

GACR
PG 3rd SEMESTER EXAMINATION - 2018
(COMPUTER SCIENCE)

SUBJECT : Mobile Communication
PAPER : MCS - 304

Full Marks : 80
Time : 4 Hours

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

Section - A (Compulsory)

1. Answer any Eight of the following questions : (2x8)
- (a) What is handoff? List out its characteristics.
 - (b) Give examples for mobile adhoc networks.
 - (c) Define Adhoc wireless network with example.
 - (d) Mention the primary goals of WAP.
 - (e) What a Link Management Protocol does?
 - (f) What do you mean by sectoring?
 - (g) How 3G is different than 4G?
 - (h) What is mobile number portability?
 - (i) What do you mean by Fast Retransmit?
 - (j) List the advantaged and disadvantaged of WLAN.

Section - B (Answer any FOUR questions)

2. a. Discuss in detail about the different transmission mediums with advantages and disadvantages. (8)
- b. Discuss in detail about GPRS and its Data Services. Also explain its procedures. (8)
3. a. Explain in detail about the motivation for a specialized MAC. (8)

(2)

- b. Describe MAC Layer and its management in detail. (8)
- 4. a. Discuss how snooping TCP acts as a transparent TCP and Explain the role of foreign agent in it in detail. (8)
- b. State the importance of Indirect TCP and Mobile TCP and Mobile Communication. What happens to I-TCP, if the mobile is disconnected? Discuss. (8)
- 5. a. How can the tunnelling and encapsulation be performed in mobile IP? Explain. (8)
- b. Discuss the principle and operation of cellular wireless networks in detail. (8)
- 6. a. Explain in detail the components and interfaces of the WAP architecture. (8)
- b. Discuss in detail the WAP protocol and architecture. (8)
- 7. a. Explain Bluetooth protocol architecture in detail. (8)
- b. What is a cellular system? How does it work? State their advantages and disadvantages.
- 8. Write short notes on (Any FOUR) : (4x4)
 - a. HIPERLAN
 - b. Dynamic Source Routing.
 - c. Congestion Control
 - d. Channel Allocation Management
 - e. Reverse Tunnelling

- x - x - x -

GACR
PG 3rd SEMESTER EXAMINATION - 2018
(COMPUTER SCIENCE)

SUBJECT : Cryptography & Network Security Full Marks : 80
PAPER : MCS - 305 Time : 4 Hours

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

Section - A (Compulsory)

1. Answer any EIGHT of the following questions : (2x8)
- (a) What are the key principles of security?
 - (b) What are the different modes of operation is DES?
 - (c) Compare the symmetric and asymmetric key cryptography.
 - (d) What is a hash function?
 - (e) What is the difference between an SSL connection and SSL session?
 - (f) List out four requirements defined for kerberos.
 - (g) What are the services provided by IPSec?
 - (h) What is meant by denial of service?
 - (i) Specify the four categories of security threats?
 - (j) Define Ciphertext.

Section - B (Answer any FOUR questions)

2. a. Explain classical Encryption techniques in detail. (8)
b. Give detailed differentiation between cryptography and steganography. (8)
3. a. Explain Data Encryption Standard (DES) in detail. (8)
b. Explain differential and linear cryptanalysis in detail. (8)

(2)

4. a. When public key encryption is preferred? Explain the key management of public key encryption in detail with example. (8)
- b. What is a firewall and what are its limitations? Why do corporate houses implement more than one firewall for security? (8)
5. a. Describe authentic token certificate based authentication and biometric authentication in detail with examples. (8)
- b. What do you mean by secure protocol? Discuss about the security steps taken for Electronic money transfer process. (8)
6. a. What are the functional areas and benefits of IP security? Specify the IP security services and name the protocols used for IP security. (8)
- b. Give a detailed view on practical implementation of Java Cryptographic Solutions and Microsoft Cryptographic Solutions. Also mention the pros and cons of both. (8)
7. a. Describe different types of Network threats in detail. (8)
- b. Give brief descriptions on different types of attacks which lead to need for security. (8)
8. Write short notes on (Any FOUR) : (4x4)
 - a. Transposition method
 - b. Digital Signature
 - c. SSL and SET
 - d. SSO approach
 - e. Knapsack Algorithm



GACR
PG 3rd SEMESTER EXAMINATION - 2018
(SCIENCE)

SUBJECT : BOTANY
PAPER : 304

Full Marks : 60
Time : 4 Hours

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

Group - A (Compulsory)

1. Answer any SIX of the following : (2x6)
- (i) Which root part is known as quiescent center?
 - (ii) What metabolic changes occur during fruit ripening?
 - (iii) What is male sterility?
 - (iv) If the number of chromosome in an angiospermic endosperm is 36, then how many chromosomes will be present in the embryo?
 - (v) What is pistil-pollen interaction?
 - (vi) What is a dicot embryo and what are its various parts?
 - (vii) Name the methods used for producing artificial seeds.
 - (viii) How somatic embryo genesis can be initiated?

Group - B

Answer any **FOUR** of the following :

2. Discuss the theories with reference to the organization of Apical Meristem. (12)

(2)

3. Give an account of the molecular basis of fruit development in *Arabidopsis*. (12)
4. Describe the process of development of female gametophyte in angio-spermic plant. (12)
5. What is self-incompatibility? Discuss its cytological, biochemical and molecular aspects. Add a note to its significance in plants. (12)
6. Give an account of the development of different types of endosperms in angiospermic plants. (12)
7. Define tissue culture. Describe the basic requirements and various steps involved in plant tissue culture technique. (12)
8. Write notes on : (6x2)
 - (a) Organogenesis
 - (b) Gene transfer in plants.



GACR
PG 3rd SEMESTER EXAMINATION - 2018
(SCIENCE)

SUBJECT : PHYSICS
PAPER : 304

Full Marks : 60
Time : 4 Hours

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

Section - A (Compulsory)

1. Answer any SIX of the following Questions : (2x6=12)
- (a) What is reverse saturation current?
 - (b) What is diffusion capacitance?
 - (c) What is Zener diode?
 - (d) What do you mean by ohmic contact?
 - (e) Write the two assumptions to obtain general expression for the barrier height of a metal - semiconductor system.
 - (f) With a given transistor, it is found that $i_B = 25 \mu A$ and $i_C = 1.27 mA$. Determine h_{FE} and a_F .
 - (g) Define transconductance.
 - (h) What is tunnel diode?

Section - B

Answer any FOUR of the following questions :

2. (a) What do you mean by the transition capacitance, C_T , of a p-n junction? Discuss the variation of C_T as a function of applied reverse voltage as well as depletion layer width, for a hyper abrupt junction. (3+6)

(2)

- (b) What is a varactor? (3)
3. Derive the ideal current-voltage relation for a p-n junction diode. (12)
4. Obtain the current-voltage characteristics for an ideal schottky diode. (12)
5. Derive the current-voltage relationship for a p-n heterojunction. (12)
6. (a) Discuss the base width modulation in a transistor. (5)
(b) Analyse the Ebers-Moll model for a transistor. (5)
(c) What is avalanche breakdown in a transistor. (5)
7. Draw the diagram of a junction field effect transistor showing its different parts. Explain its operation and hence derive the expression for the pinch off voltage. (3+6+3)
8. Draw the schematic representation and idealized equivalent circuit of a solar cell. Discuss its basic characteristics. (12)



GACR
PG 3rd SEMESTER EXAMINATION - 2018
(SCIENCE)
Zoology - 304

Time : 4 Hours

Full Marks : 60

*Answer all Questions as per the instruction
The figure in the right hand margin indicate marks*

Group - A (Compulsory)

1. Answer any **SIX** of the following : (2x6)
- (a) What are the applications of biosystematics in biology?
 - (b) Define species concept.
 - (c) What is phylogenetic classification? How it is different from natural classification.
 - (d) International code of Zoological nomenclature.
 - (e) Define D.N.A. Bar coding.
 - (f) What is bio-diversity indices?
 - (g) What are placodermi
 - (h) Archeopteryx

Group - B

Answer any **FOUR** of the following :

2. Explain the different theories of biological classification and Hierarchy Categories. (12)

(2)

3. Describe the different taxonomic procedures. (12)
4. Briefly explain about the evaluation of Biodiversity indices. (12)
5. Explain about (12)
 - (a) Cytotaxonomy
 - (b) Numerical taxonomy
6. Give an account of Origin of Jaw in Placodermi and chondrichthyes. (12)
7. What is fossil? Discuss different types of fossils and fossilization. (12)
8. Describe about the Ice Age Extinction of large mammals. (12)

- x - x - x -

No. of Pages: 2

GACR
PG, 3rd SEMESTER END EXAMINATION-2018
(ARTS)

Sub.- Pol. Science
PAPER : P-304

Time: 4 Hours

Full Marks:80

The figure in the right hand margin indicate marks.

Question No.1 is compulsory, answer any FOUR from the rest.

GROUP - A

[2 x 8

1. Answer any EIGHT of the following :-
- a) Write any one reason for the failure of the League of nations.
 - b) What is Yalta conference?
 - c) What is the major function of UNESCO ?
 - d) What is GATT?
 - e) What is the role of non-permanent members of the security council in UN.
 - f) What is NAFTA?
 - g) What is ISIS ?
 - h) What is Non-proliferation Treaty?
 - i) What is universal declaration of Human Rights?
 - j) What is state terrorism?

P.T.O.

GROUP - B

[16x 4

Answer any FOUR questions.

2. Analyse the role of League of Nations in world politics and peace.
3. Give a historical background of the events leading to the formation of the United Nations.
4. Discuss the role of the Secretary General of the UN in resolving international conflicts & his limitations.
5. Discuss the role of WTO in global trade today. Is it serving the interests of the rich nations? Discuss.
6. Discuss the role of SAARC in achieving regional peace & co-operation in South Asia.
7. What is Terrorism? How can it be combated at global scale? Discuss.
8. Protection of environment is the biggest challenge before human kind today. Discuss the reasons of its degradation & measures to prevent it.



No of Pages : 2

GACR
PG 3rd SEMESTER EXAMINATION - 2018
(ARTS)

SUBJECT : PSYCHOLOGY

Full Marks : 60

PAPER : 304

Time : 4 Hours

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

Group - A (Compulsory)

1. Answer any SIX of the following :

(2x6)

- (a) Write One significant goal of positive psychology.
- (b) Write the cone of western perspective on positive psychology
- (c) Importance of value for positive thinking.
- (d) Two important benefits of positive thinking.
- (e) Define positive emotion with various examples.
- (f) Write two principles of happy life.
- (g) Define various components of attitude.
- (h) Write the techniques of cultivating gratitude in brief.

Group - B

Answer any **FOUR** of the following :

2. Show your acquaintance with goals of positive psychology and its application for daily life. (12)
3. Describe different types of thought and external factors influencing thought with studies. (12)

P.T.O.

(2)

4. Positive thoughts can be developed by various methods, explain. (12)
5. Explain concept of life and living with principles of happy living. (12)
6. Positive growth and development can be possible by management of thought, emotion, attitude & memory, justify. (12)
7. Critically analyse subjective well being with its determinants. (12)
8. Define and differentiate positive and negative attitude with their impact on human life and living style. (12)



GACR
PG 3rd SEMESTER EXAMINATION - 2018
(ARTS)

SUBJECT : ODIA
PAPER : 304

Full Marks : 80
Time : 4 Hours

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

(କାବ୍ୟତତ୍ତ୍ୱ (ପ୍ରାଚ୍ୟ ଓ ପାଷାତ୍ୟ)

'କ' ବିଭାଗ (ବାଧ୍ୟତାମୂଳକ)

e. ଯେକୌଣସି ଆଠଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଗୋଟିଏ କିମ୍ବା ଦୁଇଟି ବାକ୍ୟରେ ଦିଅ : (୨x୮=୧୬)

- (କ) ସ୍ତ୍ରୀଧାରାବ କାହାକୁ କହନ୍ତି ?
- (ଖ) ବକ୍ରୋକ୍ତି କେତେଭାଗରେ ବିଭକ୍ତ ଓ କ'ଣ, କ'ଣ ?
- (ଗ) ଭରତଙ୍କ ନାଟ୍ୟ ଶାସ୍ତ୍ରରେ କେତୋଟି ରସର କଥା କୁହାଯାଇଛି ଏବଂ ସେଗୁଡ଼ିକର ନାମ ଲେଖ ?
- (ଘ) 'ସରସ୍ୱତୀ କଣ୍ଠାଭରଣ'ର ଲେଖକ କିଏ ?
- (ଙ) ଜର୍ମାନ ଲେଖକ ଗେଟେ ରୋମାଣ୍ଟିସିଜିମ୍ ଓ କ୍ଲ୍ୟୁସିସିଜିମ୍ ସମ୍ପର୍କରେ କ'ଣ କହିଛନ୍ତି ?
- (ଚ) ଉପମା ବାଚକ ଶବ୍ଦ କିଏ - ଉଦାହରଣ ଦେଇ ବୁଝାଅ ।
- (ଛ) 'ଧୂନ୍ୟାଲୋକ'ର ରଚୟିତାଙ୍କ ନାମ କ'ଣ ?
- (ଜ) ଇଂରାଜୀ ସାହିତ୍ୟରେ କେଉଁମାନଙ୍କୁ ପ୍ରତୀକବାଦୀ ଆନ୍ଦୋଳନର କର୍ଣ୍ଣଧାର ବୋଲି କୁହାଯାଏ ?
- (ଝ) ସାମ୍ୟବାଦର ପ୍ରବକ୍ତା ଭାବରେ କାହାକୁ ଅଭିହିତ କରାଯାଏ ?
- (ଞ) ଗାଁପଲସାଉଁରେ କେଉଁ ବାଦର ଚିତ୍ରକ ଭାବରେ ବିଚାର କରାଯାଏ ?

‘ଖ’ ବିଭାଗ

(୧୭ x ୪)

ଯେ କୌଣସି ଋରୋଟି ପ୍ରଶ୍ନର ଉତ୍ତର ଦିଅ ।

୨. (କ) ରସ ନିଷ୍ପତି ସମ୍ପର୍କୀୟ ବିଭିନ୍ନ ମତବାଦ ସହିତ, ପ୍ରକାର ଭେଦ ଆଲୋଚନା କର ।
- (ଖ) ରୀତି ସାହିତ୍ୟର ଆଭିମୁଖ୍ୟ ନିରୂପଣ କରି ରୀତିର ପ୍ରକାର ଭେଦ ଦୃଷ୍ଟାନ୍ତ ସହ ଆଲୋଚନା କର ।
- (ଗ) ଧ୍ୱନିର ସଂଜ୍ଞା, ସ୍ୱରୂପ ଓ ବିଭାଗ ସମ୍ପର୍କରେ ଆଲୋଚନା କର ।
- (ଘ) ଓଡ଼ିଆ କାବ୍ୟର ଅନ୍ୟତମ ଚମତ୍କାର ବିଧାୟକ ତତ୍ତ୍ୱ ଭାବରେ ଅଳଙ୍କାରର ମହତ୍ତ୍ୱ ସଉଦାହରଣ ବୁଝାଇ ଲେଖ ।
- (ଙ) ରୋମାଞ୍ଚିସିଦ୍ଧିମର ସଂଜ୍ଞା ଓ ସ୍ୱରୂପ ଉଦ୍‌ଘାଟନ କରି ଓଡ଼ିଆ କବିତାରେ ଏହାର ପ୍ରତିଫଳନ ଦର୍ଶାଅ ।
- (ଚ) ବାସ୍ତବବାଦର ସଂଜ୍ଞା ଓ ସ୍ୱରୂପ ନିରୂପଣ କରି ଆଧୁନିକ ଓଡ଼ିଆ ନାଟକରେ ଏହା କିପରି ପ୍ରକାଶ ପାଇଛି ବିଚାର କର ।
- (ଛ) ଅସ୍ତିତ୍ୱବାଦର ସଂଜ୍ଞା ଓ ସ୍ୱରୂପ ଉପସ୍ଥାପନ କର ।



No of Pages : 2

GACR
PG 3rd SEMESTER EXAMINATION - 2018
(ARTS)
SOCIOLOGY (P - 304)

Time : 4 Hours

Full Marks : 80

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

Group - A (Compulsory)

1. Answer any **Eight** of the following questions : (2x8)
- (a) Define the concept of social movement.
 - (b) What is collective behaviour?
 - (c) What is Ethnicity?
 - (d) What is ideology?
 - (e) What is peasant movement?
 - (f) What is Trade Union?
 - (g) Write any two aims of Prathana Samaj.
 - (h) Write any two aims of Theosophical society.
 - (i) What is counter movement?
 - (j) Write any two causes of pre-independent tribal movement.

Group - B

(16x4)

Answer any **Four** of the following :

- 2. Discuss the characteristics of social movement.
- 3. Discuss different types of social movements.

P.T.O.

(2)

4. Discuss the origin, growth and ideology of Brahmo Samaj.
5. Explain various causes of peasant movement in India.
6. Discuss the role of ideology on social movements.
7. Explain various problems of ethnicity in Indian society.
8. Discuss the major causes of tribal movements in post-independent India.

- x - x - x -

GACR
PG 3rd SEMESTER EXAMINATION - 2018
(ARTS)

SUBJECT : EDUCATION
PAPER : 304

Full Marks : 60
Time : 4 Hours

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

Group - A (Compulsory)

1. Answer any SIX of the following question in two sentences : (2x6)
- (a) Any two functions of educational management.
 - (b) SWOT
 - (c) Humanistic theory of management.
 - (d) Democratic Management.
 - (e) Two demerits of Authoritarian management.
 - (f) Principles of educational administration.
 - (g) Need and importance of educational planning.
 - (h) Any two guiding principles of educational planning.

Group - B

Answer any Four Questions of the following :

1. What do you mean by Educational Management?
Discuss its functions in present context. (12)

(2)

2. What is Total Quality Management (TQM)? How it can be used for quality improvement in Higher Education. (12)
3. What is humanistic approach in educational management? Discuss its important features. (12)
4. Differentiate between centralised Vs. Decentralised educational management. (12)
5. What do you mean by Educational Planning? Discuss its guiding principles. (12)
6. Discuss the major focus made in 12th five year plan with reference to Education Sector. (12)

-x-x-x-

No of Pages : 2

GACR
PG 3rd SEMESTER EXAMINATION - 2018
(ARTS)

SUBJECT : ENGLISH
PAPER : 304

Full Marks : 80
Time : 4 Hours

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

Group - A (Compulsory)

(2x8=16)

1. Answer any EIGHT of the following Questions :

- (a) Comment on the thematic pattern of Anand's novels.
- (b) How is Babu Nathoo Ram an Anglophile?
- (c) Why was Raju popularly known as Railway guide?
- (d) Give your impressions on velan.
- (e) Why does Ammu leave Baba?
- (f) What is "the sound of Music"?
- (g) Briefly describe the Orthodox Bengali family before partition.
- (h) Why did the grandmother's attempt to rescue her only living Uncle Prove futile?
- (i) Comment on the theme of identity, crisis in 'The Inheritance of Loss.'
- (j) What makes Biju give up his dreams in America?

P.T.O.

Group - B

(4x16)

Answer any FOUR of the following questions.

2. 'Coolie' is a strong indictment of the exploitative caste system prevailing in Indian Society. Elaborate.
3. Discuss the elements of humour, WIC, irony and satire in 'The Guide'.
4. "Raju never did anything; things always happen to him". comment.
5. Mortality or death resonate through out Arundhati Ray's 'The God of small things'. Elucidate.
6. "The shadow lines deals with the effect of fear on memory and one's engagement with the world"- Discuss.
7. Attempt a character sketch of 'Nick'.
8. Kiran Desai's "The inheritance of Loss is a study of the rigid class system that exist in India and abroad among Indians"- Discuss.



No of Pages : 2

GACR
PG 3rd SEMESTER EXAMINATION - 2018
(ARTS)

SUBJECT : ECONOMICS

Full Marks : 80

PAPER : 304

Time : 4 Hours

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

Group - A (Compulsory)

1. Write short notes on - (Any EIGHT) (2x8=16)
- (a) Capitalist agriculture
 - (b) White revolution
 - (c) Land reform
 - (d) Self - Help Group
 - (e) RRB
 - (f) Co-operative
 - (g) Floriculture
 - (h) Collective farming
 - (i) Marginal farmer
 - (j) Agro - based industries

Group - B

Answer any FOUR among the following questions.

2. Explain the role of agriculture in the economic development of a country. (16)
- OR
- Critically examine Mellor's theory of agricultural development.

P.T.O.

(2)

3. Analyse the relationship between the size of farm and its productivity. (16)
OR
Discuss the production function analysis in agriculture.
4. Explain the importance of livestock resources. What measures can be taken for livestock development? (16)
OR
Discuss the issues and problems in rural industrialisation.
5. What do you mean by tenancy system? Discuss the incidence and effects of crop sharing in tenancy system. (16)
OR
Explain the problems of marginal and small farmers.
6. Discuss the role of NABARD in rural credit system. (16)
OR
(a) Rural indebtedness and farmer suicide
(b) Sources of informal credit.



GACR
PG 3rd SEMESTER EXAMINATION - 2018
(COMMERCE)
Accounting for Managerial Decision Making
MCO - 304

Time : 3 Hours

Full Marks : 80

Answer all Questions as per the instruction
The figure in the right hand margin indicate marks

Group - A (Compulsory)

1. Answer any Eight of the following : (2x8=16)

- (i) What is Vertical Analysis?
- (ii) What do you mean by Solvency Ratio?
- (iii) What is margin of safety?
- (iv) What is angle of incidence?
- (v) What is master budget?
- (vi) What is Budget Manual?
- (vii) What do you mean by variance?
- (viii) What is the difference between Budgeted cost and standard cost?
- (ix) What is an investment centre?
- (x) What is Balanced Score Card?

Group - B

(16)

Answer any **Four** Questions from the following :

2. What is financial statement Analysis? Discuss different techniques of financial statement analysis with suitable example? (16)
3. What is Responsibility Accounting? What is its significance? Discuss different types of responsibility centres with suitable example?

(2)

4. Write short notes on :-
(a) Fixed and Flexible Budget. (16)
(b) Zero-Base Budgeting (ZBB)
5. What is Activity Based Costing? How is it different from traditional costing? Discuss different merits and demerits of Activity Based Costing? (16)
6. The standard cost of a chemical mixture is as under:
8 tons of material A at Rs.40 per ton
12 tons of material B at Rs.60 per ton
Standard yield is 90% of input. (16)
Actual cost for the period is as under :
10 tons of material A at Rs.30 per ton.
20 tons of material B at Rs.68 per ton.
Actual Yield is 26.5 tons
Compute all material variances.
7. The following particulars relates to two periods.
Period I & Period II
- | <u>Period</u> | <u>Sales</u> | <u>Costs</u> | <u>Profits</u> |
|---------------|--------------|--------------|----------------|
| I | 1,20,000 | 1,11,000 | 9,000 |
| II | 1,40,000 | 1,27,000 | 13,000 |
- Assuming that cost structure and selling price remains the same in both periods, find out :-
(a) Profit volume Ratio (b) Fixed cost (c) B.E.P. (d) Profit when sales are Rs.1,00,000. (e) Sales required to earn a profit of Rs.20,000 (f) Margin of safety at a profit of Rs.15,000 (g) Variable cost in period II. (16)
8. (a) From the following information determine opening and closing stock
Stock Turnover Ratio - 5 times
Total Sales - Rs.2,00,000
Rate of Gross Profit on sales = 25%

(3)

- Closing stock is more by Rs.4,000 than the opening stock.
- (b) From the following details, calculate Return on Investment (ROI)
- | | |
|---|-------------|
| Equity share capital | - 8,00,000 |
| Preference share capital | - 2,00,000 |
| General Reserves | - 3,00,000 |
| 10% Debentures | - 8,00,000 |
| Current Liability | - 2,00,000 |
| Discount on issue of share | - 50,000 |
| Net Profit (after Debenture interest but before Income Tax) | - 1,60,000. |

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GACR
PG 3rd SEMESTER EXAMINATION - 2018
(SCIENCE)

SUBJECT : CHEMISTRY
PAPER : 304

Full Marks : 60
Time : 4 Hours

*The figure in the right hand margin indicate marks
Q.no. 1 is compulsory. Answer any FOUR from rest.*

SECTION - A

1. Answer any **SIX** Questions : (2x6)
- (i) Which of the following molecule exhibit rotational and/or vibrational spectra H_2 , HF, CO_2 , OCS.
 - (ii) The rotational constant $B = 10.6 \text{ cm}^{-1}$ for $H^{13}C^{18}O$ calculate the frequency in CM^{-1} for the pure rotational transition $j = 0 \rightarrow 1$.
 - (iii) Why is the Q branch not seen in the vibrational rotational spectrum?
 - (iv) What is the Principle of mutual exclusion?
 - (v) Predict the number of lines for methyl radical (CH_3) and methoxy methyl radical $H_2C(OCH_3)$ in an esr spectrum.
 - (vi) A crystal plane intercepts the three crystallographic axes of the following multiples of unit distances, $3/2$, 2 and 1. What are the Miller indices of the plane?
 - (vii) What do you mean by a thermogram?
 - (viii) Define Half wave potential.

(2)

SECTION - B

Answer any Four Questions :

2. (a) Classify the Polyatomic rotors on the basis of their moments of inertia by giving examples on each. (5)
- (b) Distinguish between the energy levels of a rigid and a non-rigid rotor. (7)
3. (a) Out line the selection rules for rotational and vibrational spectra and rationalise the role of molecular dipole moment in the selection rule. (4)
- (b) Sketch and explain the rotational spectra of diatomic molecule. (5)
- (c) The rotational constant for $H^{35}Cl$ is observed to be 10.5909 CM^{-1} . What are the values of B for $H^{37}Cl$ and for $^2D^{35}Cl$? (3)
4. (a) Describe the selection rules for Raman Spectroscopy. What is Rayleigh scattering and Raman Scattering? Why are the anti-stokes lines less intense than the stokes line in the Raman Spectrum. (2+3+2)
- (b) State and explain with suitable PE Curves the Franck-Condon Principle. (5)
5. (a) Describe the electron - number coupling in esr spectrum. Sketch the esr spectrum of $\dot{C}H_3$ and $\dot{N}H_2$ radical. (7)
- (b) What is g -factor? Explain the g values in isotropic system and anisotropic system. (5)

(3)

6. Give Short notes on
- (a) Magnetic hyperline interaction (6)
- (b) Doppler effect (6)
7. (a) Describe Dropping Mercury Electrode (DME) and Discuss the experimental setup for polarographic measurements. (2+6)
- (b) Discuss the reduction of cadmium ions at the DME. (4)
8. (a) Describe the apparatus for polarography measurement with a neat diagram. (8)
- (b) Define limiting diffusion current. (4)
9. (a) Explain the general principle of thermogravimetric analysis. (5)
- (b) Out line Schematically and discuss the thermograms of $AgNO_3$, $Cu(NO_3)_2 \cdot 5H_2O$ and $CuSO_4 \cdot 5H_2O$. (7)

- x - x - x -