, r, w_d, t_p, M_p, the time at which the first overshoot occurs, the time period of oscillations and the number of cycles completed before reaching the steady state. 15

   (b) Discuss the mapping from S-plane to Z-plane and explain the consequence of stability. 10

   (c) What is a microprocessor? What is the difference between a microprocessor and a CPU? 15

2019

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.

The figures in the margin indicate marks for each question.

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

All symbols have their usual significances.

Answer *any five* questions.

1. (a) A 50 MVA, 11 kV, three phase synchronous generator was subjected to different types of faults. The fault currents are as follows:

LG fault — 4200 A

LL fault — 2600 A

LLL fault — 2000 A

The generator neutral is solidly grounded. Find the per unit values of three sequence reactances of the generator. 10

(b) A 6600 V, three phase alternator has a maximum rating of 2500 kVA and its reactance is 12·5%. It is equipped with Merz Price circulating current protection, which is set to operate at fault current not less than 200 amperes. Find what value of neutral earthing resistance leaves 10% of the winding unprotected. 15

(c) A 50 Hz transmission line is 280 km long. It has a total series impedance of $(35 + j140)$ ohms and a shunt admittance of 930×10^{-6} mho. It delivers 40000 kW at 220 kV with 0·9 power factor lagging. Find the sending end voltage, voltage regulation, transmission efficiency and A, B, C, D constants by the nominal T-method approximation. 15

2. (a) A single core lead sheath cable has a conductor of 10 mm diameter and two layers of different insulating materials, each 10 mm thick. Relative permittivities are 3 (inner) and 2·5 (outer). Calculate the potential gradient at the surface of the conductor when the potential difference between the conductor and the lead sheath is 60 kV. 10

(b) Define Transient Recovery Voltage. Draw the Transient Recovery Voltage Curve and also derive an expression for Rate of Rise of Recovery Voltage (RRRV). 10

(c) A 50 Hz, 3-phase synchronous generator has an inductance per phase of 1·65 mH and its neutral is grounded. It feeds a line through the circuit breaker. Total stray capacitance to ground of the generator and circuit breaker is 0·0022 μF. A fault occurs just beyond the circuit breaker, which opens when the symmetrical short circuit current is 7000A (rms). Determine the following:

(i) Natural frequency of oscillations

(ii) Peak value of Transient Recovery Voltage (TRV)

(iii) Time at which the peak value of TRV occurs

(iv) Maximum rate of rise of TRV 12

(d) Write advantages and disadvantages of SF_6 circuit breaker. 8

3. (a) A single phase transformer with secondary voltage of 230 V, 50 Hz delivers power to load R = 10 ohm through a half wave controlled rectifier circuit. For a firing angle delay of 60°, determine the rectification efficiency, form factor, voltage ripple factor, transformer utilization factor and PIV of thyristor. 15

(b) The speed of a separately excited DC motor is controlled below base speed by type-A chopper. The supply voltage is 220V DC. The armature circuit has $R_a = 0{\cdot}5$ ohm and $L_a = 10$ mH. The motor constant is 0·1 V/rpm. The motor drives a constant torque load requiring an average current of 30A. On the assumption of continuous armature current, calculate:

(i) The range of speed control and

(ii) The range of duty cycle 15

(c) A single-phase 230V, 1 kW heater is connected across single-phase 230V, 50 Hz supply through a diode. Calculate the power delivered to the heater element. Find also the peak diode current and input power factor. 10

4. (a) Draw the equivalent circuit of an arc furnace and performance characteristics of a typical arc furnace. Derive the condition for the maximum output. 4+4+10=18

(b) A low frequency induction furnace, whose secondary voltage is maintained cosntant at 10 Volts, takes 400 kW at 0·6 power factor when the hearth is full. Assuming the resistance of the secondary circuit to vary inversely as the height of the charge and reactance to remain constant, find the height up to which hearth should be filled to obtain maximum heat. 12

(c) A slab of insulating material, 150 cm^2 in area and 1 cm thick is to be heated by dielectric heating. The power required is 400W at 30 MHz. Material has relative permittivity of 5 and of 0·05. Absolute permittivity = $8{\cdot}854 \times 10^{-12}$ F/m. Determine the necessary voltage. 10

5. (a) Explain Maximum Power Point Tracker (MPPT). 5

(b) Explain what are the methods used to overcome the fluctuating power generation of windmill. 10

(c) A 200W filament lamp is suspended at a height of 5 metres above working plane and gives uniform illumination over an area of 4 metre diameter. Determine the illumination on the working plane. Given efficiency of the reflector is 50% and efficiency of the lamp is 0·89 W/CP. 10

(d) Explain what is meant by stroboscopic effect. What causes stroboscopic effect in fluorescent lamp? Describe one method for avoiding stroboscopic effect. 7+4+4=15

6. (a) Define what is meant by Amplitude Modulation (AM). Derive the relevant expressions for AM wave. 20

(b) Explain what is meant by frequency shift keying. 5

(c) Draw and explain PAM generation system. 15

7. (a) A 220V DC shunt motor has armature and field resistance of 0·2 ohm and 220 ohm respectively. The motor is driving a constant load torque and running at 1000 rpm, drowing 10A current from the supply. Calculate the new speed and armature current if an external armature resistance of 5 ohm is inserted in the armature circuit. Neglect armature reaction and saturation. 20

(b) The O.C. and S.C. test data are given below for a single phase, 5 kVA, 200/400V, 50 Hz transformer:

O.C. test (on L.V. side) : 200V, 1·25A, 150W

S.C. test (on H.V. side) : 20V, 12·5A, 175W

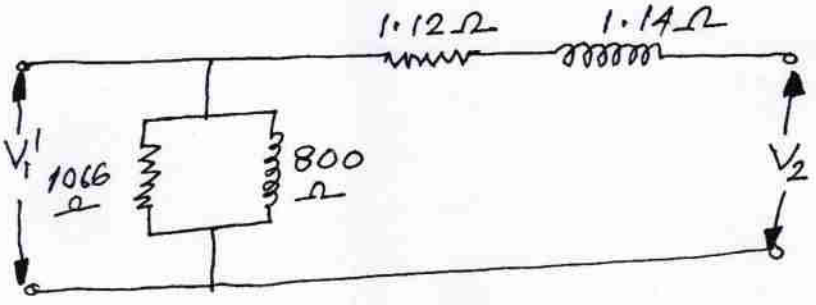


Fig: Equivalent circuit referred to HV side.

Calculate the following: 20

(i) The efficiency of the transformer at 75% loading with load power factor = 0·7

(ii) At what load or kVA the transformer is to be operated for maximum efficiency? Calculate the maximum efficiency.

(iii) Regulation of the transformer at full load 0·8 power factor lagging

(iv) What should be the applied voltage to the LV side when the transformer delivers rated current at 0·7 power factor lagging, at a terminal voltage of 400V?

8. (a) A three phase induction motor has a starting torque of 100% and a maximum torque of 200% of the full load torque. Find: 20

(i) Slip at maximum torque

(ii) Full-load slip

(iii) Rotor current at starting in pU of full load current

Neglect stator impedance.

(b) Can V-curve be plotted for alternator operation? How does it differ from V-curve of a synchronous motor? 10

(c) The rotating field of the stator and rotor are stationary with respect to each other — Justify. 10

2019

FRENCH

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.

The figures in the margin indicate marks for each question.

1. Faites des phrases avec les expressions suivantes (dix de votre choix) : 20

Grace à, Avoir besoin de, Faire une sieste, A la folie, Bien que, En raison de, Coup de foudre, Etre à l'ouest, Faire la grasse matinée, Avoir le cafard, Revenons à nos moutons.

2. Changez de la voix active à la voix passive : 20

(a) Jacques a fait un gâteau.

(b) Les maçons ont détruit la maison.

(c) La France ne gagnera pas la coupe du monde.

(d) Tous ses étudiants aiment ce professeur.

(e) Les marins surveillaient la météo.

(f) Dans une semaine, toute la famille aura lu ce livre.

(g) Chaque Dimance, ja fais mes courses dans un supermarché.

(h) Nous jetons les déchets à la poubelle.

(i) Ma collège prononce une conférence ce soir.

(j) Je veux que Srutakirti fasse la tarte pour l'anniversaire de son fils.

3. Remplissez avec les prépositions appropriées : 10

(a) Chaque jour, Madhuchhanda va _____ bureau _____ voiture.

(b) Il a acheté un pull _____ cotton.

(c) Tous sont venus pour la boum _____ Arindam _____Julien.

(d) _____ Suisse, beaucoup de visiteurs fréquentent _____ printemps.

(e) Kasturi est la plus grande _____ les filles.

(f) _____ l'ordinateur, nous pouvons faire des choses très rapidement.

(g) _____ les vacances, chaque année, nous allons chez mon grand-père.

4. Remplissez avec les formes appropriée des verbes dans le passé composé, imparfait ou plus-que-parfait : 10

(a) C' _____ (être) une belle matinée. Comme d'habitude, il _____ (se réveiller) à 7 heures du matin.

(b) Je _____ (tomber) hier. J'ai ressenti une douleur intense pour cela. C'est la raison pour laquelle je _____ (ne pas dormir) la nuit précédente.

(c) Elle _____ (lire) un livre quand soudain la téléphone _____ (sonner).

(d) Sudipta _____ (avoir) 15 ans quand elle _____ (partir) pour France pour faire ses études supérieurs.

(e) Il _____ (se souvenir) qu'il _____ (oublier) l'anniversaire de son père.

5. Remplissez avec la forme appropriée du verbe : 20

(a) Je veux que tu _____ (aller) avec ton père au marché pour faire les courses.

(b) Tu as peur qu'elle _____ (être) en retard?

(c) Il est certain que Jacque _____ (savoir) la solution pour ce problème.

(d) Il est nécessaire qu'ils _____ (savoir) la vérité.

(e) Il est probable que Martin _____ (venir) lundi prochain.

(f) Je ne crois pas qu'elle _____ (être) chez Martinique.

(g) J'exige que tu _____ (venir) avec moi.

(h) Il est très occupé avec son travail au Japon, il _____ (arriver) toujours pendant la Durga Puja quand même.

(i) Il est prodigue, en revanche, son frère _____ (être) avare.

(j) On apprend le français pour qu'on _____ (pouvoir) lire la littérature française.

6. Transformez les phrases suivantes de discours directs à discours indirect: 10

(a) Sudeshna a dit: <<J'ai fait un long chemin à arriver chez vous.>>

(b) Le médecin m'a conseillé: <<Garde ton sourire pour avoir une bonne santé.>>

(c) <<Comment vous vous-appelez>> me demande le professeur.

(d) Le <<Vas-y>>, lui ai-je dit.

(e) <<Suivez son exemple>> disait notre professeur.

7. Remplacez par l'adverbe qui convient: 10

(a) La danseuse évolue sur scène _____ (avec grâce).

(b) Il parle très _____ (doux).

(c) Une étude américaine a _____ (récent) révélé l'existence d'un nouveau type de cafard.

(d) Les bras de mères sont faits de tendresse; les enfants y dorment _____ (Profond).

(e) Aristote a dit que l'homme est _____ (naturel) un animal politique.

8. Complétez les phrases suivantes par Qui, Que, Dont, Où, Lequel, Laquelle, Auquel: 20

(a) Nous voudrions un appartement _____ le loyer ne soit pas trop élevé.

(b) C'est la jeune femme avec _____ il est allé au cinema.

(c) Le film _____ je parle n'est pas très violent.

(d) Les touristes _____ fréquentent au Bangladesh sont toujours gentils.

(e) Est-ce que vous savez _____ Ranjan habite avec Nandini?

(f) C'est le village _____ je passais mon enfance avec ma famille.

(g) Ce sont des questions _____ tout le monde se pose.

(h) La compagnie pour _____ il travaille distribue des films.

(i) C'est le film _____ je pense.

(j) Il voudrait savoir ce _____ nous avons décidé ensemble.

9. Traduisez en anglais (deux au choix) : 20×2=40

(a) J'ai ainsi vécu seul, sans personne avec qui parler véritablement, jusqu'à une panne dans le désert du Sahara, il y a six ans. Quelque chose s'était cassé dans mon moteur. Et comme je n'avais avec moi ni mécanicien, ni passagers, je me préparai à essayer de réussir, tout seul, une réparation difficile. C'était pour moi une question de vie ou de mort. J'avais à peine de l'eau à boire pour huit jours.

Le premier soir je me suis donc endormi sur le sable à mille milles de toute terre habitée. J'étais bien plus isolé qu'un naufragé sur un radeau au milieu de l'océan. Alors vous imaginez ma surprise, au lever du jour, quand une drôle de petite voix m'a réveillé. Elle disait:

— S'il vous plaît ... dessine-moi un mouton!

— Hein!

— Dessine-moi un mouton...

(b) Quand j'avais six ou sept ans, j'ai été volée. Je ne m'en souviens pas vraiment, car j'étais trop jeune, et tout ce que j'ai vécu ensuite a effacé ce souvenir. C'est plutôt comme un rêve, un cauchemar lointain, terrible, qui revient certaines nuits, qui me trouble même dans le jour. Il y a cette rue blanche de soleil, poussiéreuse et vide, le ciel bleu, le cri déchirant d'un oiseau noit, et tout à coup des mains d'homme qui me jettent au fond d'un grand sac, et j'étouffe. C'est Lalla Asma qui m'a achetée.

C'est pourquoi je ne connais pas mon vrai nom, celui que ma mère m'a donné à ma naissance, ni le nom de mon père, ni le lieu où je suis née. Tout ce que je sais, c'est ce que m'a dit Lalla Asma, que je suis arrivée chez elle une nuit, et pour cela elle m'a appelée Laila, la Nuit. Je viens du Sud, de très loin, peut-être d'un pays qui n'existe plus, Pour moi, il n'y a rien eu avant, juste cette rue poussiéreuse, l'oiseau noir, et le sac.

(c) La plus grande contribution d'Escoffier à la cuisine française est peut-être la publication du « Guide culinaire » en 1903. Ce livre établit les bases de la cuisine française. Escoffier, qui a lui-même inventé de nombreux nouveaux plats, test que ''Pêche Melba'' et

''Crêpes Suzette'' a mis à jour ''Le Guide Culinaire'' quatre fois de son vivant. Escoffier a également simplifié les menus modernes et la structure du repas. Il a divisé le repas en différents segments et chaque segment serait servi dans des assiettes différentes. Ce concept a pourtant été popularisé par Félix Urbain Dubois.

Permettez-moi maintenant d'expliquer et de préciser un peu le terme de « nouvelle cuisine ». La première caractéristique de la nouvelle cuisine était le rejet de la complication excessive dans la cuisine. Deuxièmement, le temps de cuisson de la plupart des poissons, fruits de mer, gibiers à plumes, veau, légumes verts et pâtés ont été réduits afin de préserver les arômes naturels. La cuisson à la vapeur est devenue une tendance importante. Troisièmement, en utilisant les ingrédients les plus frais possibles. Quatrièmement, les menus plus importants ont été abandonnes au profit de menus plus courts. Cinquièmement, les plats régionaux ont été inspirés au lieu des plats de « haute cuisine » du passé. Enfin, une attention accrue aux besoins alimentaires des invités est devenue importante.

10. Traduisez en français (deux au choix) : 20×2=40

(a) I know your teaching is to fight against evil by the help of good. But such a fight is for heroes and not for men led by impulses of the moment. Evil on one side naturally begets evil on the other, injustice leading to violence and insult to vengefulness. Unfortunately such a force has already been started, and either through panic or through wrath our authorities have shown us the claws whose sure effect is to drive some of us into the secret path of resentment and others into utter demoralization. In this crisis you, as a great leader of men, have stood among us to proclaim your faith in the ideal which you know to be that of India, the ideal which is both against the cowardliness of hidden revenge and the cowed submissiveness of the terror-stricken.

(b) Trees make for great friends. They are sturdy and dependable; can listen to you for hours while you pour your heart out; they do not complain if you pluck their fruits or flowers; are always ready to provide you shade or a place to rest under. Fortunately for me, there are plenty of such friends to be made in the mountains and plains of India. I can never run out of them or have enough of them.

(c) We have come to think of sugar very differently in the early twenty-first century, and the book that follows is an attempt to explain how that happened. At one level, we view it differently partly because we know so much more about it. But sugar has also taken a route no one could have predicted, even a generation ago. Very few people suggested, say in 1970, that sugar posed a global health problem. Yet, today, sugar is regularly denounced as a dangerous addiction—on a par with tobacco—and is the cause of a global epidemic of obesity.

2019

FRENCH

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.

The figures in the margin indicate marks for each question.

Group - A

Écrivez toutes les questions. Chaque question porte 10 points. 10×8=80

1. Quel sont les règles des trois unités au théâtre? Décrivez en bref avec des exemples.

2. Expliquez les objectifs principaux de Pléiade avec les noms de ses membres.

3. <<Les salons français jouent un rôle essentiel dans le développement de la littérature française.>> Exprimez voter point de vue sur ce sujet.

4. Écrivez le rôle de l'académie française dans l'histoire de la littérature française.

5. Quelles sont les caractéristiques du mouvement littéraire français Parnassien.

6. Écrivez une petite réduction sur le réalisme. Nommez deux auteurs français réalistes. Écrivez une petite note sur l'un d'entre eux.

7. Qui est considéré comme le père de la tragédie française? Est-qu'il a écrit des comédies aussi? Quelles sont ses oeuvres principales?

8. Que comprenez-vous par le terme d'existentialisme? Comment Jean Paul Sartre est associé à ce concept philosophique?

Group - B

Écrivez toutes les questions. Chaque question porte 20 points. 20×6=120

1. Est-ce que 'Le roman d'un enfant' est un roman autobiographique? Décrivez l'enfance du narrateur selon ce roman? Pourquoi il a arrêté à raconter son histoire après quatorze ans et demi?

2. Décrivez le personnage d'Harpagon dans <<L'avare>> de Molière.

3. L'amour contre l'honneur de la famille est l'un des thèmes centraux dans <<Le Cid>> de Corneille. Quel est votre point de vue sur ce sujet? Expliquez.

4. La chevalerie est un thème important et intégral du drame 'Le Cid'. Exprimez votre opinion. Décrivez aussi le personage de Don Rodrigue.

5. Est-ce que <<Souvenir>> d'Alfred de Musset est un poème élégiaque? Justifiez votre réponse.

6. Décrivez les sources qui ont aidé Molière, directement ou indirectement, à écrire L'avare. Décrivez aussi le personage de Cléante.

2019

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.

*Answer may be given either in **English** or in **Bengali.** But all the answers must be in one and same language.*

Illustrate your answers with suitable sketches and diagrams.

*Answer **any five** questions, taking at least **two** from each group.*

Group-A

1. Compare the characteristics of boreal and temperate forest ecosystem. State how cybernetics helps in the process of homeostasis. Mention how overgrazing causes degradation of land resource. 20+10+10=40

2. Discuss the fundamental common properties of Polar Zenithal projections. Classify maps according to scale and purpose. What is vector data structure? 20+12+8=40

3. Mention the different conditions that are favourable for the growth of coral reefs. Account for the surface ocean currents of the Atlantic ocean with illustrations. 26+14=40

4. Discuss the theory of Isostasy as put forwarded by Sir George Airy. Illustrate the fundamental concept of 'The same physical processes and laws that are operate today operated through out geological time, although not necessarily always with the same intensity as now'. Mention the basis of Davision model of 'Geographical Cycle'. 22+12+6=40

5. Explain the conditions required for the formation of tropical cyclones. State how airmass modifications take place by thermodynamic processes. What is Hadley cell? 20+12+8=40

Group-B

6. Critically illustrate Rimland theory as put forwarded by Spykman. Distinguish between absolute and relative space. 28+12=40

7. Describe the characteristics of extensive commercial farming in temperate lands. Mention the major problems of hydel power generation in India. Distinguish between tangible and non tangible resources. 22+10+8=40

8. Illustrate 'multiple nuclei' model of urban growth. Discuss the characteristics of CBD. What is primate city? 22+12+6=40

9. Explain the factors that influence migration of population. Discuss the importance of sex-ratio for population analysis and development of a country. 24+16=40

10. Briefly discuss the Growth Pole theory of Perroux. Classify planning regions on the basis of regional hierarchy. 28+12=40

2019

GEOGRAPHY

(REGIONAL 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

(Geography of India)

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

1. Discuss the significance of location of India on her physical environment. In spite of moderately high rainfall why is the country facing water crises in her various parts? How can the 'demographic dividends' of India achievable in the near future? 20+10+10=40

2. Attempt a regional classification of natural vegetation of India and discuss the major characteristic features associated with them. Bring out the reasons for degeneration of the rivers of India. What are the major aforestation programmes taken up in the country? 15+10+5=30

3. Give an account of the geographical distribution of the principle non-conventional energy sources of India. How are the major biotic resources of the country being utilized at present? 20+10=30

4. Assess the problems associated with tea cultivation in India. Evaluate the trends of automobile industry in the country. What is the current state of air transportation within India? 15+10+5=30

5. Discuss the pattern of urbanization and associated environmental issues in the post-liberalization period in India. Highlight the nature of labour mobility within the country in the present century. 20+10=30

Group-B

(Geography of West Bengal)

Answer ***Question No. 6*** *and* ***any two*** of the following.

6. What is the geographical distinctiveness of West Bengal? Why are six seasons normally experienced in most parts of it? Write the geographical distribution and salient features of the major agro-climatic regions of the state. 10+10+20=40

7. Review the utilization and conservation of water resources of West Bengal. Assess the problems pertaining to utilization of land resources of the state. 20+10=30

8. Discuss the trends of food crop cultivation in West Bengal in the present century. Examine its impact on the economy of the state. 20+10=30

9. Elaborate the nature of industrial development in West Bengal since 1990. Elucidate the factors behind such development. 20+10=30

10. Discuss the trends of occupational structure of population of West Bengal in the post-independence period. What are its geographical implications within the state? 20+10=30

2019

MSC(O)GL-I/19

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 same language.*

ANSWER ANY FIVE QUESTIONS.

1. a) Define a fault. Draw sketches to show the different parts of a fault. What are the different types of faults and state their distinguishing features.

b) Define a fold. Explain with the help of neat sketches the important types of folds, as distinguished on the basis of interlimb angle. Add note on the causes of folding.

3+5+12

2. a) What do you understand by Landslides ? Give a classification of different types of landslides. State any two remedial measures for prevention of landslides.

b) What is a seismogram ? Illustrate the procedure of determination of the epicenter of an earthquake from seismogram data ?

3+9+8

5+10+5

3. a) Write in detail about the interior of the earth and its composition mentioning the major discontinuity surfaces.

b) What is an Unconformity ? How is it recognized ? Describe briefly the different types of Unconformities and their significance.

5+15

20

4+4+12

4. a) Explain Darcy's Law. What is '**Hydraulic Conductivity**' of an aquifer ? Show how it is related to '**Transmissivity**' of an aquifer. Also show how hydraulic conductivity is related to groundwater velocity.

b) What is Rain Water Harvesting ? Why it is so important now-a-days ? Describe briefly on Roof Top Rain Water Harvesting giving emphasis on its various components and methods.

4+4+6+6

4+6+10

5. a) What do you understand by the term 'Atmospheric window' ? Discuss briefly on the different types of orbiting satellites and their significances.

b) What are the different types of plate boundaries ? Discuss briefly each of them giving emphasis on their tectonic significance. Illustrate your answer with suitable sketches.

5+15

6+14

P.T.O.

6. a) Define porosity and permeability of a rock. Distinguish between **'Specific Yield'** and **'Specific Retention'**. How are they related to porosity of an aquifer ?

8+8+4

b) What is a cone of depression and how is it formed ? Explain the result of excessive withdrawal of groundwater by pumping in rural as well as in cities.

3+5+12

7. a) Discuss the stratigraphic classification of Gondwana supergroup or rocks mentioning lithology, brief content of fossils and broad outline of Palaeoenvironment.

8+12

b) Describe briefly on the application of radioactivity in determining the age of rocks. State why methods used in case of Archaean rocks one generally not used in case of Tertiary rocks ?

14+6

8. a) Define Dam. What are the different types of dam ? Describe the salient geological features that are to be given importance in selecting sites for construction of a dam.

3+5+12

b) What is meant by GPS ? Describe its operational principles.

5+15

2019

MSC(O)GL-II/19

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 same language.*

GROUP-A

Answer any THREE of the following Questions.

1. a) Describe procedure for determination of Hermann-Mauguin Symmetry notation. What would be Hermann-Mauguin Symmetry notation for following crystal classes

   i) A crystal class with one hexad axis and six mirror planes.

   ii) A crystal class with one inversion tetrad axis, two mirror (Vertical) planes at right angle and two diad axes at 45° with mirror plane.

   iii) A crystal class with three tetrad axes, four triad axes, six diad axes and nine mirror planes.

   14+2+2+2

   b) What do you mean by isotropic and anisotropic minerals, uniaxial and biaxial minerals ? Write with suitable examples.

   Describe optical indicatrix of uniaxial and biaxial minerals.

   4+4+6+6

2. a) State and derive 'Phase rule' for a system containing 'P' number of phases, 'C' number of components present in all 'P' phases. The degree of freedom of the system is denoted by 'F'.

   Calculate degrees of freedom for a liquid at eutectic point, on liquidus curve, in all liquid field —— given that the system is a two component solid-liquid equilibrium system studied under constant Pressure.

   6+4+4+6

   b) Give IUGS classification of Ultramafic rock. Describe their petrography and add a note on Origin of Ultramafic rocks.

   6+8+6

3. a) Discuss roles of temperature, pressure and chemically active fluids in metamorphic Processes.

   8+6+6

   b) Describe mineralogical and textural changes in impure casbonate rock during contact metamorphism. Give at least four equations related to transformation and origin of minerals during these processes.

   16+4

4. a) State with suitable diagrams the classification of sandstone.

   20

   b) What is 'provenance' ? How does a terrigenous clastic sedimentary rock form.

   5+15

P.T.O.

5. a) Describe briefly different Ore forming processes with suitable examples. 20

b) Write a note on mode of occurrence, mineralogy and different views on the origin of Pb-Zn deposits of Rajasthan. 20

GROUP-B

Answer any TWO of the following Questions.

6. Write notes on any four of the following :

i) Different types of silicate structures found in minerals.
ii) Types of metamorphic reactions.
iii) Common structures of plutonic igneous rocks.
iv) Diagenesis and lithification.
v) Causes of landslides. 10x4

7. a) What are the raw materials used in Cement industry ? Describe briefly geology of Cement grade limestone deposits in India. 6+14

b) Discuss various aspects of water pollution and its effect on human being. 12+8

8. a) Describe briefly the process of formation, migration and entrapment of petroleum. 5+5+10

b) Describe the 'Bowen's Reaction Series'. How does the Bowen's Reaction series help to explain magmatic differentiation ? 6+14

2019

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 की अवधारणा स्पष्ट करते हुए यह प्रमाणित कीजिए कि परिवर्तनशीलता भाषा की प्रमुख प्रवृत्ति है। 30

अथवा,

भाषा के विभिन्न तत्त्वों पर प्रकाश डालते हुए यह सिद्ध कीजिए कि भाषा का कोई वर्गीय चरित्र नहीं होता है।

2. वर्तमान परिप्रेक्ष्य में हिंदी भाषा का वैश्विक प्रगति की आलोचनात्मक पड़ताल कीजिए। 20

अथवा,

देवनागरी लिपि की वैज्ञानिकता के महत्त्व को निरूपित कीजिए।

Group-B

3. हिंदी साहित्येतिहास लेखन परंपरा की समीक्षा करते हुए आचार्य रामचंद्र शुक्ल की इतिहास-दृष्टि स्पष्ट कीजिए। 30

अथवा,

हिंदी साहित्येतिहास लेखन में नामकरण की समस्याओं का विवेचन कीजिए।

4. संत काव्य-धारा की सामाजिक चेतना का विश्लेषण करते हुए कबीर के योगदान का उल्लेख कीजिए। 30

अथवा,

सूफी काव्य-धारा में निरूपित प्रेम तत्त्वों की समीक्षा करते हुए जायसी के महत्त्व की विवेचना कीजिए।

5. नवजागरण की महत्ता को स्पष्ट करते हुए बंगाल के नवजागरण में विद्यासागर की भूमिका पर आलोकपात कीजिए। 40

अथवा,

हिंदी गद्य के उद्‌भव और विकास पर संक्षिप्त टिप्पणी करते हुए महावीर प्रसाद द्विवेदी के अवदान पर मंतव्य व्यक्त कीजिए।

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

(क) तुलसीदास

(ख) घनानंद

(ग) मुक्तिबोध

(घ) राम विलास शर्मा

2019

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.

Group-A

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

1. ''कबीर वाणी के डिक्टेटर थे।''– इस कथन की समीक्षा कीजिए।
2. सूरदास के 'भ्रमरगीत' में निहित स्त्री स्वाभिमान पर प्रकाश डालिए।
3. 'बिहारी सतसई' के आधार पर कवि की समासोक्ति का विवेचन कीजिए।
4. जयशंकर प्रसाद के 'कामायनी' के 'श्रद्धा' सर्ग की विशेषताएँ सोदाहरण स्पष्ट कीजिए।
5. नागार्जुन की प्रगतिशील चेतना पर सोदाहरण विचार कीजिए।
6. पठित कविताओं के आधार पर मुक्तिबोध के काव्य सौंदर्य पर प्रकाश डालिए।

Group-B

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

7. 'अंधेर नगरी' के आधार पर नाटककार की व्यंग्य चेतना उद्घाटित कीजिए।
8. आचार्य रामचंद्र शुक्ल की निबंध-कला का परिचय दीजिए।
9. 'गोदान' में निहित उपन्यासकार की राजनीतिक चेतना का विश्लेषण कीजिए।
10. फणीश्वरनाथ 'रेणु' की कहानियाँ में अभिव्यक्त युग स्पंदन का आकलन कीजिए।

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2019

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.

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

Group-A

1. Answer *any three* questions: 10×3=30

   (a) Examine the importance of archaeology for the re-construction of ancient Indian history.

   (b) How would you explain the urban characteristics of the Harappan civilization?

   (c) Bring out the elements of continuity and change between the early Vedic and the later Vedic cultures.

   (d) Explain the growth of Indo-Roman trade in ancient India.

2. Answer *any two* questions: 20×2=40

   (a) Analyse the transition from the formation of territorial states (Sixteen Mahajanapadas) to the rise of Magadhan imperialism.

   (b) How did Asoka's policies and reforms contribute to the fall of the Mauryan empire?

   (c) Discuss the growth of temple architecture in South India.

   (d) Write an essay on the caste system in ancient India.

3. Answer *any one* of the following question: 30

   (a) Discuss the growth of science and technology in ancient India.

   (b) Explain the causes of the downfall of the Gupta empire.

   (c) Write an essay on the trade guilds in ancient India.

Group-B

4. Answer *any three* questions: 10×3=30

   (a) Assess the cultural significance of the Bhakti movement.

   (b) Account for the introduction of the market control regulations by Alauddin Khilji.

   (c) Give an account of the Mughal-Afghan contest for supremacy in medieval India.

   (d) How far was Akbar's Rajput policy politically expedient?

5. Answer *any two* questions: 20×2=40

   (a) Why did Muhammad-bin-Tughlaq occupy a special place in the history of medieval India?

   (b) How did Bengal flourish under the rulers of the Illyas Shahi dynasty?

   (c) Assess critically the land revenue administration under the Mughals.

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

   (a) The progress of Mughal architecture

   (b) Debate on the theocratic nature of the Delhi Sultanate

   (c) The 18th Century Debate

2019

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 remaining ones ignored.

Answers may be given either in English *or in* Bengali *or in* Nepali *but all answer 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) Which factors would you attribute to the Anglo-French conflict in India? Why the French were defeated? 10+10=20

(b) Why was Western education introduced in India by the East India Company? What role did Bentinck and Macaulay play in it? 10+10=20

(c) Do you agree that the partition of India in 1947 could be avoided? 20

2. Critically discuss how the railways brought certain changes in the economy of British India. Did it lead to any structural change in the economy? 25+15=40

3. How would you explain the peasant and working class movements in India in the period between the two world wars? 40

4. What were the basic parameters of India's foreign policy under Jawaharlal Nehru? What role did India play in the Korean war and the Congo Crisis? 20+10+10=40

Group-B

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

5. Answer *any one* question:

(a) Do you subscribe to the view that the French Revolution of 1789 was a bourgeois revolution? 20

(b) How would you explain the unification of Germany under Bismark? 20

(c) What was new in New Imperialism? Discuss its impact on Africa and Asia. 10+10=20

6. Why and wher was the League of Nations formed? Explain its success and failure. 20+10+10=40

7. Analyse the causes of the rise of Nationalist movements in Southeast Asia with special reference to Malay and Indonesia. 20+20=40

8. What do you understand by Cold War? Illustrate with examples the salient features of the Cold War till 1960. 10+30=40

2019

MSC(O)L-I/19

LAW– PAPER-I

Time Allowed- 3 Hours *Full Marks – 200*

If the questions attempted are in excess o 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 same language.*

GROUP – A

Answer any three questions :-

1. (a) Discuss critically the doctrine of severability.

   (b) Who can challenge the constitutionality of the law ? 20+20

2. (a) "The State shall not deny to any person equality before the law or equal protection of the laws within the territory of India". Discuss.

   (b) Critically discuss the expanding scope of Article 21 of the Indian Constitution. 20+20

3. (a) On what grounds a member of Legislative Assembly can be disqualified from the membership of the Assembly ?

   (b) Discuss the Fundamental duties and their utilities under the Indian Constitution. 20+20

4. (a) Critically discuss the principles regarding jurisdiction by High Court under Article 226.

   (b) Discuss the scope of territorial jurisdiction of High Court. 20+20

5. (a) "No person who is a member of a civil service of the Union or an all-India service or a civil service of a State or holds a civil post under Union or State shall be dismissed or removed by an authority subordinate to that by which he was appointed." Discuss.

   (b) Discuss the scope of judicial power of Administrative Tribunal 20+20

6. Write notes on any two of the following :-
   (a) Rule of law
   (b) Instrumentalities of State
   (c) Doctrine of Pleasure
   (d) Legal principles relating to granting of Special leave under Article 136. 20 x 2

GROUP – B

Answer any one question :-

7. (a) Define International law. Bring out the differences between International law and Municipal law.

   (b) Can the International law be called true law ? Justify your answer. 20+20

P. T. O.

8. (a) Critically discuss different types of jurisdiction under international law.

   (b) Discuss the conditions and limitations of the right to hot putsuit by a state. 20+20

GROUP-C

Answer any one questions :-

9. (a) "Ownership consists of an innumerable number of claims, liberties, powers and immunities with regard to thing owned" but the "possession carries with it the claim to possession and not to be interfered with until someone else establishes its superior title". Discuss the main legal characteristics of ownership and possession.

   (b) Make out the differences between 'stare decisis' and 'ratio decidendi'. Which one of the two carry greater legal importance ? 20+20

10. (a) Discuss the scope of human rights.

    (b) Discuss place of human rights in the Indian Constitution. 20+20

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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 same language.*

Law – Paper II

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) *Damnum sine injuria*
   (b) *Volenti non fit injuria*
   (c) *Res ipsa loquitor*
   (d) *Vis major*
   (e) *Ubi jus ibi remedium*
   (f) *Innuendo* 5 x 4
2. (a) Define tort. What are the essential elements of tort.
   (b) Discuss inevitable accident as a valid defence of tort. 10+10
3. (a) Critically examine the development of law relating to remoteness of damages.
   (b) Which test do you prefer to decide remoteness of damages? Give reasons. 10+10
4. (a) What is the right of private defence of a person under criminal law?
   (b)Are there any limitations or restriction on these rights? Explain. 10+10
5. (a) Define kidnapping. What are the kinds of kidnapping? What are the essentials of kidnapping?
   (b)How does kidnapping differ from abduction? 10+10
6. (a) Define theft. Distinguish between theft and extortion.
   (b)What is adultery? Illustrate constitutional validity of law relating to adultery. 10+10

Group-B

Answer Question No. 7 and any three questions from the rest of the Group -B

7. Write short notes on **any four** of the following:-
   (a) Voidable agreement
   (b) Misrepresentation
   (c) Wagering agreement.
   (d) Quasi contract
   (e) *Nudum pactum*
   (f) Discharge of contract by novation. 5 x 4
8. (a) Define contract. What are the essential elements of a valid contract.
   (b) Distinguish between void agreement and illegal agreement. 10+10
9. (a) Who are competent to make a contract?
   (b) Discuss the contractual liability of a minor's agreement with case laws. 10+10
10. (a) What is coercion? Does threat to commit suicide is coercion? Explain.
    (b)Distinguish between fraud and undue influence. 10+10

11. (a)Define consideration. What are the essential elements of consideration?
    (b)Discuss the exception to the rule "no consideration no contract." 10+10
12. (a)What is a contingent contract? Distinguish between contingent contract and wagering agreement.
    (b)Explain the doctrine of "Frustration of Contract". 10+10

Group-C

Answer <u>Question No. 13</u> and <u>any one</u> question from the rest of the Group -C

13. Write short notes on **<u>any four</u>** of the following:-
    (a) Dying declaration.
    (b) Res gestae
    (c) Expert opinion
    (d) Estoppel
    (e) Fact in issue
    (f) Cross examination 5 x 4
14. (a)What is meant by burden of proof?
    (b)Discuss the law relating to burden of proof. 10+10
15. (a) Distinguish between "primary evidence" and "secondary evidence.
    (b) What is meant by "presumption of law" and "presumption of fact"? Discuss the law of presumption under the Indian Evidence Act. 10+10

2019

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.

Answer may be given either in English *or in* Bengali *but all answer must be in one and the same language.*

1. Answer *any two* questions: 10×2=20

(a) Prove that $S = \{(x, y, z, w) \in \mathbb{R}^4;\ 2x + y + 3z + w = 0, x + 2y + z + 3w = 0\}$ is a vector space. Find its dimension and a basis.

(b) A is a non-singular square matrix of order 3 such that sum of the element of each row is K. Hence show that $(1, 1, 1)^T$ is an eigenvector of A. Hence show that sum of the elements in each row is $\frac{1}{k}$.

(c) If $A = \begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$, show that 2 is an eigenvalue of A. Find its algebraic and geometric multiplicity. Hence comment on diagonalisability of A.

2. Answer *any two* questions: 10×2=20

(a) If the system of equations $ax + by + cz = 0; bx + cy + az = 0; cx + ay + bz = 0$ has a non-zero solution, then prove that either $a = b = c$ or $a + b + c = 0$.

(b) Find the nature of the quadratic form $Q = xy + yz + zx$ and obtain a non-singular transformation which reduce it into normal form.

(c) If S be a skew Harmitian matrix then show that $(I + S)(I - S)^{-1}$ is a unitary matrix.

3. Answer *any two* questions: 10×2=20

(a) Prove that between two real numbers there lie a rational and an irrational number.

(b) Prove that $\left\{\frac{x^n}{|n}\right\}$ is converges to $0\ \ \forall x \in \mathbb{R}$.

(c) For a sequence $a_n = 1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}$, prove that $\{a_n\}$ is monotone increasing and divergent. Is $\sum \frac{1}{n}$ convergent? — Justify.

4. Answer *any two* questions: 10×2=20

(a) Show that $f: [0,1] \to \mathbb{R}$ defined by

$$f(x) = \begin{cases} 2x \sin\frac{1}{x^2} - \frac{2}{x}\cos\frac{1}{x^2}, & 0 < x \leq 1 \\ 0 \quad , & x = 0 \end{cases}$$

is *N* integrable but not R-integrable in $[0,1]$.

(b) Show that the sequence of function $\{x^n\}\, x \in [0,1]$ is not uniformly convergent.

(c) Find interval of convergence of power series $\sum a_n x^n$ where $a_n = \frac{1}{(n+1)^2}$. Also comment on uniform convergence of this power series.

5. Answer *any two* questions: 10×2=20

(a) Using Lagrange Mean Value Theorem, prove that any chord of the parabola $y = ax^2 + bx + c$ is parallel to the tangent at the point whose abscissa is same as the middle point of the chord.

(b) If $f'(x)$ exist in $[0,1]$ prove that $f(1) - f(0) = \frac{f'(x)}{2x}$ has at least one solution in $(0,1)$.

(c) Find the envelop of the circles drawn upon the radius vectors of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ as diameter.

6. Answer *any two* questions: 10×2=20

(a) Reduce the equation $x^2 - 6xy + y^2 - 10x - 10y - 19 = 0$ into canonical form and hence find the nature of the conic.

(b) Show that six normals can be drawn from a point to the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$.

(c) Prove that locus of the point of intersection of the normals to the parabola $y^2 = 4ax$ at the extremities of the focal chord is the parabola $y^2 = a(x - 3a)$.

7. Answer *any two* questions: 10×2=20

(a) Show that the lines $\frac{x-a_1}{a_2} = \frac{y-b_1}{b_2} = \frac{z-c_1}{c_2}$ and $\frac{x-a_2}{a_1} = \frac{y-b_2}{b_1} = \frac{z-c_2}{c_1}$ will intersect. Find their point of intersection.

(b) The points (0, 1, 0) and (3, –5, 2) are end points of a diameter of a sphere *S*. Find equation of the sphere on which intersection of the plane $5x - 2y + 4z + 7 = 0$ with the given sphere *S* is a great circle.

(c) Find the integrating factor of

$x(3ydx + 2xdy) + 8y^4(ydx + 3xdy) = 0$ of the form $x^\alpha y^\beta$ and hence solve it.

8. Answer *any two* questions: 10×2=20

(a) Find general and singular solution of

$p^2(x^2 - a^2) - 2pxy + y^2 - b^2 = 0$, where $p = \frac{dy}{dx}$.

(b) Solve: $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = \cosh x$

(c) Solve by Charpit method: $(p^2 + q^2)y = qz$.

9. Answer *any two* questions: 10×2=20

(a) Find the condition of astatic equilibrium in 2-dimension.

(b) A paraboloid of revolution is fixed with its axis vertical and vertex upward, a heavy elastic string of unstretched length $2\pi c$ is placed on it. Show that in equilibrium it rests in form of a circle of radius $\frac{4\pi ac}{4\pi a\lambda - cw}$; where w is the weight of the string, λ is modulus of elasticity and $4a$ is the latus rectum of the generating parabola.

(c) Forces X, Y, Z act along three lines $y = b, z = -c; z = c, x = -a; x = a, y = -b$ respectively show that they will have a single resultant if $\frac{a}{X} + \frac{b}{Y} + \frac{c}{Z} = 0$.

10. Answer *any two* questions: 10×2=20

(a) A particle moves in a plane under a force which is always perpendicular and towards a fixed straight line on the plane, magnitude being $\mu \div$ (distance from the line)^2. If initially it be at a distance $2a$ from the line and projected with a velocity $\sqrt{\frac{\mu}{a}}$ parallel to the line, prove that the path traces out by it is a cycloid.

(b) A particle describes the path $r^4 = a^4 \cos 4\theta$ under a central force. Find the law of force.

(c) State and prove Keplar's Second law on planetary motion.

2019

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) If the equation $x^4 + px^3 + qx^2 + rx + s = 0$ has roots of the form $\alpha + i\alpha$, $\beta + i\beta$, where α, β are real. Prove that $p^2 - 2q = 0$ and $r^2 - 2qs = 0$. 14

   (b) Prove that $\sqrt{n} < \sqrt[n]{n!} < \frac{n+1}{2}\ \forall n > 2$. 14

2. (a) If p is an odd prime prove that

   (i) $1^2.3^2.5^2 \ldots (p-2)^2 \equiv (-1)^{\frac{p+1}{2}} (mod\ p)$

   (ii) $2^2.4^2.6^2 \ldots (p-1)^2 \equiv (-1)^{\frac{p+1}{2}} (mod\ p)$ 7+7=14

   (b) (i) Show that the roots of the equation $(1+z)^n = (1-z)^n$ are the values of $i\tan\left(\frac{r\pi}{n}\right)$, where $r = 0, 1, 2, \ldots n-1$, but omitting $\frac{n}{2}$ if n is even.

   (ii) Show that the product of all values of $\left(\sqrt{3}+i\right)^{\frac{3}{5}}$ is $8i$. 7+7=14

3. (a) Define f over R^2 by

$$f(x,y) = \begin{cases} \left(\frac{|x|}{y^2}\right).e^{\frac{-|x|}{y^2}}, & y \neq 0 \\ 0, & y = 0 \end{cases}$$

   Show that $\lim_{(x,y)\to(0,0)} f(x,y)$ exists along any straight line but the limit does not exist. 14

   (b) Let $f(x,y) = \begin{cases} \frac{x^3}{x^2+y^2}, & x^2+y^2 \neq 0 \\ 0, & x^2+y^2 = 0 \end{cases}$

   Show that both f_x and f_y exist at (0, 0) but f is not differentiable at (0, 0). 7+7=14

4. (a) If V is a closed region bounded by the planes $x = 0, y = 0, z = 0, 2x + 2y + z = 4$ and $F = (3x^2 - 8z)i - 2xyj - 8xk$, then show that

   (i) $\iiint_V \nabla.FdV = \frac{16}{3}$

   (ii) $\iiint_V \nabla \times Fd\nabla = -\frac{8}{3}k$ 7+7=14

(b) Proved that $a.\nabla\left(b.\nabla\left(\frac{1}{r}\right)\right) = \frac{(3(a.\vec{r})\,(b.\vec{r}))}{r^5} - \frac{a.b}{r^3}$ where a and b are constant vectors and $r = |\vec{r}|$. 14

5. (a) Let $(G, \circ)$ be a group and $(H, \circ)$ be a subgroup of $(G, \circ)$. Let $x, y \in G$ and a relation ρ is defined on G by "$x \rho y$ iff $x \circ y^{-1} \in H$." Prove that ρ is an equivalence relation on G. 14

(b) If an abelian group G of order 10 contains an element of order 5, prove that G must be cyclic group. 14

6. (a) If $u - v = (x - y)(x^2 + 4xy + y^2)$ and $f(z) = u + iv$ is an analytic function of $z = x + iy$. Find $f(z)$ in terms of z. 14

(b) Suppose X is a non-empty set and $d(a, a) = 0$ for all $a \in X$ *and* $d(a, b) = 1$ for all $a, b \in X$ with $a \neq b$. Show that d is a metric on X. 14

7. (a) Construct the Lagrange interpolation polynomial for the data.

x	–1	1	4	7
$f(x)$	–2	0	63	32

Hence interpolate at $x = 5$. 14

(b) Using Newton–Raphson method solve $x \log_{10} x = 12 \cdot 34$ with $x_0 = 10$. 14

Group B

Answer any two *questions*.

8. (a) If the independent random variables X and Y be each uniformly distributed in the interval $(-a, a)$ then find the distribution of

(a) $X + Y$

(b) XY

(c) $\frac{X}{Y}$ 5+5+5=15

(b) In the equation $x^2 + 2x - q = 0, q$ is a random variable uniformly distributed over the interval (0, 2). Find the distribution function of the largest root. 15

9. (a) The least square regression lines of Y on X and X on Y are respectively $x + 3y = 0, 3x + 2y = 0$. If $\sigma_x = 1$ then find the least square regression line of V on U where $U = X + Y, V = X - Y$. 15

(b) Let $U = aX + bY$ and $V = bX - aY$. If $E(X) = E(Y) = 0$ and if $\rho(X, Y) = \rho, \rho(U, V) = 0$, then show that

(i) $\text{var}U.\text{var}V = (a^2 + b^2)^2\,(\text{var}X)(\text{var}Y)(1 - \rho^2)$

(ii) $ab(\text{var}X - \text{var}Y) = \rho\sigma_x\sigma_y(a^2 - b^2)$ 7·5+7·5=15

10. (a) By solving the dual of the primal problem:

Minimize $Z = 3x_1 - 2x_2 + 4x_3$

Subject to $3x_1 + 5x_2 + 4x_3 \geq 7$,

$6x_1 + x_2 + 3x_3 \geq 4$

$7x_1 - 2x_2 - x_3 \leq 10$

$4x_1 + 7x_2 - 2x_3 \geq 2$

$x_1 - 2x_2 + 5x_3 \geq 3,\ x_1, x_2, x_3 \geq 0,$

Show that it has no solution. 15

(b) Five operators (A, B, C, D, E) have been assigned to five machines (I, II, III, IV, V). Operator A cannot operate machine III and operator C cannot operate machine IV. Find the optimal assignment schedule.

	I	II	III	IV	V
A	5	5	-	2	6
B	7	4	2	3	4
C	9	3	5	-	3
D	7	2	6	7	2
E	6	5	7	9	1

15

2019

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. (a) Two similar round bars X and Y are each 300 mm long as shown in the figure 1.(a).

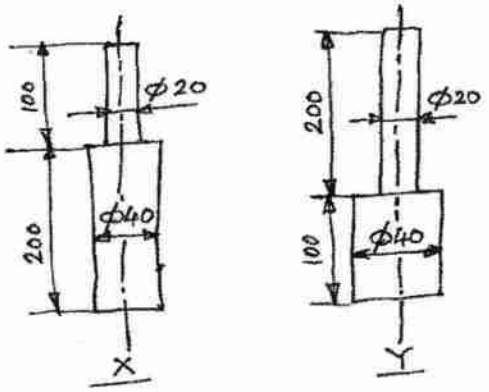

Figure 1.(a)

The bar X receives an-axial blow, which produces a maximum stress of 2500 kg/cm^2. Find the maximum stress produced by the same blow on the bar Y. If the bar Y is also stressed to 2500 kg/cm^2, determine the ratio of energy stored by the bars Y and X. 20

(b) Shear force diagram for the loaded beam is shown in figure 1.(b). Determine the loading on the beam and hence draw the bending moment diagram. Locate the point of contra flexure, if any. 20

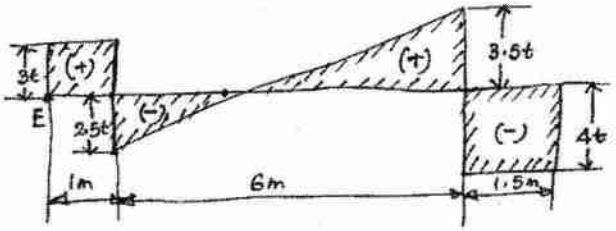

Figure 1.(b)

2. (a) A company XYZ sold 500000 litres of paints with variable cost of Rs. 28.00 per litre every year. Each litre contributes 30% of its revenue to fixed costs and profits. The company is contemplating a price reduction of 5% this year. Calculate how many more litres will the company be required to sell at the 5% price reduction in order to achieve the same profit. 20

(b) The characteristics of project schedule are as given below:

Activity	Time (days)	Activity	Time (days)
1–2	4	5–6	4
1–3	1	5–7	8
2–4	1	6–8	1
3–4	1	7–8	2
3–5	6	8–10	5
4–9	5	9–10	7

From the above data

(i) construct a PERT network.

(ii) compute the earliest and latest expected time for each event.

(iii) find the critical path. 20

3. (a) With the help of neat sketches, explain the point defect, line defect and surface defect in connection with crystal imperfections. Discuss the different mechanisms related to them. 20

(b) Draw the T-T-T diagram for carbon steel and explain it. Discuss the various treatments to impart surface hardness to carbon steel. 20

4. (a) Prove that in EBM process

$$u = 600\sqrt{E}$$

where u = final velocity of electron, km/s

E = potential difference by which electron is accelerated 10

(b) Discuss about the different types of error introduced during the EDM operations. 10

(c) Explain the working principle of ECM process. Give necessary sketch. 10

(d) Discuss about the tool material and abrasive slurry used in USM process. 10

5. (a) During an orthogonal machining operation on ms, the results obtained are:

Un cut chip thickness = 0·25 mm

Cut chip thickness = 0·75 mm

Width of cut = 2·5 mm

Rake angle = 0°

Cutting component of machining force = 950N

Thrust component of machine force = 475N

Determine

(i) the coefficient of friction between the tool and the chip.

(ii) ultimate shear stress of the work material. 20

(b) (i) Write the differences between forward extrusion and backward extrusion. 10

(ii) Calculate the CLA value of surface roughness for the following data: 10

Sampling length = 0·8 mm

The graph is drawn to a vertical magnification of 15000 and horizontal magnification 100. The areas above and below the mean line are 160, 90, 180, 50 mm^2 and 95, 65, 170, 150 mm^2 respectively.

6. (a) A timber beam 100 mm wide × 200 mm deep is strengthened by a steel plate 100 mm wide and 10 mm thick, screwed at the bottom surface of the timber beam. Calculate the moment of resistance of the beam if the safe stresses in the timber and the steel are 100 kg/cm^2 and 1500 kg/cm^2 respectively. Take $E_s = 20E_t$. 20

(b) Determine the ratio of the strengths of a solid steel column to that of a hollow column of the same material and having same cross-sectional area. The internal diameter of the hollow column is $\frac{1}{2}$ of its external diameter. Both the columns are of the same length and are pinned at their both ends. 20

7. (a) A three-cylinder single acting engine has its cranks at 120°. The turning moment diagram for each cycle is a triangle for the power stroke with a maximum torque of 60 N-m at 60° after the dead centre of the corresponding crank. There is no torque on the return stroke. The engine runs at 400 rpm.

Determine

(i) the power developed.

(ii) the coefficient of fluctuation of speed if the mass of the flywheel is 10 kg and the radius of gyration is 88 mm.

(iii) the coefficient of fluctuation of energy.

(iv) the maximum angular acceleration of the flywheel. 20

(b) Each ball of a Porter governor has a mass of 3 kg and the mass of the sleeve is 15 kg. The governor has equal arms each 200 mm long and pivoted on the axis of rotation. When the radius of rotation of the balls is 120 mm, the sleeve begins to rise and 160 mm at maximum speed.

Determine

(i) the range of speed.

(ii) the lift of the sleeve.

(iii) the effort of the governor.

(iv) the power of the governor.

What will be the effect of friction at the sleeve if it is equivalent to 8N? 20

8. (a) The following data relate to a shaft held in long bearings:

Length of the shaft = 1·2 m

Diameter of the shaft = 14 mm

Mass of a rotor at midpoint = 16 kg

Eccentricity of centre of mass of rotor from centre of rotor = 0·4 mm

Modulus of elasticity of the shaft material = 200 GN/m^2

Permissible stress of the shaft material = 70×10^6 N/m^2

Determine the critical speed of the shaft and the range of speed over which it is unsafe to run the shaft. Assume the shaft to be massless. 20

(b) Write a FORTRAN programme to solve for the roots of a quadratic equation considering the possibilities of real (equal or unequal) and imaginary roots. The input values to be supplied through key board and the output should be displayed on the monitor. 20

2019

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. Any data if needed may be assumed, but it must be clearly mentioned.*

Answer any five *questions.*

1. (a) What do you mean by quasi-static process? How will you define a thermodynamic process and a thermodynamic cycle? An imaginary engine receives heat and does work on a slowly moving piston at such a rate that the cycle of operation of 1kg of working fluid can be represented as a circle of 10cm diameter on a PV diagram on which 1cm = 300 kPa and 1cm = 0·1m^3/kg. How much work is done by each kg of the working fluid for each cycle of operation? If the heat rejected by the engine in a cycle is 2000 kJ per kg of working fluid, what would be its thermal efficiency?

   (b) What do you mean by non-flow process and flow process? Derive the steady flow energy equation with single inlet and single outlet. State the assumptions made to derive this equation.

   (c) A heat engine operating between two reservoirs at temperatures 600°C and 40°C drives a refrigerator operating between reservoirs at temperatures of 40°C and –15°C. The heat transfer to the heat engine is 2500 kJ and the net work output of the combined engine and refrigerator plant is 400 kJ. The efficiency of the heat engine and the COP of the refrigerator are each 40% of the maximum possible values. Estimate the heat transfer of the refrigerant from the cold reservoir and the net heat transfer to the reservoir at 40°C.

   (d) What do you mean by the principle of increase of entropy? Show that the entropy change of the universe will be necessarily positive due to the mixing of two fluids initially at different temperatures. You may assume that the heat capacities of the two fluids are the same.

   10+10+12+8=40

2. (a) Define fin efficiency and fin effectiveness. If a fin is thin and tip loss is negligible, show that the heat transfer from the fin is given by $Q = \sqrt{hPkA}\,(T_0 - T_\alpha)\tan h\,(ml)$, where the symbols have their usual meanings.

   (b) An aluminium alloy fin, 3·5 mm thick and 25 mm long protrudes from a wall. The base is at 420°C and the surrounding temperature is 30°C. The heat transfer coefficient and the thermal conductivity of aluminium may be taken as 11W/m^2-K and 200W/m-K respectively. Calculate the heat loss and fin efficiency, if the heat loss from the tip is negligible.

(c) A 2·5 m long steam pipe having 50 mm diameter has been placed horizontally and exposed to still air at 25°C. If the temperature of the pipe wall is 295°C, determine the rate of heat loss from the pipe due to convection. The properties of air at 160°C are as follows:

$v = 30 \cdot 09 \times 10^{-6} m^2/s,\ k = 3 \cdot 64 \times 10^{-2}\ W/m - k$ and $Pr = 0 \cdot 682.$

The following correlation may be used for Nusselt number:

$Nu = 0 \cdot 53(Gr.Pr)^{0 \cdot 25}$ for $10^4 < Gr.Pr < 10^9$ (laminar flow) and

$Nu = 0 \cdot 13(Gr.Pr)^{0 \cdot 33}$ for $10^9 < Gr.Pr < 10^{12}$ (turbulent flow).

(d) What do you mean by monochromatic emissive power and total emissive power of a black body? Starting from Planck's law of black body radiation, derive Wien's displacement law. What is the importance of this law? 8+8+14+10=40

3. (a) What is the difference between dry bulb temperature and wet bulb temperature? How will you measure them? What type of air conditioning system is needed for very hot and humid weather? Show the whole process on the psychometric chart.

(b) The condenser temperature and the evaporator temperature of an ammonia ice plant are of 35°C and of –15°C respectively. The plant produces 5 tons of ice per day from water at 25°C to ice at –5°C. Ammonia enters the compressor as dry saturated vapour and leaves the condenser as saturated liquid. Determine

(i) the capacity of the refrigeration plant,
(ii) mass flow rate of the refrigerant,
(iii) discharge temperature of ammonia from the compressor,
(iv) power consumed by the compressor and
(v) COP of the plant.

Take, latent heat of ice = 335 kJ/kg; specific heat of ice = 1·94 kJ/kg-K; specific heat of water = 4·2 kJ/kg-K and specific heat of ammonia vapour = 2·8 kJ/kg-K.

Other relevant properties of ammonia refrigerant may be obtained from the following table:

Tem (°C)	h_f(kJ/kg)	h_g(kJ/kg)	s_f(kJ/kg-K)	s_g(kJ/kg-K)
–15	112·3	1426·0	0·457	5·549
+35	347·5	1471·0	1·282	4·930

(c) What do you mean by stoichiometric air-fuel ratio and equivalence ratio? For what purpose ORSAT apparatus is used? Explain its working principle. 13+15+12=40

4. (a) State the differences between black body and gray body. What are space resistance and surface resistance in radiative heat transfer? What do you mean by radiation shield? How does it reduce the heat transfer rate due to radiation between two bodies?

(b) A hot oil with heat capacity rate of 2500 W/K flows through a double pipe heat exchanger. It enters at 360°C and leaves at 300°C. Cold fluid enters at 30°C and leaves at 200°C. If the overall heat transfer co-efficient is 800 W/m^2-K, determine the heat exchanger area for

(i) parallel flow arrangement and
(ii) counter flow arrangement.

Draw also the corresponding temperature profiles for both the cases.

(c) For what purpose Bell-Coleman cycle is used? Derive an expression for the COP of this cycle. 16+14+10=40

5. (a) Draw the PV and TS diagrams of Otto cycle. Find an expression for the air standard efficiency of Otto cycle. Show that the efficiency of Otto cycle is greater than that of Diesel cycle for the same compression ratio.

   (b) Explain with the help of a neat sketch the principle of operation of an accelerating pump as employed in a carburettor.

   (c) A trial on a single cylinder 4-stroke diesel engine provides the following data:

   Speed = 400 rpm; Brake Power = 100 kW; Brake mean effective pressure = 850 kPa; Brake specific fuel consumption = 0·335 kg/kWh; Calorific value of the fuel = 43·50 MJ/kg. If the stroke to bore ratio is 1·25 and the mechanical efficiency of the engine is 80%, determine the bore and stroke of the engine, the brake thermal efficiency, the indicated thermal efficiency and the indicated mean effective pressure. 16+8+16=40

6. (a) What do you mean by ideal fluid? Sate and explain Newton's law of viscosity. What is the difference between dynamic viscosity and kinematic viscosity?

   (b) A square metal plant of 1·8 m side has a thickness of 1·8 mm and weight of 60 N. The plate has to be lifted through a vertical gap of 30 mm of infinite extent. The oil in the gap has a specific gravity of 0·95 and viscosity of 3 N-s/m^2. Calculate the force and power required to lift the plate at a constant speed of 0·12m/s.

   (c) What is a Pitot tube? How does it measure the velocity of flow at any point in a pipe?

   (d) A rectangular plate 1·2 m long and 0·6 m wide is submerged in an oil bath of specific gravity 0·8. The maximum and the minimum depths of the plate are 1·6 m and 0·75 m respectively from the free surface. Find the hydrostatic force on one face of the plate and the depth of the centre of pressure. 8+12+8+12=40

7. (a) Define the following dimensionless numbers and state their importance in fluid mechanics:

   (i) Reynolds number,

   (ii) Froude number,

   (iii) Mach number and

   (iv) Weber number

   (b) State different losses associated with the flow of liquid through a pipe. Derive an expression for the head loss due to friction in terms of Darcy co-efficient of friction, dimensions of the pipe and flow velocity.

   (c) An oil of specific gravity 0·8 is flowing through a pipe of 300 mm diameter and 800 m length at a rate of 0·45 m^3/s. Kinematic viscosity of the oil is 0·3 stoke. Calculate the head loss due to friction and the power required to maintain the flow.

   (d) State the condition for a fluid flow of be irrotational. What is Euler's equation? Explain the concept of velocity boundary layer and thermal boundary layer. 8+12+10+10=40

8. (a) What advantages are obtained in using high pressure boiler in a thermal power plant? With the help of a neat sketch explain the working of a high pressure boiler.

(b) Steam at 20 bar and 360°C expands in a turbine to a pressure of 0·08 bar. It then enters a condenser where it is condensed to saturated liquid water. Then the pump feeds back the water to the boiler. Calculate the cycle efficiency and the power developed if steam flow rate is 25kg/s.

The cycle may be assumed to follow an ideal Rankine cycle. Steam table or Mollier diagram may be used to get the properties of steam.

(c) State the differences between impulse and reaction turbines in case of hydraulic turbines. Give examples of each case.

(d) Explain the principle used in forced and induced draught. How will you calculate the power required to run ID fan and FD fan? Explain why balanced draught is preferred over only forced draught or induced draught. 12+10+10+8=40

2019

MSC(O)MG -I/19

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 same language.*

GROUP – A

Answer any three questions :-

1. (a) State Mccarthy's 4 ps ; explain with suitable examples. 20

   (b) Explain the different types of Demand with examples. 20

2. (a) Explain Fayol's 14 principle of management. 25

   (b) As HR manager, why do you think that delegation of responsibility has to be associated with delegation of authority ? 15

3. (a) What are the roles of a manager in the organisation ? 20

   (b) What are the steps of taking decisions under uncertainity ? 20

4. (a) What are the basic differences between Administrative and Management Concepts ? 10

   (b) Design an organisational structure for a medium size organisation. - Explain Scater-Chain. 30

5. (a) Discuss the basic style of leaderships. 30

   (b) Give your opinion about the Authoritarian. 10

GROUP – B

Answer any two questions :-

6. (a) Discuss about the implementation of the 5Is' principle in an organisation. 20

   (b) Analyse the failure of implementation of 'JIT' in most of the Indian organisations. 20

7. (a) Analyse the merits of 'Conflicts' in implementing any decision in the organisation. 25

   (b) What are the basic factors which requires a conflict resolution-manager ? 15

8. (a) Discuss the evolution process of the changing function of 'Purchase manager' - 'Materials Manager' - 'Supply Chain Manager'. 15

   (b) Draw a flow diagram explaining the 'Bull-whip effect' in Supply Chain. 25

9. Write short notes on any two :-

   (a) Six Sigma
   (b) E R P
   (c) Span of control
   (d) M B O.

   20 x 2

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2019

MSC(O)MG -II/19

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 same language.*

Answer any five questions :-

1. (a) Analyse the changing trends of business and marketing and how they are creating new behaviours, new challenges and new opportunities. 25

   (b) How can a marketer understand the reality of Consumer behaviours ? 15

2. (a) "A successful price increase can raise profits". To analyse this statement a company requires a thorough investigation into Reaction to price changes' and 'responding to competitors price changes'. Explain with suitable examples. 25

   (b) Explain the different functions of marketing channels. Briefly discuss the differences between consumer marketing channels and industrial marketing channels. 15

3. (a) Previously companies were giving importance on 'Personnel Management' but now-a-days every company gives stress on 'Human Resource Management' - Why ? 15

   (b) What is 'Strategic Human Resource Management' ? How will you implement this in your organisation as HR Head ? 15

   (c) What do you feel should be the ideal qualities of an HR Manager ? 10

4. (a) Develop a performance appraisal format and explain how it differs from a traditional performance appraisal approach. 20

   (b) You, as HR Head, will have to implement 360 degree appraisal system in your organisation ; how will you do it ? 20

5. (a) Differentiate between 'Cost of debt Capital' and 'Cost of preference Capital'. 20

   (b) Explain operating cycle and cash cycle. How will you washout inventory period and accounts receivable and payable period ? 20

6. (a) Define 'Activity' & 'Event'. 10

   (b) Find out Project duration time and critical path after drawing the Network from the following data :-

Activity	Duration (Days)	Interdependency
A	2	–
B	3	–
C	3	–
D	2	A
E	3	D, F
F	2	B
G	3	C
H	2	B
I	3	H
J	4	G, E
K	2	I, J

30

P. T. O.

7. (a) Discuss global marketing strategy which have been developed as an example by Indian Company Tata & South Korean Company LG, Hundai. 20

   (b) What are the unique features of service marketing ? Explain with the example of HDFC Bank. 20

8. Write short notes (any four) :-

   (a) PEST Analysis
   (b) Porter's 5 forces frame work
   (c) BCG Matrix
   (d) Capital Budgeting
   (e) Marketing Mix (4 ps Vs 4 cs)
   (f) Break Even Analysis. 10 x 4

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2019

MSC(O)MS-I/19

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

1. Answer any four questions :-

(a) Briefly describe the anatomy of conduction system of heart.
(b) Describe the cardiac cycle with different phases.
(c) Describe the biochemistry of Neuro Muscular conduction.
(d) Describe the pathophysiology of bronchial asthma.
(e) Microbiological diagnosis of Dengue Infection.
(f) Common oral hypoglycemic drugs (OHA) - enumerate. 10 x 4

2. Answer any four questions :-

(a) Describe coronary circulation.
(b) Common causes of hyponatremia.
(c) What is stem cell ? How stem cells can help in diseases ?
(d) How resistance pattern is transferred from one pathogen to other pathogen ?
(e) What are the important features of hanging ?
(f) Common drugs used in Acid Peptic Disease. 10 x 4

3. Answer any four questions :-

(a) Common causes of cerebro vascular accident ? Describe briefly about prevention and rehabilitation.
(b) Definition of inflammation and enumerate common inflamatory disorders ?
(c) What are types of Imunological Disorders ? (Name some Immunomodulators used in Common Diseases.)
(d) Classify ante hypertensives with examples.
(e) Enumerate the differences between bronchial asthma and cardiac asthma.
(f) Common poisoning in rural bengal - names and initial management of organophosphorous poisioning. 10 x 4

4. Answer any four questions :-

(a) Enumerate common antiepilectics. Side effects of carbamazepine ?
(b) What is DOTs therepy ? What are the drugs used ?
(c) Enumerate the types of Malaria infection. Name complications of Falciparum Malaria. (Plasmodim Falciparum).
(d) Common causes of Blindness in India ? How to prevent blindness ?
(e) Enumerate the small muscles of hand.
(f) What are Lepra Reactions ? 10 x 4

P. T. O.

5. Answer any four questions :-

(a) Enumerate different cyber crimes in India and abroad.

(b) Enumerate common bone disorders in India. What are the preventive strategies ?

(c) What imunological and biochemical parameteres to be assessed before organ transplantation ?

(d) When to declare brain death ? What are the basic precautions necessary ?

(e) When to call something as Multi Drug Resistant (MDR) Tuberculosis ? How to manage MDR Tuberculosis ?

(f) How to approach an unconcious patient ?

10x4

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2019

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 notes on any four of the following :-

(a) Clinical Spectrum, complication and antibiotics of choice in Gonorrhea.

(b) Give the flow chart for Management of urethral discharge in man.

(c) Outline briefly key population in India affected from HIV.

(d) What are the common symptoms of heart attack? What dedications are commonly recommended? What are common interventions may be required?

(e) Ebola Virus disease - its public Health significance contries affected and prevention of ebola virus disease.

(f) A 36 yrs. old woman in her 32nd week of pregnancy has come with bleeding per vagina. What is the differential diagnosis. Enumerate steps in management of any of the causes 10x4

2. Outline the management of any four of the following :-

(a) Outline briefly the initial management of Burns - do's and don'ts

(b) Snake bite - antivenom treatment and initial care.

(c) What are the signs and symptoms of intestinal obstruction. What will be the line of management in the Primary Health centres.

(d) What are the common domestic accidents? What first AID treatment you will recommend for a person just drowned in pond.

(e) What are the causes of acute suppurative otitis media? How will you treat and prevent complication?

(f) What are the signs by which you will diagnose child aged 6 months as Acute Respiratory Infection - What will be treatment you will recommend as per IMNCI guideline to the child. 10x4

3. Briefly explain any four of the following :-

(a) Toxic Shock Syndrome.

(b) Severe acute respiratory syndrome (SARS)

(c) The first line of Antitubercular drugs.

(d) Carriers in cholera.

(e) Scheme of treatment of Vivax Malaria (P.Vivax)

(f) Describe the causes of Anemia. What are the investigations to confirm the diagnosis (WHO Guideline)?

10x4

P.T.O.

4. Differentiate any four of the following :-

(a) Case Control and Cohort Study.
(b) Salk Vaccine and Sabin Vaccine.
(c) Epidemic and endemic.
(d) Primary Health Centre and Community Health Centre.
(e) UNICEF and WHO.
(f) Active and Passive immunisation. 10x4

5. Enumerate any eight of the following :-

(a) Intrauterine devices.
(b) Use of condoms.
(c) Couple protection rate.
(d) Demographic cycle.
(e) Relative risk.
(f) Composition of reduced Osmolarity ORS.
(g) Vaccines to be given at birth as per National Schedule.
(h) Exclusive breast feeding practices.
(i) Manure pit.
(j) Antityphoid vaccine.
(k) Kangaroo Mother Care.
(l) Food and Agricultural Organisation (FAO).
(m) Neonatal Mortality rate.
(n) Nutritional Services in School health. 5x8

2019

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 *Devnagari or Roman* or *Bengali* Script in their answers, quotations or expressions in Pali.

Group-A

1. Write a note on the Origin and Homoland of Pali. 12

2. Write a comprehensiv note on the Śaurasenī Prākrit. 20

Or,

Write a note on the chief characteristic features of Pali.

3. Explain *any three* of the following phonetic tendencies in Pali, with suitable examples: 6×3=18

   (a) Assimilation
   (b) Metathesis
   (c) Compensation
   (d) Haplology
   (e) Epenthesis

Group-B

4. What is *Niggahīta*? Write a note on the Niggahīta-Sandhi in Pali. 18

5. Show the various uses *either* of the 4th or the 6th case-endings in Pali. 12

6. (a) Decline fully *any one* of the following: 5
   Latā, Sādhu, Amha.

   (b) Conjugate fully *any one* of the following: 5
   $\sqrt{\text{Pac}}$ in the Optative Mood;
   $\sqrt{\text{Kar}}$ in the Aorist;
   $\sqrt{\text{ṭhā}}$ in the Bhavissanti.

   (c) Give the Pali equivalents of the following Sanskrit words (*any five*): 2×5=10
   Ārya, mārga, sanskṛta, parokṣā, saṅkleśa, aṣṭāṅgika, Śrāvastī, Kuśīnagara, Kṛśā Gautamī.

Group-C

7. Translate into English *either* of the following two passages adding grammatical notes on the words underlined: 10+4=14

(a) Idha Doṇo brāhmaṇo *ubhato* sujāto hoti, mātito ca pitito ca, saṁsuddhagahaniko yāva sattamā pitāmahayugā akkhitto anupakkṭṭho *jātivadena*. So aṭṭhacattālīsa-vassāni komāra-brahmacariyaṁ carati mante adhīyāno.

(b) Tena kho pana samayena Bimbisāro ca Pasenadi-Kosalo aññamaññaṁ bhaginipatikā honti. Ath' ekadivasaṁ Kosalarājā *cintesi*: "Bimbisārassa vijito pañca amitabhogā vasanti mayhaṁ vijito eko pi tādiso n'atthi. yan-nūnāhaṁ Bimbisārassa santikaṁ *gantvā* ekaṁ mahāpuññaṁ yāceyyan" ti.

8. Translate into English of the following two verses adding grammatical notes on the underlined words: 10+4=14

(a) Sabbapāpassa *akaraṇaṁ* kusalyass' upasampadā
sacitta-pariyodapanaṁ etaṁ *Buddhāna* sāsanaṁ.

(b) Phandanaṁ capalaṁ cittaṁ, *dūrakkhaṁ* dunnivāraṁ
ujuṁ *karoti* medhāvi usukāro'va tejanaṁ.

9. Translate into Pali of the following two passages: 22

(a) Savatthi was the capital of Kosala and one of the great cities of India during Buddha's life-time. It lay on the banks of the Aciravati river. It was 45 leagues north-west of Rajagaha and 6 or 7 leagues from Saketa. It is said that Buddha spent 25 rainy seasons in Savatthi-nineteen of them in Jetavana and six in Pubbarama.

(b) Prince Abhaya was a son of king Bimbisara. His mother was Padumavati, a courtesan of Ujjeni. At the age of seven Abhaya was sent by his mother to the king's palace where he grew up with other princes. He first came under the influence of Niganṭha Nātaputta, but later he became a follower of Buddha.

Group-D

10. Write an essay in Pali on *any one* of the following: 50

(a) Bodhisatta

(b) Majjhimā patipadā

(c) Paṭiccasamuppāda

2019

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*

The figures in the margin indicate marks for each question.

Group-A

Answer ***question No.5*** and ***any two*** from the rest.

1. What is meant by the term Tipiṭaka? Give a brief account of the various texts constituting the Vinaya-Piṭaka. 30

2. When and under what circumstances was the Second Buddhist Council held? Give an account of this Council. Point out its effect on the Buddhist Saṅgha. 30

3. Write an informative essay on the Milindapañha. 30

4. Write in brief about the main events of the life of Gautama Buddha. 30

5. Write short notes on *any four* of the following: 10×4=40
   (a) Visuddhi-magga
   (b) Therīgāthā
   (c) Aśoka
   (d) Buddha-vaṃsa
   (e) Rājagaha
   (f) Sabbatthivāda

Group-B

Attempt *all* questions.

Answers in this group should be given in Pali.

6. (a) Summarise the contents either of the *yamaka vagga* or the *Buddhavagga*. 30

Or,

Summarise the contents of the Khaggavisana Sutta of the Snttanipāta. 30

(b) Discuss the importance of the Dhamma cakka-pavattana sutta in the history of Buddhism. 30

Or,

Attempt a critical estimate of the contents of the Sibi Jātaka. 30

7. (a) Write a note on the date and authorship of the Subodhālaṅkāra. 20

Or,

Write a note on Vuttodaya. 20

(b) Explain with appropriate example *any two* of the following: 10×2=20

(i) Tanumajjhā

(ii) Vijjummālā

(iii) Abbhūtopamā

(iv) Dhammopamā

2019

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. (a) Differentiate between sensation and perception, giving suitable example.

(b) What is depth perception? Discuss in this context, the monocular and binocular cues of depth perception.

(c) Enumerate with suitable examples the laws of perceptual organization. 5+(5+20)+10=40

2. (a) What do you understand by IQ and DIQ?

(b) Discuss with suitable illustration the basic tenets of Guilford's theory of structure of intellect.

(c) Critically discuss Gardner's theory of Multiple intelligence. 10+15+15=40

3. (a) Discuss, with examples and evidences, Jean Piaget's stages of cognitive development.

(b) What is creativity? Delineate with examples, the major characteristics or skills associated with creativity. 25+(5+10)=40

4. Discuss with experimental evidences the theories of Trial and Error learning and Insight learning. Comment on their relative applications in different spheres of life. (15+15)+10=40

5. (a) What is memory? Discuss the different types of memory with suitable examples.

(b) Define learning. How is it related to memory?

(c) What is forgetting? Explain the curve of forgetting with diagram.

(d) What do you understand by programmed learning? (5+10)+(5+5)+(5+5)+5=40

6. (a) What do you understand by the cognitive theories of emotion? Discuss critically in this context, the Schachter-Singer Theory of emotion.

(b) What is motivation? Discuss, with suitable examples, the relation between emotion, motivation and behaviour. 25+(5+10)=40

Group-B

Answer ***any two*** questions.

7. Distinguish between stereotype and prejudice. Show your acquaintance with any one measure of prejudice. Discuss, with reference to Indian context, some social psychological techniques of reducing prejudice. 10+10+20=40

8. (a) "Career success is an integrated function of ability, intest and value". — Justify.

(b) Discuss with examples Kohlberg's stages of moral development. 15+25=40

9. What is social development? Delineate the characteristics of social development from middle childhood upto end of adolescence. Comment on the role of school and peer group during these phases of social development. 5+25+10=40

10. What do you understand by the terms 'puberty' and 'adolescence'? Discuss in detail the physical and emotional development of the child during these phases of life. Comment on the role of parents to promote healthy development during these phases. 10+20+10=40

2019

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.*

The figures in the margin indicate marks for each question.

Group A

Answer any **three** *questions.*

1. (a) What is defense mechanism? Classify into different types with examples.

   (b) Discuss Freud's understanding of Psychological Disorders. (10+15)+15=40

2. What is stress? Discuss the GAS Model by Selye. Explain the causes and consequences of stress. 5+10+25=40

3. Classify Anxiety Disorders into different types. Explain the psychosocial etiology of Anxiety Disorders. 15+25=40

4. What are the basic tenets of Cognitive Behaviour Therapy? Discuss the process and strategies of Cognitive Behaviour Therapy. State its application in Depression. 10+20+10=40

5. Write short notes on ***any two***: 20+20=40

   (a) Eysenck's Theory of Personality

   (b) Causes of abnormal behaviour

   (c) Sources and types of conflict in organisations

   (d) Rehabilitation

Group B

Answer any **two** *questions.*

6. What is motivation in Organizational Psychology? Discuss and compare the differnt theories of motivation. State the utility of motivational theories in Organizational Behaviour. 10+20+10=40

7. What is old age? What are the commonly encountered problems of old age? How can we help people with old age problems? 5+25+10=40

8. (a) State the properties of the normal probability curve.

   (b) Discuss and compare parametric and non-parametric statistics with examples. 15+25=40

2019
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.

Group—A

Attempt *any two* of the following questions: 25×2=50

1. Discuss the important steps towards the decipherment of the Persian cuneiform inscriptions. 25

2. Trace the influence of Persian on Bengali language. 25

3. Write notes on *any three* of the following: 25

(a) Middle Persian (b) Characteristic features of Zend-Avesta

(c) Naqsh-e-Rustam (d) Affinity between Persian and Sanskrit.

Group—B

Attempt *any four* of the following questions 10×4=40

4. Give the opposite number of *any five* of the following: 2×5

قوم - ضد - قول - شیخ - اشعار - منازل - ملل - صلحا -

5. Illustrate with example *any two* of the following: 5×2

اسم معرفه - فعل مستقبل - صفت ذاتی - تفصیل کلی.

6. Explain the formation of *any five* of the following: 5×2

هوشمند - گلستان - دلنشین - مُرغزاد - خزانچی - ماهرو -

7. Give the uses of ت or ش. 10

8. Form words with *any five* of the following: 5×2

ترین - زار - گاه - بان - وار - تار - ناك

Group–C

9. Translate the follwing passage into English: 30

کبوتر ها آزاد و شاد، در آسمان پروازمی کردند و از آزادی و بازی در آسمانِ نیلگوں لذت می بردند. پس ازمدتی، برای رفع خستگی روی درختی نشستند. پائین درخت دانه فروان بود. یکی از کبوتران دانه ها را دید. آرام بال گشود و به پائین درخت پرواز کرد. چندتا از دانه ها راخورد. دانه هاتازه و خوشمزه بودند. دوستانِ خود راهم صدا کردتا از این دانه های خوشمزه بخودرند. کبوتر ها پائین بآمد ند. کنار دانه نشستند و مشغول بر چیدنِ دانه شد ند. وقتی که خوب سیر شدند. یکی از کبوتر ان آمادهٔ پرواز شد. بال گشود تا پرواز کند ولی تنوانست. احساس کرد که بندی به پایش گره خورده است. کبوتتر ان دیگر نیز، بال گشو دند تا پرواز کنند ، ولی نخهای دام پای آنها داهم گرفته بود.

کبوتر دانا و هوشیاری که نامش طوقی بود گفت : ای دوستان، حق این بود که وقتی دانه ها را دیدیم بفکرمی افتادیم که این دانه ها را چه کسی آورده است. چرا این همه دانه های تازه و خومزه در پایِ درخت ریخته است. اگر فکرمی کردیم، در دام نمی افتادیم.

10. Translate into Persian, the passage given below: 30

The study of Persian in India has a long history behind it. It commences with the arrival of Muslim adventurers on Indian soil. Abul Farj Runi and Masud bin Saad Salman are considered to be the first two great Persian poets of Indian orgin. Their life and works have already been published from Iran. Masud Saad Salman is said to have left behind three collections of his poems in Persian, Arabic and Hindi. But his Arabic and Hindi Diwans, unfortunately seem to have been lost. Before these two great poets of Indian origin , mention of another Persian poet of Indian origin Abu Abdullah Nokati has also been made in Persian Tazkirahs, but we have no knowledge about him except that he was a native of Lahore and lived in the time of Sultan Masud of Ghazna. When Delhi was made the capital of Muslim rulers in India, the city of Ghazna lost its former glory and became deserted.

11. Define *any three* of the following and give suitable examples. 10×3=30

استعاره - مبالغه - عکس - حسن تعلیل - مذهب کلامی -
ورد مفرق - فاصله صغری.

12. Scan any two of the following verses and name the metre. 10×2=20

(الف) اگر خواهی که گل بینی رخ خود را تماشا کن
و گر میل خزان داری نگاهی جانب ما کن

(ب) خسرو غریب است و گدا افتاده در شهر شما
باشد که از بهر خدا سوی غریبان بنگری

(ج) بشنو از نی چون حکایت می کند
از جدائ ها شکایت می کند

2019
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.
The figures in the margin indicate marks for each question.
Answer may be given either in English or Persian unless otherwise mentioned in the question.

Group—A

Attempt *any four* of the following questions:

1. Discuss the development of Persian literature during the Samanid period. 25

2. Define Ghazal. Describe in brief the history of the origin and development of Ghazal writing in Persian up to the Ilkhani period. 25

3. Estimate the contribution of the Ghaznavid period to Persian prose literature. 25

4. Give an account of Shaikh Saadi's contribution to Persian literature. 25

5. What place do you assign to Jalaluddin Rumi among the sufi poets of Iran. Discuss fully with reference to his Masnavi. 25

6. Assess the contribution of Perveen Itesami to modern Persian poetry. 25

Group—B

7. Explain *any four* of the following: 10×4=40

(الف) آسائس دو گیتی تفسیر ایں دو حرف است
بادوستان تلطف با دشمنان مدارا

(ب) توانا بود هر که دانا بود
ز دانش دلِ پیر برنا بود

(ج) بنی آدم اعضای یک دیگر اند
همان نخل را شاخ و برگ و بر اند

(د) اللّٰه تعالیی ملک را عقل دادبی شهوت وغضب و حیوان را شهوت و غضب بی عقل وانسان را هر دو داد. پس اگر انسان شهوت وغضب راهر مطبع و منقادِ عقل گرداند، رتبهٔ او از ملک اعلی باشد.

(ه) خلافت انسان را بدو چیز منوط است. یکی حکمتِ بالغه که عبادت است از کمال علمی. دوم قدرت فاجله که عبارت است از کمال عملی.

8. Write shorts notes in Persian on *any four* of the following: 15×4=60

دقیقی بلخی - منو چهری دامغانی - امام غزالی - قابوس نامی
چهار مقاله - آئین اکبری - محمد تقی بهار - نلد من فیضی.

2019

MSC(O)PH-I/19

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 same language.*

Answer any FIVE Questions, taking at least TWO, from each Group.

GROUP-A

1. Explain Aristotle's doctrine of four causes. Are the four causes reducible to only two causes ? Justify your answer. **30+10**

2. What do you mean by Innate ideas ? How does Locke refute the doctrine of Innate ideas ? How for Locke's position is acceptable ? **10+20+10**

3. Distinguish between analytic and synthetic judgements after Kant. Are synthetic apriori judgements possible ? — Discuss after Kant. **20+20**

4. Write notes on any two of the following :-

   a) Descartes' theory of mind-body dualism.

   b) Berkeley's thesis 'esse est percipi'.

   c) Leilenitz's concept of Monad.

   d) Hume's theory of causation as 'constant conjunction'.

   20+20

GROUP-B

5. Explain the basic tenets of Jaina 'Syādvāda' and 'Saptabhangīnaya'. How is Syādvāda related to Anekāntavāda ? **15+15+10**

6. Explain the nature of Vyāpti after Nyāya Philosophy. How is Vyāpti Known ? Discuss after Nyāya Philosophy. **15+25**

7. Discuss, after Śaṅkara, the nature of Brahman with reference to the distinction between Saguṇa and nirguṇa Brahman. **40**

8. Write notes on any two of the following :

   a) Cārvāka 'bhūta-caitanya vāda'

   b) Vaiśeṣika view of Sanavāya (inherence)

   c) Buddhist doctrine of 'not-self' (nairātmā)

   d) Different types of Cittabhūmi as discussed in Yoga Philosophy.

   20+20

2019

MSC(O)PH-II/19

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 same language.*

GROUP-A

Answer any THREE Questions.

1. a) What is liberty ?
   b) How is liberty related to equality and justice ?
   — Discuss after Mill and Locke. 15+25

2. Can there be any right without duties ? Answer, taking into consideration the various types of rights. 40

3. a) Distinguish between Socialism and Democracy.
   b) How far these political ideologies be reconciled ?
   — Discuss. 20+20

4. Write a critical note on the various senses and applications of 'Secularism' with reference to India. 40

5. Write Short Notes on any two of the following :
   a) Gandhi's concept of ahimsā,
   b) Ambedkar's view of social justice,
   c) Mid-body dualism,
   d) Importance of prāṇāyāma and āsana of Yoga Philosophy. 20x2

GROUP-B

Answer any TWO Questions.

6. Explain critically the nature and varieties of Utilitarianism following Mill and Benthum. 40

7. a) What is Ethics ?
   b) What is Environmental Ethics ?
   c) Discuss anatytically the various aspects of Bio-centric Ethics and Eco-centric Ethics. 5+5+30

8. a) Write a short note on four pursuits of life (puruṣartha-s).
   b) Write a critical note on the Sāṁkhya view of liberation. 20+20

2019

MSC(O)PO-I/19

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 same language.*

Group - A

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

1. Attempt an analysis of Rousseau's concept of General will. How does it end in autocratic rule? 40

2. Discuss Ambedkar's views regarding the importance of social democracy. 30

3. Critically examine the role played by pressure groups in a democracy. Give suitable examples. 30

4. Identify the major weaknesses of environmental movements in India. 30

Group - B

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

5. To what extent has grass roots democracy been in India ensured following the adoption of the 73rd Constitution Amendment Act? 40

6. Discuss the provisions regarding right to equality as laid down in the Constitution of India. What should be the foundations of reasonable classification. 30

7. Identify the salient features of the Indian Constitution. 30

8. What do you understand by a PIL? Do you think that PIL in quite recent years has entered into the jurisdiction of the Executive? 30

2019

MSC(O)PO-II/19

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 same language.*

Group - A

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

1. Answer any five from the following:

   (a) Why is Scientific Management theory of organization termed as 'Scientific'?

   (b) Do you think that Weber's theory of Bureaucracy and Development Administration cannot go together? If so, explain why.

   (c) Why did Simon say that the principles of organization developed by the classical theorists contradict each other? Give examples to clarify your answer.

   (d) 'In Simon's decision - making model bad-decisions replace good decisions'.Explain

   (e) Comment on PIL's role in enforcing judicial control over administration in India.

   (f) Examine the role of Chief Secretary in state administration in India.

   (g) Discuss critically the two types of challenge that the District Magistrate had been facing since the 60s of the last century from development administration and democratic decentralization.

   (h) What are the distinctive features of All-India Services in Indian administration? 8x5

2. Define Civil Society. How does Civil Society act as a check on and guide of public administration? 30

3. Make a comparative study of the position, power and role of Cabinet Secretary and Chief Secretary in Union and state administration respectively. 30

4. Write a brief note on the relationship between the Secretariat and the Directorate. 30

Group - B

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

5. Answer any five from the following :

   (a) What are the instruments by which Balance of Power is maintained in International Relations?

   (b) 'In the present context Unipolarity is an abstract concept'. Do you support this proposition? Give your arguments fully.

   (c) How does Neo-colonialism differ from old colonialism. Give examples.

   (d) What principles and objectives of the United Nations are laid down in Article 1 of the U.N. Charter?

P.T.O.

(e) How would you explain the factors that led to the collapse of the then Soviet Union?

(f) Was the Non-Aligned Movement really non-aligned in nature during and even after the Nehru era? Give examples in support of your answer.

(g) What is Detente? When and why did it emerge?

(h) Write a short note on ISIS as an organization of International Terrorism. 8x5

6. Make a critical evaluation of India's foreign policy during 2014-19 period. 30

7. Write a critical essay on the emerging stratetic alliance of India - Japan - United States indicating its impacts on Chinese foreign policy. 30

8. Discuss the origin, role and success of SAARC. 30

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 same language.*

GROUP – A

Answer any three questions :-

1. (a) Differentiate between inertial and non-inertial frames of reference. Explain with examples.

   (b) Show that in the northern hemisphere the Coriolis force deflects a freely falling body of man m towards the east and has the magnitude $2 m v \omega \cos\lambda$ where v is the magnitude of the downward velocity at latitude λ and ω is the angular velocity of earth.

   (c) Show that the gravitational potential at an external point P, distant r from the centre of a homogeneous spherical shell of man M and radius R is given by $V = -\frac{GM}{r}$ $(r > R)$

   where G is the Universal Gravitational constant.

   (d) If a body is to be projected vertically upwards from earth's surface to reach a height of 10 R, (R being the radius of the earth), how much velocity should it be given ? $[R = 6.4 \times 10^6 \text{ m}]$

   (e) State and explain parallel axis theorem.

   (f) Define cyclic coordinates with suitable example. 6+8+8+8+5+5

2. (a) Describe briefly Michelson-Morley experiment with a suitable schematic diagram and comment on the significance of the negative results obtained.

   (b) Write down the expressions of length contraction and time dilation explaining the relevant symbols.

   (c) A vector in a reference frame S' is represented by $8\hat{i} + 6\hat{j}$. How can the vector be represented in a reference frame S with respect to which S' is moving with a velocity $0.8 c\hat{i}$. Assume $\hat{i}$ and $\hat{j}$ are unit vectors in the direction of relative motion between S and S' and perpendicular to it, respectively.

   (d) Show that the relati istic kinetic energy (T) of a particle of rest man (m_0) moving with velocity v is

   $$T = m_0 c^2 \left[\frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} - 1 \right]$$

   where c is the velocity of light.

   (e) Calculate the speed of an electron which has kinetic energy 2 MeV. (8+4)+6+6+10+6

3. (a) State Gauss' law and apply it to determine the electric field '$\vec{E}$' at a perpendicular distance 'r' from a straight infinitely long wire with a charge λ per unit length.

   (b) What is an electrical image ? Comment on its usefulness in solving electrostatic problems.

   (c) A conducting sphere carrying a charge 'q' is placed inside a linear, homogeneous, isotropic dielectric of relative permittivity 'K'. Determine the polarization of the dielectric. Hence determine the volume and surface charge (polarization) densities.

P. T. O.

(d) Explain the phenomenon of hysteresis in a fenomagnetic material with a suitable diagram.

(e) A thin circular disc of radius R lies in the xy plane with its centre at the origin. The disc has a surface charge density $\sigma(r,\theta) = \sigma_0 r\cos\theta$ where θ is the angle made by the position rector $\vec{r}$ with the diameter chosen as the x-axis. Calculate the dipole moment of the disc.

(f) State & prove Poynting's theorem. 6+4+7+7+6+10

4. (a) Write down the first and second TdS equations in thermodynamics. Hence show that for an isentropic transformation

(i) $\left(\frac{\partial V}{\partial T}\right)_S = -\frac{C_v}{C_p - C_v}\left(\frac{\partial V}{\partial T}\right)_P$

(ii) $\left(\frac{\partial P}{\partial T}\right)_S = \frac{C_p}{C_p - C_v}\left(\frac{\partial p}{\partial T}\right)_v$

(b) 10 gm. of water at 60°C is mixed with 30 gm. of water at 20°C. Calculate the change in entropy of the system.

(c) Obtain the Clausius-Clapeyron equation and mention its significance.

(d) Explain why the Joule-Thomson expansion is often regarded as "quasi-static isenthalpic process".

(e) Show that the Joule-Thomson coefficient 'μ' is given by

$$\mu = \left(\frac{\partial T}{\partial p}\right)_H = \frac{1}{C_P}\left[T\left(\frac{\partial V}{\partial T}\right)_P - V\right]$$

where symbols have usual meaning. (4+4+4)+8+8+4+8

5. (a) Write down the system matrix for a thin lens of focal length 'f'. A thin convex lens of focal length f_1 = 10 cm. is separated by 5 cm. from a thin concave lens of focal length f_2 = -10 cm. Calculate the system matrix and the equivalent focal length of the combination.

(b) Explain what do you mean by spatial and temporal coherence.

(c) Draw a schematic diagram for Newton's ring apparatus and obtain an expression for radius of n^{th} dark ring.

(d) What is Brewster's angle ? Explain the phenomenon of double refraction.

(e) A diffraction grating used at normal incidence gives a green line (5400 Å) in a certain order superimposed on the violet line (4050 Å) of the next higher order. If the angle of diffraction is 30°, how many lines/cm. are there in the grating ? (5+3)+(4+4)+10+(3+3)+8

6. (a) It is known that the magnetic field $\vec{B}$ is derivable from a vector potential $\vec{A}$, according to the relation $\vec{B} = \vec{\nabla} \times \vec{A}$ Hence calculate $\vec{B}$ if $\vec{A} = e^{-x}\sin y\,\hat{i} - (1+\cos y)e^{-x}\,\hat{j}$

(b) Show that the force $\vec{F}$ acting between two infinitely long parallel conductors carrying currents i_1 and i_2, separated by a distance 'd' is given by $F = \mu_0 \frac{i_1 i_2}{2\pi d}$ where μ_0 is the permeability of free space.

(c) A dc voltage of 80V is switched on to a circuit containing a resistance of 5Ω in series with an inductor of inductance 20 H. Calculate the rate of growth of current at the instant when the current is (i) 6 A and (ii) 16 A.

Contd...P/3.

(d) Obtain an expression for instantaneous current in a series L-C-R circuit with an alternating current source. Hence obtain the condition of resonance.

(e) Define mutual inductance and define its SI unit. Calculate the mutual inductance between the primary and secondary coil of a solenoid. 5+7+8+(8+2)+(4+6)

GROUP - B

Answer any two questions :-

7. (a) A bead slides without friction on a frictionless wire in the shape of a cycloid with equations $x = a(\theta - \sin\theta)$, $y = a(1+\cos\theta)$ where $0 \leq \theta \leq 2\pi$. Find the lagrangian of the system and the lagrange's equation of motion.

(b) Consider two identical simple harmonic oscillators which are coupled together. Their kinetic and potential energies are given by

$$T = \frac{1}{2}m\,(\dot{q}_1^2 + \dot{q}_2^2)$$

$$V = \frac{1}{2}k\,(q_1^2 + q_2^2) - hq_1q_2$$

Calculate the Hamiltonian of the system.

(c) Define moment of inertia and radius of gyration. Calculate the moment of inertia of a circular disc of radius "R" about an axis passing through its centre and perpendicular to its plane.

(d) Show that a shearing stress is equivalent to an extensional stress and a compressional stress at right angles to each other.

(e) Deduce Poiseuille's formula for the streamline flow of a liquid through a capillary tube. Hence calculate the rate at which water flows through a capillary tube of length 0.5 m with an internal diameter of 1 mm. Coefficient of viscosity is 1.3×10^{-3} kg/m-sec. The pressure head is 20 cm. of water. 7+7+(4+4)+6+(10+2)

8. (a) Differentiate between stimulated and spontaneous emissions.

(b) Define phase velocity and group velocity. Show that

$$v_g = v_p - \lambda \frac{dv_p}{d\lambda}$$

where v_g is group velocity and v_p is phase velocity, λ is the wavelength.

(c) Calculate the wavelength shift in the relativistic Doppler effect for the Hα (6563 $\mathring{A}$) line emitted by a star receding from the earth with a relative velocity 0.1c, where c is the velocity of light.

(d) State and explain what is meant by Gibb's phase rule. Explain why entropy increases in all natural processes.

(e) The density of iodine at the boiling point (458.3 K) is 3.71 gm/cc and latent heat of vapourisation is 40.9 cal/gm. If the boiling point changes by $1^{\circ}C$ for a change of pressure of 17 mm of Hg, use Clapeyron's eqn to calculate the specific volume of the vapour. 6+(4+4)+8+(5+5)+8

P. T. O.

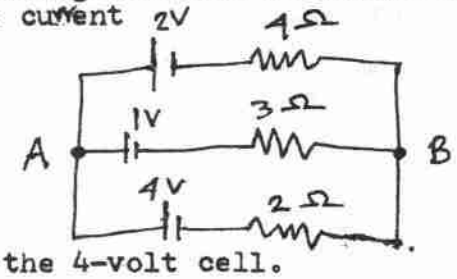
9. (a) In a frame S, the following two events occur :-

Event 1 : $X_1 = X_o$; $t_1 = \frac{X_o}{c}$ and $y_1 = Z_1 = 0$

Event 2 : $X_2 = 2X_o$; $t_2 = \frac{X_o}{2c}$ and $y_2 = Z_2 = 0$

Find the velocity of the frame S' (tort S) in which these two events occur at the same time. What is the value of t in S' at which these events are simultaneous ?

(b) Three cells are connected in parallel with similar poles connected together with wires of negligible resistances. The emfs of the cells are 2, 1 and 4 volts respectively and the corresponding internal resistances are 4Ω, 3Ω and 2Ω. Find the current through the 4-volt cell.



(c) Define Q-factor of an ac circuit. How is it related to sharpness of resonance ?

(d) Apply Ampere's circuital law to find the magnetic field inside a toroid (endless solenoid).

(e) Explain how the concept of displacement current was introduced by Maxwell. What is its physical significance ?

10+6+(4+4)+8+(4+4)

10. (a) State and explain Fermat's principle. Hence obtain the laws of refraction.

(b) Show that for a system of particles the total kinetic energy is

$$T = \frac{1}{2} MV^2 + \frac{1}{2} \sum_i m_i \vec{v}_i'^2$$

where symbols have usual meaning.

(c) Derive the equation of continuity for fluid motion.

(d) What would be the pressure inside a small air bubble of 0.1 mm radius situated just below the surface of water. (Surface tension of water is 0.072 N/m and atmospheric pressure $= 1.013 \times 10^5$ N/m^2)

(e) Calculate the work done in twisting a steel wire of radius 1 mm and length 0.25 m through 45°. Given, modulus of rigidity for steel $\eta = 8 \times 10^{10}$ N/m^2.

(4+8)+8+8+6+6

§§§§§§§§§§§§§§§§§

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 same language.*

Group - A

Answer any six questions

1. (a) Explain the concept of wave particle dualism. What led de-Broglie to suggest that matter has wave characteristic. 2+3

   (b) Calculate the de-Broglie wavelength of an electron moving with velocity $\frac{3}{5}c$. 5

2. (a) State and explain uncertainty principle. Discuss its significance and importance. 2+3

   (b) Assume that the uncertainty in the position of a particle is equal to its de-Broglie wavelength. Show that uncertainty in the velocity is equal to its velocity. 5

3. (a) A linear harmonic oscillator moves with a constant enerty along the x-axis. What will be the phase trajectory. 5

   (b) The single particle partition function of a system of N distinguishable particles is $F=CV\,T^{3/2}$ When c is a constant. Calculate the internal energy and the pressure of the system. 5

4. (a) What is Binding Energy and why the BE curve is so significant. Why do we get maxima and minima peaks in BE curve. 3+2

   (b) Explain the term atomic mass unit. Compute the energy of 1 a.m.u. in MeV. 5

5. (a) What are the similarities and dissimilarities between nuclear fission and fusion. Explain with examples. 5

   (b) Calculate the energy released by fission of 1 Kg of u^{235} in KWH. The energy released per fission is 200 MeV and Avogadro's number is 6.023×10^{23}. 5

6. (a) Why X-rays are used for crystal structure analysis. Derive Bragg's law of crystal diffraction. 2+3

   (b) Prove that in determining lattice parameters, the greater the diffraction angle, the greater is the accuracy. 5

7. (a) Derive the low temperature behaviour of lattice contribution to the specific heat of solid. 5

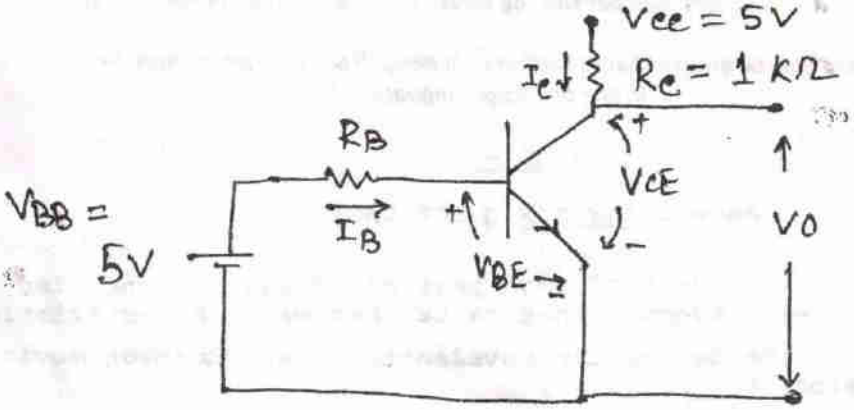
   (b) The molar specific heat of solid at constant volume is 2.77 $JK^{-1}\,mol^{-1}$ at 36.8K. Determine the debye temperature of the solid. 5

8. (a) What is an OPAMP? Why is it so called? What is CMRR of an OPAMP? 2+1+2

   (b) Draw the circuit using two OPAMPs whose output V_o is given as $V_o = 4V_1+6V_2$, where V_1 and V_2 are two input singals. 5

P.T.O.

9. (a) For the transistor in the Circuit $B=h_{FE}=50$, $V_{BE,Sat}=0.8v$ and $V_{CE,Sat}=0.2v$. Find the limiting value of R_B for which the transistor will be driven into saturation



5

(b) (i) Convert the decimal 263 into a number system consisting of five digits 0,1,2,3,4.

(ii) Prove that $A \oplus B = \bar{A} \oplus \bar{B}$ 2½x2

Group - B

Answer any seven questions

10. (a) Establish Schrödinger equation of a linear harmonic oscillator and solve it for different eigenvalues. Discuss significance of zero point energy. 8+2

(b) Show, by solving Schrödinger equation that a free particle cannot have negative energy. 5

(c) Using the operator representation of the x - component of the momentum of a particle prove that,

$(x\hat{P}_x - \hat{P}_x x)\Psi = i\hbar\Psi$, where Ψ is an wave function. 5

11. (a) State and explain pauli's exclusion principle. How does a knowledge of symmetric and anti-symmatric wave functions lead to this principle. 2+6

(b) Show that no two electrons have same quantum state. 2

(c) What is Raman effect? How is Raman effect explained on the basis of quantum thery? Explain the origin of stokes and Anti-stokes lines in Raman Spectrum. Why are the anti-stokes line fainter than stokes lines. 2+3+3+2

12. (a) Write down Bose-Einstein and Fermi-Dirac distribution functions. What are the basic assumptions used in the derivation of these distribution functions. Sketch the FD distribution Function for T=0 K and T> OK. 3+3+4

(b) If f is the FD distribtion functiin, show that

$$\frac{df}{dE} = -\frac{f(1-f)}{K_B T}$$ 4

(c) Show that at a high temperature and low concentrations the FD distribution reduces to the MB distribution. 6

Contd..P/3..

13. (a) Starting from Bose-Einstein distribution formula Establish Planck's law of black body radiation and hence derive Wier's displacement law. 8+2

(b) Calculate the Fermi energy at OK of metallic silver containing one free electron per atom. The density and atomic weight of silver is 10.5 g/cm^3 and 108 respectively. 6

(c) At the same temperature, which will exert the greatest and and the least pressure - a gas obeying MB statistics, a gas of Bosons, and a gas of fermions? 4

14. (a) Give the main assumptions of liquid drop model of the nucleus, Justify the name liquid drop model. 2+3

(b) Obtain the expression for binding energy of a nucleus based on liquid drop model. State semi-emperical formula of Weizacker. 10

(c) Using the semi-emprical binding energy formula calculate binding energy of $^{40}_{20}Ca$.

(Given a_v = 14 Mev, a_s = 13 Mev, a_c = 0.60 Mev, a_a = 19 Mev, a_p = -34 Mev) 5

15. (a) What do you mean by Q-value of a nuclear reaction? Discuss the energetics of endoergic and exoergic reactions. Define threshold energy of an endoergic reaction. 2+2+6

(b) Calculate the Q value for the formation of P^{30} in the ground state in the reaction $Si^{29}(d,n)P^{30}$ from the following cycles of nuclear reactions.

$$P^{31} + \gamma \longleftrightarrow P^{30} + n - 12.37 \text{ Mev}$$

$$P^{31} + P \longrightarrow Si^{28} + He^4 + 1.909 \text{ Mev}$$

$$Si^{28} + d \longrightarrow Si^{29} + P + 6.246 \text{ Mev}$$

$$2d = He^4 + 23.834 \text{ Mev}.$$

10

16. (a) Explain the motion of electron in one dimension accending to the Bond theory and show how the energy, velocity and effective mass vary as a function of wave vector. 2+(3+3+2)

(b) What are valence and conduction bands? What do you mean by forbidden energy gap. 2+3

(c) What are Brillouin Zones? Discuss the importance of the first Brillouin Zone. 2+3

17. (a) What is ferromagnetism? Derive the Curie-Weiss law of ferromagnetism and explain how magnetic susceptibility varies with temperature. 2+8

(b) What is superconductivity? Explain the effect of an external magnetic field on the superconducting state of a material. 2+6

(c) What is the difference between a conductor cooled at OK and super-conductor. 2

P.T.O.

18. (a) What do you mean by feed back in Amplifiers. Derive the expression for the overall transfer gain of a negative feed back amplifier. 2+6

(b) Find the expression for the frequency of oscillation of Wien Bridge Oscillator. Show that the voltage gain of the amplifier used in this oscillator must be greater than 3. 4+4

(c) A Wien Bridge Oscillator is to be operated in the frequency range 30 Hz to 3 KHZ. The variable capacitance has a range 50 PF to 500 PF. Find the resistance values required. If the resistances in the other arms are in the 5:1, find out the gain of the amplifier. 4

19. (a) Define positive and negative logic systems. Draw the circuit diagram of a positive diode logic AND gate. Explain its operation. Show that a negative logic OR gate is the same circuit as a positive logic AND gate. 2+3+2+3

(b) Draw a logic circuit using NOR gates to implement the Boolean expression $Y = AB + \bar{B}\bar{C}$ 5

(c) Prove the following using Boolean algebraic theorems

(i) $\bar{A}BC + A\bar{B}C + AB\bar{C} + ABC = AB+BC+CA$

(ii) $\overline{AB} + \bar{A} + AB = 1$. $2\frac{1}{2}\times2$

2019

MSC(O)PY-I/19

PHYSIOLOGY– 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 same language.*

GROUP –A

Answer any three questions :-

1. (a) Explain the working principle of acid-base indicator. Mention the biological significance of buffers in human body.

   (b) "Glucose and galactose are epimers of each other"- explain. What are reducing sugars ? Explain what happens if glucose is heated with strong mineral acid and dilute aqueous alkali. Write in brief about anomerism and epimerism.

   (c) Classify lipoproteins and state their physiological function. (4+6)+(3+4+5+8)+10

2. (a) Write down the chemical structure of the branch point of a starch molecule having α-1,4 and α-1,6 glycosidic linkages. Explain why concentrated sucrose solution is used as preservative.

   (b) Describe the process of β-oxidation of odd carbon saturated fatty acids. Describe the mechanism of action of pyruvate dehydrogenase stating the involvements of its various components and cofactors.

   (c) Distinguish between transamination and deamination. Describe the role of pyridoxal phosphate in transamination reaction. (6+4)+(12+8)+(3+7)

3. (a) What are vitamins ? Describe the symptoms of vitamin D deficiency in children and adults.

   (b) Describe the deficiency symptoms of vitamin C, sodium and potassium in an adult human.

   (c) Discuss the functions of vitamin B 12 in human body. What are functions of vitamin K ? (2+10)+(6+6+6)+(5+5)

4. (a) Describe the process of development of erythrocytes and discuss the factors influencing it.

   (b) Describe the functions of red blood corpuscles and platelets.

   (c) Classify plasma proteins. What is plasmapheresis ? Discuss the important functions of plasma proteins. (6+6)+8+(6+4+10)

5. (a) Explain genesis of normal ECG of cardiac muscle.

   (b) Describe the Stannius ligature experiment.

   (c) Discuss with diagram the pressure and volume changes in heart at different phases of cardiac cycle. 12+8+(10+10)

P. T. O.

GROUP - B

Answer any two questions :-

6. (a) Describe the CO_2 dissociation curve and its regulation.

   (b) What is "Functional Residual Capacity ? State its significance.

   (c) Discuss the mechanism of CO_2 transport in the blood. What do you know about chloride shift and reverse chloride shift.

   10+(3+7)+(10+5+5)

7. (a) Describe the non-excretory functions of kidney.

   (b) State briefly the principle of glomerular filtration.

   (c) Discuss the counter current mechanism in renal tubule for concentrating urine.

   (d) State the differences between cortical and juxta medullary nephron. Describe the structural peculiarities of epithelial cells in human renal tubule.

   12+8+10+(5+5)

8. (a) Discuss the mechanism of energy production in different steps of citric acid cycle. Name three inhibitors of the cycle and mention their site of action.

   (b) Mention the differences between hexokinase and glucokinase. What do you know about mutarotation ?

   (c) Discuss the basis of primary and secondary immune responses.

   (14+6)+(5+5)+10

9. (a) Discuss the principles of formulation of balanced diet.

   (b) Discuss the role of iodine in human body. What are major functions of calcium ?

   (c) Describe the physiological basis of ABO blood group system. What is erythroblastosis foetalis ?

   (d) Explain FEV and FVC with diagrams.

   10+(5+5)+(7+3)+10

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2019

MSC(O)PY-II/19

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 same language.*

GROUP – A

Answer any six questions :-

1. (a) Discuss the origin, course, termination, functions of tract of Goll & Burdach. 10

   (b) Discuss the molecular basis of synaptic transmission. 10

2. (a) Discuss the excitation-contraction coupling of skeletal muscle. 10

   (b) Draw, label, discuss the histological structure and functions of cerebellum. 10

3. (a) Discuss the different types of GABA receptors and their mode of actions. 10

   (b) Discuss the effects of lesion of upper and lower motor neurons. 10

4. (a) Discuss the physiological basis of REM sleep. 10

   (b) Discuss with diagram the origin, course, termination of auditory pathway. 10

5. (a) Draw, label and discuss the visual pathway. 10

   (b) Discuss the neurophysiology of learning and memory. 10

6. (a) Draw, label and discuss the nervous pathway of taste sensation. 10

   (b) Draw, label and discuss the functions of vestibular apparatus and cochlea. 10

7. (a) Discuss the body temperature regulation mechanism in human. 10

   (b) Discuss the physiological changes that occur in humans in extreme hot and cold climate. 10

8. Short notes (any four) :-

   (a) Webner Flechner Law
   (b) Cerebro spinal fluid
   (c) Electro retinogram (ERG)
   (d) Argyll-Robertson Pupil
   (e) Triple response
   (f) Parkinson's disease. 5 x 4

P.T.O.

GROUP - B

Answer any four questions :-

9. (a) Discuss the synthesis, storage and release of insulin from pancreas. 10

   (b) Discuss the metabolic basis of diabetes mellitus. 10

10. (a) Discuss the structure and functions of parathormone. 10

    (b) Compare the structure-functions of estrogen and progesterone. 10

11. (a) Compare the active principles, functions of adrenal cortex and adrenal medulla. 10

    (b) Discuss the role of hormones in breast development and in lactation. 10

12. (a) Discuss the role of hormones in pregnancy. 10

    (b) Discuss the peculiarities of foetal circulation. 10

13. (a) Define static and dynamic work and mention the muscles involved in it. 10

    (b) Discuss the detail the Harvard step test to determine PFI. 10

14. (a) Discuss the major steps to control air, water, sound pollution. 10

    (b) Discuss the major steps taken by the Govt. of India to control goitre. 10

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2019

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. Sketch the classification of Indo-European family of languages by determining their variation into group of type. 30

Or,

Write a comparative note by distinguishing between Vedic and Sanskrit languages through contribution specially in genealogical structure.

2. Define and illustrate *any two* of the following: 10×2=20

(a) Grimm's Law

(b) Assimilation

(c) Vivṛtti

(d) Grassmann's Law

Group-B

3. Explain *any two* of the following jungles in Sanskrit: 10×2=20

(a) कर्तुरीप्सिततमं कर्म

(b) समर्थः पदविधिः

(c) अमुक्तस्यार्थस्य न

4. Account for case ending in *any five* of the underlined words in the following sentences citing relevent Pāṇinian aphorisms on each case: 4×5=20

(a) ग्रामं गच्छन् तृणं स्पृशति।

(b) जपमनु प्रावर्षत्।

(c) पुष्पेभ्यः स्पृहयति।

(d) यागाय याति।

(e) नमस्कुर्मो नृसिंहाय।

(f) नाहं त्वां तृणाय मन्ये।

(g) गृहीत इव केशेषु मृत्युना धर्ममाचरेत्।

5. Name and expound the Compounds on *any five* of the following pauses: 4×5=20

(a) त्रिमुनि

(b) शाकप्रति

(c) वीणापाणिः

(d) अग्नीषोमौ

(e) केशाकेशि

(f) उपगिरम्

(g) खद्वारूढः

6. Justify *any two* of the following in Sanskrit: 10×2=20

(a) वपुषा स धतुर्मुजः।

(b) मानसे रमतां नित्यं सर्वशुक्ला सरस्वती।

(c) तुलां यदारोहति दन्तवाससा।

(d) सिंहो माणवकः।

Group-C

7. Translate into English or Vernacular *any two* of the following: 10×2=20

(a) उप त्वाग्ने दिवे दिवे

दोषावस्तर्धिया वयम्।

नमो भरन्त एमसि।।

(b) सूर्यो देवीमुषसं रोचमानां
मर्यो न योषामभ्येति पश्चात्।
यत्रा नरौ देवयन्तौ युगानि
वितन्वते प्रति भद्राय भद्रम्।।

(c) यो हत्वाहिमरिणात् सप्त सिन्धून्
यो गा उदाजदपधा वलस्य।
यो अश्मनोरन्तरग्निं धधान
संवृक् समत्सु स जनास इन्द्रः।।

Group-D

8. Translate from English into Sanskrit : 30

The oblations are prepared from new grains in the form of a sacrificial cake contained on twelve potsherds for Indrāgnī, a Carn for the Viśvadevas and a cake on one potsherd for heaven and earth.

Or,

Translate into English from Sanskrit: 30

नानाशाखाभिन्न ऋग्वेदः साम्प्रतं शाकल-वाष्कलशाखाद्वयेन विभिद्यमानो विराजते। स ध वेदो दशमण्डलात्मना विभक्तः सन् दशतयीत्वेन संज्ञां प्रपेदे। पुनरपि मण्डलानि ध सूक्तात्मना विभज्यन्ते। अध्यायरूपेण ऋग्वेदो विभक्तो जातः। अष्टौ अध्याय एकात्मकाष्टकत्वं भजन्ते। एवमष्टौ अष्टकानि प्रतिषदयन्ते। अध्यायानां वर्गात्मना विभागो वर्तते। सर्वा भेदकृतिरध्ययनसौकर्याय। प्रयोगे पुनः सूक्तात्मनैव विनियोगः प्रतीयते।

Group-E

9. Write a paragraph in Sanskrit *any one* of the following topics: 20

(a) भारतीयसंस्कृतौ संस्कृतस्योपयोगः।

(b) दूरभाषयन्त्रस्य योगायोग विश्लेषणम्।

(c) संस्कृतसाहित्ये माइकेलमधुसूदनदत्तमहाभागस्य काव्यकृतिः।

2019

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.

*Answer may be written either in **Bengali** or in **English** or in **Sanskrit**.*

All questions carry equal marks.

Asnswer question Nos. 1 and 2 and any *three* from the rest.

1. What do you mean by the "secular hymns" of the Ṛgveda? Give an account of any three of such hymns. 4+36=40

Or,

Write an informative note on Āraṇyaka literature.

2. Write an eleborate note on Vaiśeṣika atomism in Indian philosophy 40

Or,

What is 'Satkāryavāda'? Who advocated this theory? Explain the reasons for admitting this theory? (6+1+33)=40

3. Estimate the value and importance of the Mahābhārata. 40

4. What do you understand by the saying 'उपमा कालिदासस्य'? Enrich your answer with special reference to अभिज्ञानशकुन्तलम् and कुमारसम्भवम्। 40

5. Estimate the merits of Bhavabhūti as a poet and scholar. 40

6. Write an informative note on Bhāsa as a dramatist. 40

7. Write a note on the fundamental doctrine of the Īśāvāsyopaniṣad 40

8. ''राजानभसृजत्'' — Justify the remark according to Manu. Write a comprehensive note on the duties of a king as revealed in the chapter VII of the text Manusaṃhitā 15+25=40

2019

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 remaining ones ignored.

Answer should be given in 'Olchiki' script.

SECTION-A

1. ᱡᱷᱚᱛᱚ ᱠᱩᱠᱞᱤ ᱨᱮᱱᱟᱜ ᱛᱮᱞᱟ ᱚᱞ ᱢᱮ । 5×10=50

(Answer all the questions)

ᱚ) Austric ᱯᱟᱹᱨᱥᱤ ᱜᱷᱟᱨᱚᱸᱡᱽ ᱵᱟᱵᱚᱛ ᱪᱷᱚᱠ ᱛᱟᱞᱟᱛᱮ ᱡᱤᱞᱮᱧ ᱛᱮ ᱚᱞ ᱢᱮ ।

ᱛ) ᱥᱟᱱᱛᱟᱲᱤ ᱯᱟᱹᱨᱥᱤ ᱫᱚ ᱨᱚᱱᱚᱲ ᱞᱮᱠᱟᱛᱮ ᱥᱟᱡᱟᱣ ᱟᱠᱟᱱᱟ, ᱫᱟᱹᱭᱠᱟᱹ ᱥᱟᱞᱟᱜ ᱚᱞ ᱢᱮ ।

ᱜ) ᱚᱞ ᱪᱤᱠᱤ ᱟᱠᱷᱚᱨ ᱨᱮᱭᱟᱜ ᱱᱟᱜᱟᱢ ᱚᱞ ᱥᱚᱫᱚᱨ ᱢᱮ ।

ᱝ) ᱟᱲᱟᱝ ᱥᱟᱨᱮᱥ ᱢᱚᱦᱚᱞ ᱨᱮᱭᱟᱜ ᱚᱡᱮ ᱠᱚ ᱚᱞ ᱢᱮ ।

ᱞ) ᱥᱟᱱᱛᱟᱲᱤ ᱨᱚᱲ ᱥᱟᱹᱦᱤᱛ ᱞᱟᱦᱟᱱᱛᱤ ᱨᱮᱱᱟᱜ ᱯᱟᱱᱛᱮᱭᱟ ᱠᱚ ᱚᱞ ᱥᱚᱫᱚᱨ ᱢᱮ ।

2. ᱡᱟᱹᱦᱟ ᱜᱮ ᱵᱟᱨᱭᱟ ᱠᱩᱠᱞᱤ ᱨᱮᱭᱟᱜ ᱛᱮᱞᱟ ᱚᱞ ᱢᱮ । 2×25=50

(Answer any two)

ᱚ) ᱯᱟᱹᱨᱥᱤ ᱫᱚ ᱚᱠᱟ ᱠᱚ ᱢᱮᱛᱟᱜ-ᱟ ? ᱨᱚᱲ ᱯᱟᱹᱨᱥᱤ ᱟᱨ ᱚᱞ ᱯᱟᱹᱨᱥᱤ ᱨᱮ ᱪᱮᱫ ᱯᱷᱟᱨᱟᱠ ᱠᱚ ᱢᱮᱱᱟᱜ-ᱟ ᱚᱞ ᱢᱮ ।

ᱛ) ᱧᱩᱛᱩᱢ ᱫᱚ ᱚᱠᱟ ᱠᱚ ᱢᱮᱛᱟᱜ-ᱟ ? ᱧᱩᱛᱩᱢ ᱨᱮᱭᱟᱜ ᱦᱟᱹᱴᱤᱧ ᱠᱚ ᱫᱟᱹᱭᱠᱟᱹ ᱥᱟᱞᱟᱜ ᱚᱞ ᱢᱮ ।

ᱜ) ᱯᱟᱹᱨᱥᱤ ᱥᱟᱹᱨᱮᱥ ᱨᱮᱭᱟᱜ ᱚᱱᱚᱥᱚᱞ (Definition) ᱯᱩᱥᱴᱟᱹᱣ ᱛᱮ ᱚᱞ ᱥᱚᱫᱚᱨ ᱢᱮ ।

ᱝ) ᱯᱟᱹᱨᱥᱤ ᱥᱤᱥᱡᱚᱱ ᱵᱟᱵᱚᱛ ᱯᱚᱱᱰᱤᱛ ᱠᱚᱣᱟᱜ ᱠᱟᱛᱷᱟ ᱠᱚ ᱚᱞ ᱥᱚᱫᱚᱨ ᱢᱮ ।

SECTION-B

3. ᱡᱷᱚᱛᱚ ᱠᱩᱠᱞᱤ ᱨᱮᱱᱟᱜ ᱜᱮ ᱛᱮᱞᱟ ᱚᱞ ᱢᱮ । 5×10=50

ᱚ) ᱥᱟᱱᱛᱟᱲᱤ ᱥᱟᱹᱦᱤᱛ ᱨᱮᱱᱟᱜ ᱟᱥᱚᱞ ᱟᱥᱚᱞ ᱛᱮᱸᱛᱮᱫ ᱫᱚ ᱚᱠᱟ ᱠᱚ ᱠᱟᱱᱟ ? ᱯᱩᱥᱴᱟᱹᱣ ᱛᱮ ᱚᱞ ᱢᱮ ।

 Please Turn Over

O) ଦ୍ରବଣରେ ହେଉଥିବା ହ୍ରାସକୁ ଜଳ ୱାଗ୍ରେରେ ଥିବା ଡ଼ି.ପି ଏଡ଼ିଥା ଜଣାନ୍ତୁ ଯାହା ହେଉଛନ୍ତି ଯେ ।

G) ହି.ଫ୍ରାଡ଼ ଆଜାଣ୍ଟିମ୍‌ଫ୍ରି ପାଡ଼ାପାଡ଼ି ଜଳ ଯାହାରେ, ଡ଼ି.ପି ୱାଗ୍ରେରେ ଥିବା ହେଲ୍ଥଏଜ୍ ହ୍ୟାଲ୍‌ଥରେ ଦ୍ରବଣରେ ଯାହା ହେଉଛନ୍ତି ଯେ ।

S) ହେଲ୍ଥଏଜ୍ ଆଇନ୍‌ରେ ଥିବା ଜଣେ ଅଧିକାରୀ ଜଣେ ଅଧିକାରୀଙ୍କୁ ଯାହା ଅଧିକାର ଦେଇଥାଏ ତାହାକୁ ଦ୍ରବଣରେ ଯାହାପ୍ରତି ଦେ ଯାହା ।

P) 'ହେଡ୍‌ହେଲ୍ଡ ଫିଜ୍‌ିସ୍' ହେଲ୍‌ରେ ଜଣେ ୱାଡ଼ଓ୍ୱାଡ଼ ଜେଲ୍‌ରେ ଥାଏନ୍ତି, ଜେଲ୍‌ରେ ଆଇନ୍‌ରେ ଜ୍ୱରାଗ୍ରସ୍ତ ଦେଖିବା ଯାହା ଦେ ।

4. ୱାଣ୍ଟ୍‌ଯୋ ଜେ ଦ୍ରବାଣ୍ଟରେ (ଯ) ଚ୍ଚଚ୍ଚଏ ଆଇନ୍‌ରେ ଦେଏଥିବା ଯାହା ଦେ । 2×25=50

(Answer any two)

ଅ) ଦ୍ୱାଜ୍ଞ ୱାଣ୍ଟ୍‌ଜ୍ଞାଣ ଜେଲ୍‌ରେ ଦ୍ରବାଣ୍ଟଦେ ଅଣ୍ଟିଅଦ୍ୱାରେ. ୱାଟ୍ଜ ହେଣ୍ଟ୍‌ଜ୍ଞାଯ ଯ ଯୋଜାଦ୍ରବ ଚଣ୍ଟାରେ ଘ୍ରଯାଣ୍ଟ.ଜ ଦେ ଯାହା ।

O) ୱାଣ୍ଟ—ୱାଜ ୱାଜ୍ଞାଣ୍ଟାଗ୍ରେଣ୍ଟ.ଜ ଆଜ ଚଣ୍ଟାଜ୍ଞାଦ ଦ୍ୱାଯୋଦ୍ୱା ଆଇନ୍‌ରେ ଚଣ୍ଟ.ପି ଏଡ଼ିଥା ଚଜ ଯାହା ।

G) ପ୍ଟାଣ୍ଟା. ଜେଦ୍ରାଦେ ଜ୍ଜ ୱାଯେ ଘ୍ରଏଚଜ୍ଞ ଚଣ୍ଟାରେ ? ୱାଯ୍ଜ ୱାଯ୍ଜ ଚଜ ଯାହା ଅଚଣ୍ଟାରେ ଯାହାପ୍ରତି ଦେ ଯାହା ହେଉଛନ୍ତି ଯେ ।

S) ଝଣ୍ଟାଚଯ ଯଣ୍ଟ.ଜେଯାହ ୱାଝଝ୍ଜଜ ହେଜ୍ଜଯେ ଜଳ ଯାହାରେ ଜଣେ ହେଲ୍ଥଏଜ୍ଞ ଚଣ୍ଟ.ପି ଏଡ଼ିଥା ଯାହା ହେଉଛନ୍ତି ଯେ ।

2019

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 remaining ones ignored.

Answer should be given in 'Olchiki' script.

[illegible]

(Answer *any four* out of six questions, Question No.1 of Section–A and question No.4 of Section–B are compulsury)

SECTION-A

1. [illegible] 5×10=50

[illegible] [illegible]

[illegible] [illegible] (Stanza) [illegible]

[illegible] [illegible]

[illegible] [illegible]

[illegible] [illegible]

[illegible]

[illegible]

2. [illegible] 25

[illegible] 25

Please Turn Over

3. ᱚ. ᱵᱤᱫᱩ ᱫᱚ ᱚᱠᱟᱨᱮᱭ ᱠᱟᱹᱢᱤ ᱠᱟᱱ ᱛᱟᱸᱦᱮᱛ ? ᱚᱱᱟ ᱠᱟᱹᱢᱤ ᱵᱟᱹᱜᱤ ᱠᱟᱛᱮ ᱮᱴᱟᱜ ᱜᱟᱣ ᱛᱮ ᱡᱮᱯᱟᱜ ᱫᱟᱞᱟᱡ ᱮᱱᱟ ? ᱵᱤᱫᱩ ᱨᱩᱫᱟᱹᱣ ᱟᱹᱜᱩ ᱞᱟᱹᱜᱤᱛ ᱫᱟᱸᱵᱟᱜ ᱟᱜ ᱠᱟᱹᱢᱤ ᱚᱞ ᱢᱮ ।

25

ᱛ. 'ᱠᱳᱨᱥᱚᱫᱟᱞ ᱵᱚᱵᱥᱚ ᱫᱟᱨᱥᱚᱢ ᱵᱩᱛᱚᱭᱤ' ᱫᱚ ᱡᱮᱫ ᱵᱩᱛᱚᱭᱤ ᱠᱟᱱᱟ ? ᱚᱱᱟ ᱵᱩᱛᱚᱭᱤ ᱨᱮ ᱡᱮᱫ ᱠᱚ ᱚᱞ ᱟᱠᱟᱱᱟ ᱵᱩᱴᱟᱹ. ᱥᱟᱸᱦᱤᱰ ᱚᱞ ᱥᱚᱫᱚᱨ ᱢᱮ ।

25

SECTION-B

4. ᱚ. ᱫᱟᱸᱥᱟᱭ ᱫᱟᱢᱟᱱ ᱨᱮᱭᱟᱜ ᱛᱮᱛᱮᱫ ᱱᱟᱜᱟᱢ ᱞᱮᱠᱟᱛᱮ ᱚᱞ ᱥᱚᱫᱚᱨ ᱢᱮ । 5×10=50

ᱛ. ᱠᱟᱹᱴᱤᱰ ᱠᱟᱹᱦᱱᱤ ᱟᱨ ᱜᱟᱢᱟᱢ ᱨᱮ ᱡᱮᱫ ᱡᱮᱫ ᱵᱳᱟᱨᱟᱯ ᱪᱮᱞ ᱪᱟᱢᱚᱜ-ᱟ ᱚᱞ ᱢᱮ ।

ᱜ. ᱟᱹᱡ ᱠᱳᱚᱱ ᱢᱟᱱᱣᱟ ᱠᱚ ᱟᱜ ᱵᱟᱹᱵ ᱟᱨ ᱠᱟᱹᱢᱤ ᱛᱟᱞᱟ ᱛᱮ ᱵᱟᱹᱨᱤᱥ ᱦᱟᱹᱴᱤᱪ ᱠᱟᱛᱳᱟ ᱠᱚ ᱵᱩᱴᱟᱹ. ᱥᱟᱸᱦᱤᱰ ᱚᱞ ᱢᱮ ।

ᱝ. ᱛᱩᱞᱟᱹᱰᱚᱠᱳᱟ ᱥᱟᱹᱡᱦᱮᱡ ᱫᱚ ᱜᱚᱱᱚᱝ ᱟᱱ ᱠᱟᱱᱟ ᱡᱮᱫᱟᱜ ? ᱥᱟᱱᱛᱟᱣᱤ ᱟᱨ ᱵᱟᱝᱞᱟ ᱥᱟᱹᱡᱦᱮᱡ ᱛᱩᱞᱟᱹᱰᱚᱠᱳᱟ ᱠᱟᱛᱮ ᱚᱞ ᱥᱚᱫᱚᱨ ᱢᱮ ।

ᱞ. 'ᱢᱟᱭᱟᱰᱟᱞ' ᱠᱟᱹᱦᱱᱤ ᱨᱮ ᱚᱠᱟ ᱞᱮᱠᱟᱱᱟᱜ ᱢᱟᱭᱟᱰᱟᱞ ᱨᱮᱱᱟᱜ ᱠᱟᱛᱳᱟ ᱚᱞ ᱟᱠᱟᱱᱟ ? ᱠᱟᱹᱦᱱᱤ ᱞᱮᱠᱟᱛᱮ ᱚᱞ ᱥᱚᱫᱚᱨ ᱢᱮ ।

5. ᱚ. ᱱᱟᱦᱟᱜ ᱚᱠᱛᱚ ᱨᱮ ᱥᱟᱛᱟᱞᱤ ᱢᱤᱵᱤᱭᱟᱢ ᱛᱮ ᱵᱟᱣᱦᱟᱡ ᱛᱤᱱᱟᱜ ᱰᱚᱛᱳᱟᱛᱟ ᱟᱢᱟᱜ ᱫᱤᱨ ᱦᱩᱫᱤ ᱚᱞ ᱢᱮ ।

25

ᱛ. ᱥᱟᱡᱛᱟᱞ ᱵᱤᱫᱫᱨᱣᱦᱣ ᱥᱮᱛ ᱵᱚᱡᱳᱚᱨ ᱵᱩᱛᱚᱭᱤ ᱨᱮ ᱚᱱᱚᱞᱤᱭᱟ. ᱡᱮᱫ ᱠᱚ ᱚᱞ ᱟᱠᱟᱱᱟ ᱚᱞ ᱢᱮ ।

25

6. ᱚ. ᱨᱚᱣ ᱥᱟᱡᱦᱮᱫ ᱨᱮᱭᱟᱜ ᱜᱩᱱ ᱠᱚᱫᱚ ᱚᱠᱟ ᱠᱚ ᱠᱟᱱᱟ ? ᱥᱟᱡᱛᱟ ᱜᱮ ᱨᱚᱣ ᱥᱟᱡᱦᱮᱫ ᱮ ᱥᱟᱵ ᱫᱚᱦᱚᱭᱟ ᱟᱢᱟᱜ ᱢᱚᱛ ᱚᱞ ᱢᱮ ।

25

ᱛ. ᱡᱮᱫᱟᱜ ᱵᱚᱱ ᱥᱚᱦᱚᱨᱟᱭ-ᱟ ? ᱥᱚᱦᱚᱨᱟᱭ ᱨᱮᱱᱟᱜ ᱵᱚᱸᱜᱟ ᱵᱩᱨᱩ ᱟᱨ ᱠᱟᱹᱢᱤ ᱚᱞ ᱠᱟᱛᱮ ᱢᱤᱫᱴᱟᱣ ᱥᱚᱦᱚᱨᱟᱭ ᱥᱮᱨᱮᱧ ᱚᱞ ᱢᱮ ।

25

2019

SOCIOLOGY– PAPER-I

Time Allowed- 3 Hours *Full Marks – 200*

If the questions attempted are in excess o 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 same language.*

GROUP–A

Answer any three questions :-

1. Write a brief note on the scope of sociology. State the relationship between Sociology and Anthropology. 20 + 20

2. Define, following Weber, Ideal Types. Examine Weber's thesis on Propestant Ethic and the Spirit of Capitalism. 10 + 30

3. Discuss the social aspects of production and distribution. 40

4. Delineate, after Talcott Parsons, social system and its four major problems. 40

5. What do you understand by formal and informal organizations of work ? Briefly state the problems of labour in the modern world. 25 + 15

GROUP–B

Answer any two questions :-

6. Define social mobility. What are the different types of mobility ? Distinguish, with examples, between open and closed systems of mobility. 10 + 15 + 15

7. Narrate the importance of participant observation with reference to a particular study. 40

8. (a) Show the interface of science, technology and social change. 20

   (b) Distinguish between dominant culture and celebrity culture. 20

§§§§§§§§§§§§§§§§

2019

MSC(O)SO-II/19

SOCIOLOGY– 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 same language.*

GROUP–A

Answer any THREE Questions.

1. a) Examine the merits and limitations of the Approach made by M.N.Srinivas towards studying the Indian society.

   b) Why did M.N.Srinivas find it important to adopt field view from the book-view in studying the society and culture of India ?

20+20

2. Show if caste and class intersect in the Indian society. What have been the consequences of the interface of the two ?

40

3. Examine the nature of changes, if any, that have been occasioned in the family patterns by industrialisation and urbanisation in contemporary Indian society.

40

4. Analyse the factors responsible for vulnerability of women and children and suggest ways and means for overcoming them in the light of the steps already taken by the state in that direction.

40

5. Assess the nature of social and cultural change brought about in the society and culture of India by sanskritization, westernization and secularization.

40

GROUP–B

Answer any TWO Questions.

6. Discuss the nature and causes of the problem of drug addiction in today's India. How should it be combated ?

25+15

7. Examine the nature of the impact of forest on ecology. What more in to be done in avoiding conflict between State and people ? How to ensure cooperation of the two in improving forests and ecology ?

20+10+10

8. Write notes on :-

   a) B. R. Ambedkar and the Dalits.

   b) The Socially and Educationally Backward Classes.

20+20

2019

MSC(O)ST -I/19

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** but all answers must be in one and same language.*

Group – A

Answer any ten questions

1. (a) Give the classical definition of probability. What are its limitations? Justify it with examples. 3+3+4

(b) (i) An urn contains one black ball and one green ball. Another urn contains one white ball and one green ball. One ball is selected from each urn. What is the probability that both the balls will be of the same colour? Also get the probability of getting one green ball.

(ii) Find the probability of getting at least 2 heads if a fair coin is tossed six times independently. 5+1+4

(c) For any two events A and B, prove that

$$P(A)+P(B)-1 \leq P(A \cap B) \leq \sqrt{P(A)P(B)}.$$

Discuss the case for equality. 8+2

(d) Distinguish between total independence and pairwise independence for a set of events. Illustrate with an example. 6+4

(e) Define random variable and its distribution function. Discuss the important properties of a distribution function. 3+3+4

(f) Define expectation of a discrete random variable. For any two such variables, X and Y, prove that

$$E(x+y) = E(x) + E(y).$$

When does the result

$$E(xy) = E(x)E(y)$$

hold? 7+3

(g) Show that $E|x-c|$ is minimised at c=Median (x). 10

(h) When is discrete distribution said to be symmetric? For such a distribution, discuss the relation between mean, median and mode. 4+6

(i) State and prove Chebyshev's inequality. Discuss one of its uses. 6+4

(j) Discuss the properties of a bivariate normal distribution. 10

(k) (i) What is a sufficient statistic in point estimation? State a necessary and sufficient condition related to this statistic.

(ii) Let X be $N(\mu, 1)$ with unknown μ. Show that 1x1 is not sufficient for u. 4+4+2

(l) Discuss the role of auxiliary information in survey sampling. Mention at least three methods where such information is used. 5+5

P.T.O.

(m) What are random sampling numbers? Mention some important random sampling number series and discribe their methods of construction. 4+6

(n) Mention the basic principles of design of experiments. Provide two designs in which all the basic principles are used. 6+4

(o) Define the terms main effects and interaction effects in relation to a 2^3 experiment. Show that they are all treatment contrasts orthogonal to each other. 6+4

Group - B

Answer any five questions

2. (a) For any two events, A and B, define conditional probabilities and prove that (with appropriate assumption)

$$P(A|B^c) = \frac{P(A)[1-P(B|A)]}{P(B^c)}$$

(b) Show that independence of A and B is equivalent to that of A^c and B. 12+8

3. (a) Consider the distribution of (x_1, x_2, x_3) which assumes the values (1,0,0), (0,1,0), (0,0,1) and (1,1,1) each with probability $\frac{1}{4}$. Examine the independence of three random variables.

(b) Let X be distributed according to a p-variate normal distribution with mean vector μ and dispersion matrix Σ, which is positive definite. Prove that the components of X are independent if and only if Σ is a diagonal matrix. 10+10

4. (a) State the central limit theorem for independently and indentically distributed random variables and use it to find the asymptotic districution of (i) X following binomial (n,p), $0 \leq p < 1$, and (ii) X following chi-square distribution with n degrees of freedom.

(b) Let X_n be a sequence of random variables with

$$P(x_n = 1) = \frac{1}{n}, \quad P(x_n = 0) = 1 - \frac{1}{n}, \quad n \geq 1.$$

Examine whether X_n converges to zero in probability. 15+5

5. (a) Discuss the properties of a good estimator.

(b) Let $\{x_1, \ldots x_n\}$ be a random sample with mean μ and variance σ^2. Find C such that

$$C \sum_{i=1}^{n-1} (x_{i+1} - x_i)^2$$

is an unbiased estimator of σ^2 [Here random sample means that $x_1 \ldots x_n$ are iid].

(c) Explain, with an illustration, the concept of pivot in confidence interval estimation. 5+8+7

Contd..P/2.

6. (a) With reference to problem of testing hypothesis, explain the concepts of type I error, type II error, level of significance and power of a test.

(b) Let x be uniform $(\theta, \theta+1)$, $\theta \geq 0$. Find a most powerful test of size α $(0 < \alpha < \frac{1}{2})$ based on single observation (X) for $H_0 : \theta = 0$ against $H_1 : \theta = \frac{1}{2}$.

Derive the power function of this test. 12+8

7. Let $(x_1, \ldots . x_n)$ be a sample from $N(\mu, \sigma^2)$ with unknown μ and σ^2.

(a) Find the maximum likelihood and moment estimators of (μ, σ^2). Are they identical? Comment.

(b) Show that the estimators are consistent. 12+8

8. (a) Distinguish between two-stage sampling and stratified random sampling.

(b) For a two-state sampling, where the first stage units are of equal size, obtain an estimator of the population total. Also obtain the expression for the variance of the estimator. How will you estimate the variance from your sample? 5+15

9. (a) Starting from an appropriate linear model, prepare the ANOVA table for analysis of 6x6 Latin Square Design.

(b) Indicate the analysis of a 2^4 in a single replicate.

(c) What is analysis of covariance? Write down the appropriate linear model with estimators of treatment effects in Randomised Block Design. 6+6+8

2019

MSC(O)ST -II/19

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 same language.*

Group-A

Answer *any ten* questions: 10 X 10 = 100

1.

(a) Distinguish between Process control and product control with examples.

(b) What is control chart for fraction defectives? Why is it better than the np chart when the sample size varies?

(c) Explain the concept of Reliability. How can we find the reliability of a parallel system using component reliabilities?

(d) Show that Edgeworth-Marshall index number necessarily lies between Laspeyre's and Paasche's index numbers.

(e) What is cost of living index number and how is it constructed?

(f) Discuss "Infant Mortality Rate" mentioning its advantages and drawbacks.

(g) Distinguish between stable population and stationary population. In this context, interpret the L_x function of a life table.

(h) Explain the difference between age-specific death rate and instantaneous death rate.

(i) Describe how the method of moving averages can be used to determine the nature of trend of time series data.

(j) Distinguish between Additive and Multiplicative models in time series.

(k) Discuss clearly the errors in constructing index numbers.

P.T.O.

(l) What are the differences between Complete and Abridged life tables?

(m) What are Average Outgoing Quality Limit and Average Total Inspection? How are the two used in selecting a sampling plan?

(n) Write a note on Autoregressive process of order 2.

(o) Write the full forms of the statistical offices RGI & DGCIS and mention their important publications.

Group-B

Answer *any five* questions: 20 X 5= 100

2. What is income inequality? Explain the concept of Gini's coefficient of concentration as a measure of inequality of income. Derive Gini's coefficient of concentration for any continuous distribution of your choice.

3. (i) What do you mean by producer's risk and consumer's risk with respect to a sampling inspection plan?

(ii) Explain clearly the concept of a sequential sampling plan.

4. What do you mean by growth of a population? What is the essential difference between the Total Fertility Rate and the Gross Reproduction Rate? Why cannot the former be used to measure population growth?

5. Discuss various problems that arise in the construction of a price index number for any country.

6. Discuss, in detail, the use of periodogram analysis to study the nature of cyclical fluctuation in a given time series.

7. Explain the concept of simplex algorithm for solving a linear programming problem with the help of an example.

8. What are the main activities of National Sample Survey Office (NSSO) and West Bengal Bureau of Applied Economics and Statistics?

9. Write notes on :

(i) Neonatal and Perinatal Mortality rates

(ii) Allowable variation and preventable variation in a manufacturing process

2019
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 the prescribed number shall be valuted and the remaining ones ignored.

Answer should be written in Urdu

1. ھند آریائی زبان کے آغاز وارتقاء پر مختصر روشنی ڈالیے۔ 30

یا

اردو زبان کے آغاز سے متعلق حافظ محمود شیرانی کے نظریہ سے اپنے خیالات کا اظہار کیجئے۔

2. ''عادل شاہی دور میں اردو زبان وادب نے ترقی کی نئی منزلیں طے کی ہیں۔'' 30
اس قول سے اپنی واقفیت کا اظہار کیجئے۔

یا

دکنی زبان کی لسانیاتی خصوصیات کا تنقیدی جائزہ پیش کیجئے۔

Group-B

3. شہریار کی شاعرانہ عظمت احاطہ تحریر میں لائیے۔ 30

یا

اختر الایمان کی نظم نگاری کا تنقیدی جائزہ لیجئے۔

4. نظیر اکبرآبادی کی نظم ''بنجارہ نامہ'' کا تنقیدی جائزہ لیجئے۔ 30

یا

میر تقی میر کی شاعرانہ عظمت پر تفصیلی بحث کیجئے۔

5. کسی دو پر مختصر نوٹ لکھیئے۔ 10×2=20

(الف) لکھنؤ اسکول

(ب) سرسید تحریک

(ج) ناصر کاظمی

6. دلی کالج کی ادبی خدمات کا تفصیلی جائزہ پیش کیجئے۔ 30

یا

''فراق گورکھپوری نے رباعی کی صنف کو ہندوستانی ثقافت کا ترجمان بنایا''۔
اس قول کی تردید یا تائید کیجئے۔

7. درج ذیل اشعار میں سے کسی تین کی ناقدانہ تشریح کیجئے۔ 5×3=15

(الف) تھا مستعار حسن سے اس کے جو نور تھا
خورشید میں بھی اسی ہی ذرّہ ظہور تھا

(ب) ہر ذرّہ عالم میں ہے خورشید حقیقی
یوں بوجھ کے بلبل ہوں ہر اک غنچہ دہان کا

(ج) تھا خواب میں خیال کو تجھ سے معاملہ
جب آنکھ کھل گئی نہ زیاں تھا نہ سود تھا

(د) جذبۂ بے اختیارِ شوق دیکھا چاہئے
سینۂ شمشیر سے باہر ہے دم شمشیر کا

8. درج ذیل رباعی کا مرکزی خیال واضح کیجئے۔ 15

اے معنیِ کائنات مجھ میں آجا
اے رازِ صفات و ذات مجھ میں آجا
سوتا سنسار جھلملاتے تارے
اب بھیگ چلی ہے رات مجھ میں آجا

2019
URDU
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 valuted and the remaining ones ignored.

Answer should be written in Utdu

Group-A

1. درج ذیل سوالات میں سے کسی چار کے جواب تحریر کیجئے۔ 30×4=120

(i) ڈرامے کے اجزائے ترکیبی کا تعلق جائزہ لیجئے۔

(ii) محمد حسین آزاد کی ''آب حیات'' کا تنقیدی جائزہ لیجئے۔

(iii) اردو افسانے کے آغاز وارتقاء سے متعلق اپنی واقفیت کا اظہار کیجئے۔

(iv) مقالہ ''رسم ورواج کی پابندی کے نقصانات'' کا تنقیدی جائزہ لیجئے۔

(v) سعادت حسن منٹو کی افسانہ نگاری کی اہم خصوصیات کا جائزہ لیجئے۔

(vi) مولانا ابوالکلام آزاد کی مکتوب نگاری کا تنقیدی جائزہ لیجئے۔

(vii) ''مختار احمد انصاری'' کا خاکہ اپنی زبان میں پیش کیجئے۔

(viii) افسانہ ''لاجونتی'' کا تنقیدی مطالعہ پیش کیجئے۔

Group-B

2. درج ذیل سوالات میں سے کسی دو کے جواب تحریر کیجئے۔ 20×2=40

(i) اردو تنقید کے کسی ایک اہم نظریے کی وضاحت کیجئے۔

(ii) ''اردو تنقید پر ایک نظر'' کی روشنی میں کلیم الدین احمد کا تنقیدی رویہ واضح کیجئے۔

(iii) ''جمالیاتی تنقید'' سے اپنی واقفیت کا اظہار کیجئے۔

(iv) ادب اور زندگی کے باہمی رشتے کی وضاحت کیجئے۔

Group-C

3. درج ذیل عنوانات میں سے کسی ایک پر مضمون لکھیئے: 40

(الف) بنگال میں اردو کی موجودہ صورتِ حال

(ب) بنگال میں اردو افسانہ

(ج) صحافت اور اس کے ذمہ داریاں

(د) جہیز ایک لعنت

2019

MSC(O)ZO-I/19

ZOOLOGY– PAPER-I

Time Allowed- 3 Hours

Full Marks – 200

If the questions attempted are in excess o 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 same language.*

GROUP – A

Answer any ten questions :-

1. (a) Give the distinctive features of the protozoan phylum in which Paramoecium belongs to.
   (b) State the difference between a coelomate, pseudocoelomate and coelomate animals with examples of each.
   (c) Write in brief about metamerism in annelida.
   (d) State three external and three internal differences between osteichthyes and chondrichthyes. Give examples of each.
   (e) Comment on the digestion of cellulose by ruminants.
   (f) Write a note on endostyle.
   (g) Distinguish between poisonous and non-poisonous snakes with examples of each.
   (h) Explain briefly the factors controlling the population density.
   (i) How does a primary pollutant differ from a secondary pollutant ? Give an example of each in relation to air pollution.
   (j) Write in brief about types of learned behaviour.
   (k) Define biodiversity hotspot. Name the biodiversity hotspots in India.
   (l) Explain the rules of binomial nomenclature with example. What is tautonym ?
   (m) What are the various measures of central tendency ? Which measure of central tendency is the most appropriate for qualitative data ? For any data set, which measure of central tendency can have multiple values ? 4 x 10

GROUP – B

Answer any four questions :-

2. Write the systematic position (upto class) of the following animals mentioning at least one diagnostic character for each taxon :-
   (a) Sea anemone,
   (b) Sea hare,
   (c) Sea fan,
   (d) Sea mouse,
   (e) Sea lily. 4 x 5

3. Distinguish between :-
   (a) Prototheria and Metatheria
   (b) Perissodactyla and Artiodactyla
   (c) Horn and antler
   (d) Proteroglyphous snake and Solenoglyphous snakes. 5 x 4

4. Write notes on the following :-
   (a) Malpighian tubules (b) Osphradium
   (c) Integumentary glands in mammals (d) Types of poison in snakes. 5 x 4

P. T. O.

5. (a) What are the three main types of coral reefs ? Mention their salient features.

   (b) Briefly discuss about the factors that influence formation of coral reefs.

   (c) Add a note on the distribution of different types of coral reefs on Earth. 8 + 6 + 6

6. (a) Onychophorans represent an example of living connecting link between the two phyla-annelida and arthropoda - Discuss.

   (b) Define eusociality. Briefly discuss the social organization in termites and comment whether they exhibit eusociality. 10+(2+8)

7. (a) Give a comparative account of filter-feeding mechanism in hemichordata and urochordata.

   (b) Describe the aortic arches found in bony fish, amphibia and typical reptile with proper diagram. 10+(3+3+4)

8. (a) What are air sacs in birds ? Name the air sacs found in pigeon ? Write the functional significance of air sacs.

   (b) Draw and describe the structure of typical flight feather.

   (c) Describe the anatomical specializations of cetaceans which aid in echolocation. (1+3+3)+7+6

GROUP - C

Answer any four questions :-

9. Distinguish between :-

   (a) Exponential and logistic growth patterns of population

   (b) Potential and realized natality

   (c) Innate behaviour and learned behaviour

   (d) Selfishness and altruism. 5 x 4

10. Write notes on the following :-

   (a) Keystone species

   (b) Eutrophication

   (c) Biosphere reserves

   (d) Cladistics. 5 x 4

11. (a) Describe the process of ecological succession encompassing the events of

   (i) nudation,
   (ii) invasion,
   (iii) competition and coaction,
   (iv) reaction
   (v) stabilization of species.

   (b) What is the difference between fundamental and realized niche ?

   (c) How can resource partitioning allow coexistence of species ? 10 + 5 + 5

12. (a) Name four green-house gases (GHGs). How do GHGs contribute to global warming ?

   (b) Name the pollutants responsible for acid rain. Describe the effects of acid rain.

   (c) What is the difference between point source and nonpoint source water pollution ?

   (d) Distinguish between LD_{50} and LC_{50} ? (2+4)+(2+4)+4+4

Contd...P/3.

13. (a) Comment on arsenic pollution in lower Gangetic plains.
    (b) Explain the characteristic features of Fixed Action Pattern (FAP) with suitable example.
    (c) Critically evaluate the success of Project Tiger.
    (d) Comment on man-animal conflict in West Bengal. 5+5+5+5

14. (a) Define species. Discuss the merits and demerits of biological species concept.
    (b) Find the mean number of leaves per plant from the following data :-

Number of leaves	5	10	15	20	25
Number of plants	3	5	7	3	2

    (c) Two curly winged flies when mated produce 61 curly and 35 straight winged progeny. Use a X^2-square test to determine whether these numbers fit a 3 : 1 ratio.
    (Given: X^2 0.05, df 1 = 3.84) (1+5)+7+7

§§§§§§§§§§§§§§§§

2019

Time Allowed- 3 Hours ZOOLOGY– PAPER-II MSC(O)ZO-II/19

Full Marks – 200

If the questions attempted are in excess o 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 same language.*

GROUP –A

1. Answer any ten questions :-
   (a) What is Cooley's Anemia ?
   (b) What do you mean by Back packers Disease ?
   (c) What is hn RNA ?
   (d) What is Bombay phenotype ?
   (e) What do you mean by saltatory condition ?
   (f) Mention the importance of Primer of PCR.
   (g) What is Shuttle vector ?
   (h) Define Voltinism and give examples.
   (i) Mention four important uses of Shellac.
   (j) What is Glisson's capsule ?
   (k) What is Robertsonian translocation ?
   (l) What is Line-Weaver Burk plot ?
   (m) What are Chloride Shift and its significance ? 4 x 10

GROUP – B

Answer any four questions :-

2. Distinguish between :-
   (a) Holoblastic cleavage and Meroblastic cleavage
   (b) Endotheliochorial and hemochorial placenta
   (c) Fast Block and Slow block of polyspermy
   (d) Class I restriction enzyme and Class II restriction enzyme. 4 x 5

3. Design suitable experimental crosses by which you can detect and isolate both sex linked visible and lethal mutations in Drosophila. What do you mean by alternate splicing ? Mention the role of DSX-M and DSX-F protein in sex determination process of Drosophila. 8 + 4 + 8

4. What do you mean by R and T forms of Haemoglobin ? Define Bohr and Haldane effects and explain their significance in O_2 and CO_2 transport. Explain the role of Ca^{2+} in the regulation of muscle contraction. 4 + 8 + 8

5. Write briefly on the endocrine disorders associated with deficiency of Thyroxine and somatotrophic hormones in human. State the basic principles of RIA and ELISA. What is the source of Calcitonin ? Comment on the process of cryopreservation of gametes. 6+6+2+6

6. Pseudoalleles are not true alleles but are the members of a complex locus – Explain this statement. Explain the role of various enzymes involved in homologous recombination. Design an experiment to show that chromosomal replication is also semiconservative. 6+6+8

7. What is Lambert Beer's law for absorption spectroscopy ? What is the importance of Rf value in TLC ? State the fundamental difference between RAPD and RFLP. 4+4+12

P. T. O.

GROUP - C

Answer any four questions :-

8. What do you mean by allometric growth ? Explain the evolution of modern day Horse with pictorial illustration. 4 + 16

9. Define mimicry and coloration. What are the different zoogeographical realms ? Mention their names with faunal examples. What is the significance of Wallace Line ? 8 + 8 + 4

10. Comment on :-
    (a) Composite fish culture
    (b) Pebrine disease
    (c) Fish louse
    (d) Chandraki. 5 x 4

11. Comment on the following :-
    What is Apolysis ? Mention the function of Mehlis gland. What is cysticercus cellulosae ? Define Measly pork. What is the difference between schizogony and sporogony ? Mention the importance of signet ring stage.. 3+3+3+3+6+2

12. What are the different types of cattle breed found in India ? What do you mean by Dead Heart and White ear head ? Define systematic and contact insecticides. Mention the scientific name of Rice Hispa and one stored grain pest. 6+4+6+4

13. Mention the importance of vaccination. Describe the structure of Immunoglobulin G. Discuss the pathophysiology of Tuberculosis. What are cytokine and their functions ? 4+6+4+6

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