

No. of Pages: 2

GACR

PG 3rd SEMESTER EXAMINATION-2019

**Sub.- EDUCATION
PAPER : 301**

Time: 4 Hours
Full Marks: 60

*The figure in the right hand margin indicate marks.
Question No.1 is compulsory, answer any FOUR from the rest.*

Group - A [2 x 6

1. **Answer any SIX of the following.**

- a) Adolescent Education
- b) Special incentives for woman education
- c) Educational benefits to SCs and STs.
- d) Mahila Samakhya Programme
- e) Human Rights.
- f) Educational function of community
- g) Vocational Education?
- h) Internet

P.T.O.

[2]

Group - B

[12x 4

Answer any FOUR questions.

2. State the role of school in developing suitable environment for promotion of education among SCs and STs.
3. What is the meaning of a community? Explain the interlink between education and community.
4. What are the different issues in educational practice.
5. Define different strategies of Right of children to free and compulsory education.
6. Explain the efforts for upgrading the quality of higher education, role of UGC, NAAC.
7. What is computer Aided Education? Describe the characteristics of computer in relation to digital age.



PG 3rd SEMESTER EXAMINATION-2019

Sub.- ECONOMICS
PAPER : 301

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.

Section- A

[2 x 8

1. Answer any EIGHT of the following.
- What is Type-I error?
 - What is meant by degrees of freedom?
 - What is a dummy variable?
 - Define heteroscedasticity.
 - What is R^2 ?
 - What is d-W-D statistic?
 - State any two economic methods.
 - Give any two sources of multicollinearity.
 - What is a population parameter?
 - Define a hypothesis.

Section - B

[16x 4

Answer any FOUR questions.

2. Elucidate the econometric methods.
3. Explain the steps of hypothesis testing.
4. Explain the features of student's t-distribution.
5. Illustrate the assumptions of classical linear Regression Model.
6. Prove that OLS estimators are BLUE.
7. What is autocorrection? What are its consequences?
8. Explain two methods to defeat heteroscedasticity.



PG, 3RD SEMESTER EXAMINATION-2019

Sub: HINDI

Full Marks: 80

Paper: 301

Time: 4 Hours

Answer the questions as per instruction.

The figure in the right hand margin indicate marks.

Question No. 1 is mandatory.

१. निम्नलिखित प्रश्नों में से किन्हीं आठ प्रश्नों के उत्तर लिखिए। [2x8]

(क) भारतेन्दु के विचार में देश की उन्नति में निजी भाषा की क्या भूमिका है?

(ख) कविता मानव हृदय पर क्या प्रभाव डालती है?

(ग) डॉ नगेन्द्र के विचार में साहित्य का मूल धर्म क्या हैं?

(घ) “बिद्यानिवास जी हिमालय मुझे बुला रहा है”। यह किसने कहा था?

(ङ) ठकुरी बाबा से लेखिका की मुलाकात कहाँ हुई थी?

(च) निराला जी को लेखक ने वसंत का अग्रदूत क्यों कहा है?

(छ) शरतबाबू का बाल्य जीवन कैसा था?

(ज) हरिवंशराय बच्चन की प्रमुख रचनाएँ क्या हैं?

(झ) “किन्नर देश” का वास्तविक नाम क्या है?

(ञ) “अदम्य जीवन” में किस मार्मिक घटना का वर्णन है?

निम्नलिखित चार प्रश्नों का उत्तर लिखिए।

[16x4]

२. “भारतवर्षोन्नति कैसे हो सकती है?” निबन्ध में भारतेन्दु हरिश्चन्द्र के दृष्टिकोण को स्पष्ट कीजिए।

३. “अस्ति की पुकार हिमालय” निबन्ध अंतर्बस्तु पर विचार कीजिए।

४. “वसंत का अग्रदूत” की विशेषताएँ बताइए।

५. एक सफल आत्मकथा के रूप में “क्या भुलूँ क्या याद करूँ” की समीक्षा कीजिए।
६. “साहित्य में आत्मभिव्यक्ति” निबन्ध के प्रमुख विचारों की चर्चा कीजिए।
७. “किन्नर देश की ओर” का प्रतिपाद्य स्पष्ट कीजिए।

- x - x - x -

[1x20]

- केंद्र में प्रश्नों के उत्तर देने के लिए निर्देश पढ़ें।
1. निम्नलिखित प्रश्नों के उत्तर दीजिए।
1. “साहित्य में आत्मभिव्यक्ति” निबन्ध के प्रमुख विचारों की चर्चा कीजिए।
2. “किन्नर देश की ओर” का प्रतिपाद्य स्पष्ट कीजिए।

No. of Pages: 2

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PG 3rd SEMESTER EXAMINATION-2019

Sub.- BOTANY

Time: 4 Hours

PAPER : 301

Full Marks: 60

The figure in the right hand margin indicate marks.

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

GROUP -A

[2 x 6

1. **Answer any SIX questions of the following**

- a) Define M.S. Powerpoint.
- b) What is internet?
- c) How primary succession is different from secondary succession?
- d) What is k- selction?
- e) Define britic potential?
- f) What is green house effect?
- g) What is climatic climax?
- h) Define primary productivity

P.T.O.

GROUP-B

[12x4]

Answer Any FOUR questions.

2. Describe the application of MS-excel.
3. What is plant succession? Describe the mechanism of succession.
4. What is species interaction? Give examples of positive interaction?
5. Describe the role of green house gases of ozone depletion.
6. Write short notes on:
 - a) Ozone Depletion
 - b) Ecological Niche
7. Write short notes on:
 - a) MS word
 - b) r-selection



PG 3rd SEMESTER EXAMINATION-2019

**Sub.- MCO
PAPER : 301**

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.

1. **Answer any EIGHT of the following.** [2 x 8]
- a) Define the term 'Corporate Governance'
 - b) List down any four common issues encountered in Corporate Governance.
 - c) When were the OECD Principles released for the first time? What was the basic objective of framing such principles?
 - d) Write down any two roles of the confederation of Indian Industry (CII).
 - e) Generally, there are 6 common rights of shareholders. What are they?
 - f) There are many problems associated to investors as far as Corporate Governance is concerned. List down any four.
 - g) Define the term 'Business Ethics'.
 - h) Give two examples of unethical behavior in organizations.

- i) What do you understand by the term Corporate Social Responsibility?
- j) Why is CSR necessary for the success of Indian firms.

Group - B

[16x 4

Answer any FOUR questions.

2. Discuss in details the various issues associated to Corporate Governance.
3. Write short notes on :
 - a) OECD Principles
 - b) CII Initiatives
4. Discuss the rights and privileges of shareholders under Corporate Governance.
5. What are the roles of regulators and the Government in enforcing Corporate Governance in Indian firms?
6.
 - a) What are the objectives of Business Ethics?
 - b) Discuss the need & importance of Business Ethics.
7. What is the relationship between Social Responsibility and Indian companies? Justify with suitable example.
8. Write an essay on 'Ethical Decision Making'.



No. of Pages: 2

GACR

PG 3rd SEMESTER EXAMINATION-2019

Sub.- SOCIOLOGY

Time: 4 Hours

PAPER : 301

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 x8]

1. Write brief notes on any EIGHT of the following.

- a) AIGL Model
- b) Reference Group
- c) Structural Functionalism
- d) Versthen
- e) Hermeneutics
- f) Alienation
- g) World system
- h) Class struggle
- i) Dialectic
- j) Centre -Periphery
- k) Theory
- l) Fact

P.T.O.

[2]

Group - B

[16 x 4

Answer Any FOUR questions.

2. Discuss the contribution of Talcott Parsons to Functionalism.

OR

Discuss the contribution of Levi Strauss to Structuralism.

3. Identify the basic premises of Phenomenology with illustrations from any Sociologist.

OR

Identify the basic premises of Ethnomethodology with illustration from any Sociologist

4. In the light of Goffman discuss the Presentation of Self in Everyday Life.

OR

Evaluate the contribution of G.H.Mead of Symbolic interactionism.

5. How do Neo-Marxists improvise on the basic tenets of Marxism?

OR

Discuss the contributions of Frankfurt School to Neo-Marxism.”.



PG, 3RD SEMESTER EXAMINATION-2019**Sub: PSYCHOLOGY**

Full Marks: 60

Paper: 301

Time: 4 Hours

*Answer the questions as per instruction.
The figure in the right hand margin indicate marks.
Question No. 1 is mandatory.*

GROUP-A

[2x6]

1. Answer any SIX questions.

- (a) Statistics
- (b) Probability
- (c) Type-II error
- (d) Range of coefficient of correlation
- (e) Skewness
- (f) Interval scale
- (g) Null hypothesis
- (h) Level of significance

GROUP-B

[12x4]

Answer any FOUR questions.

2. Find out the rank order coefficient of correlation between the two sets of scores given below.
X- 50 60 40 53 46 42 41 42 50 55
Y- 35 35 20 36 30 28 28 30 35 33
3. What is correlation? Differentiate between rank order and product moment correlation citing examples.
4. The following are the scores in psychology secured by three group of students with five students in each

(P.T.O...)

group. Apply one way analysis at variance and find out whether the three groups of students differ significantly from one another

Gr I-	10	9	7	5	4
Gr II-	6	5	8	9	7
Gr III-	7	9	8	6	5

- What do you mean by non-parametric statistical test? Distinguish between non-parametric and parametric statistical test.
- Four group of students were administered a behaviour rating test and their scores are given below. Apply Kruskal Wallis 'H' test and interpret the result.

Gr I-	17	14	10	7	10	6		
Gr II-	18	12	10	16	4	10	15	20
Gr III-	28	30	34	40	28	26		
Gr IV-	16	30	20	16	14	18	26	
- What is meant by measurement of psychological observation? Explain with examples the different scales of measurement used in statistics.
- Discuss the properties of normal probability curve (NPC).

- x - x - x -

PG, 3RD SEMESTER EXAMINATION-2019

Sub: POL.SCIENCE

Full Marks: 80

Paper: 301

Time: 4 Hours

*Answer the questions as per instruction.
The figure in the right hand margin indicate marks.
Question No. 1 is mandatory.*

GROUP-A

1. Answer any EIGHT questions.

[2x8]

- (a) Relevance of New Public Administration.
- (b) Challenges of Liberalisation
- (c) What is good governance?
- (d) What is Human Rights theory?
- (e) Western concept of development.
- (f) Third world concept of development
- (g) Administrative Tribunals
- (h) What is systems theory?
- (i) What is administrative law?
- (j) Define public policy

GROUP-B

Answer any FOUR questions.

[16x4]

2. Define New Public Administration explain its salient features.
3. Critically evaluate Taylor's contribution to the theory of scientific management.
4. Describe the nature, scope and significance of comparative Public Administration.

(P.T.O...)

[2]

5. Discuss the concept, scope and significance of Development Administration.
6. Describe the problems and prospects of development administration in developed and developing states.
7. Critically evaluate the bureaucratic theory for the study of organisation in public administration.
8. Define public policy. Explain the important conditions for successful implementation of public policy.

- x - x - x -

PG, 3RD SEMESTER EXAMINATION-2019

Sub: ODIA

Full Marks: 80

Paper: 301

Time: 4 Hours

*Answer the questions as per instruction.**The figure in the right hand margin indicate marks.**Question No. 1 is mandatory.*

କ-ବିଭାଗ

[2x8]

e. ଯେକୌଣସି ୮ ଗୋଟି ପ୍ରଶ୍ନର ସଂକ୍ଷିପ୍ତ ଚିତ୍ତପଣୀ ଦିଅ ।

- (କ) ଭାଷାର ଲକ୍ଷଣ
- (ଖ) ଭାଷା ଉତ୍ପତ୍ତିରେ ଦୈବୀ ସିଦ୍ଧାନ୍ତ
- (ଗ) ଇଣ୍ଡୋୟୁରୋପୀୟ ଭାଷା
- (ଘ) ନାଥ ସାହିତ୍ୟରେ ଓଡ଼ିଆ ଭାଷା
- (ଙ) ଭାରତୀୟ ଆର୍ଯ୍ୟଭାଷାର ମଧ୍ୟ ସ୍ତର
- (ଚ) ଦେଶଜ ଓଡ଼ିଆ ଶବ୍ଦ
- (ଛ) ଧ୍ୱନି ଉଚ୍ଚାରଣରେ ଜିହ୍ୱାର ଭୂମିକା
- (ଜ) ଓଡ଼ିଆ ଅବର୍ଗ୍ୟ ବ୍ୟଞ୍ଜନ
- (ଝ) ସ୍ୱର ସମୀଭବନ
- (ଞ) ଅର୍ଥାଦେଶ

ଖ-ବିଭାଗ

(ଦୀର୍ଘ ଉତ୍ତର ମୂଳକ ପ୍ରଶ୍ନ- ଯେକୌଣସି ୪ଟିର ଉତ୍ତର ଲେଖ)

[16x4]

୨. ଭାଷାର ସଂଜ୍ଞା ଓ ସ୍ୱରୂପ ସମ୍ପର୍କରେ ଆଲୋଚନା କର ।

ଅଥବା

ଭାଷା ଉତ୍ପତ୍ତି ସମ୍ପର୍କୀୟ ସିଦ୍ଧାନ୍ତ ଗୁଡ଼ିକ ଆକଳନ କର ।

୩. ଓଡ଼ିଆ ଅଭିଲେଖର ଭାଷା ଚାହିଁକି ବିଶ୍ଳେଷଣ କର ।

ଅଥବା

ପଞ୍ଚଦଶ ଶତାବ୍ଦୀ ପର୍ଯ୍ୟନ୍ତ ଓଡ଼ିଆ ଭାଷାର ବିକାଶଧାରା ଦର୍ଶାଅ ।

- ୪. ଭାରତୀୟ ଆର୍ଯ୍ୟଭାଷାର ବିଭିନ୍ନ ସ୍ତର ଗୁଡ଼ିକ ବିଷୟରେ ଏକ ସ୍ଥୂଳ ପରିଚୟ ପ୍ରଦାନ କର ।

ଅଥବା

ଓଡ଼ିଆ ଶବ୍ଦ ଭଣ୍ଡାରରେ ବୈଦେଶିକ ଶବ୍ଦମାଳାର ବ୍ୟବହାର ସମ୍ପର୍କରେ ଆଲୋଚନା କର ।

- ୫. ବାଗ୍ୟନ୍ତର ବିଭିନ୍ନ ଅଂଶ ଗୁଡ଼ିକର ପ୍ରକାର୍ଯ୍ୟ ଆକଳନ କର ।

ଅଥବା

ଓଡ଼ିଆ ବ୍ୟଞ୍ଜନ ଧ୍ବନି ଗୁଡ଼ିକର ଧ୍ବନି ତାତ୍ତ୍ୱିକ ବିଶ୍ଳେଷଣ କର ।

- ୬. ଧ୍ବନି ପରିବର୍ତ୍ତନର ବିଭିନ୍ନ କାରଣ ଗୁଡ଼ିକ ଆଲୋଚନା କର ।

ଅଥବା

ଅର୍ଥ ପରିବର୍ତ୍ତନର ଦିଗଗୁଡ଼ିକ ପର୍ଯ୍ୟାଲୋଚନା କର ।

- x - x - x -

PG 3rd SEMESTER EXAMINATION-2019

Sub.- HISTORY

Time: 4 Hours

PAPER : 301

Full Marks: 80

The figure in the right hand margin indicate marks.

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

1. Answer any SIX questions of the following [2 x 8]

- a) Who was the spiritual Guru of saint Kabir?
- b) Which Gajapati king patronised Sri Chaitanya?
- c) Who was the writer of Dandi Ramayan?
- d) When did Satya Shodhak Samaj established by Jyotiba Phule?
- e) When did Birsa Munda breath his last?
- f) In which year did self Respect Movement started in South India?
- g) Who led the Mahad Satyagraha in 1927?
- h) Which British prime minister did declare communal award in the Round Table conference?
- i) Who founded the journal called "Harijan"?
- j) When did Depressed Class Association formed?

Answer Any FOUR questions.

[16x4]

2. In what way Buddha's philosophy is based on the humanitarian synthesis of mind and matter? Discuss.
3. Discuss the social dimensional of the medieval Bhakti Movement with reference to Kabir and Balaram Das.
4. Describe the ideology and programmes of Jyotiba Phule for social emancipation in India?
5. Discuss the nature of tribal resistance movements with reference to the role played by Dharanidhar Naik and Laxman Naik.
6. Critically assess the implications and consequences of the Poona pact of 1932.
7. Evaluate the Gandhian ideology and programmes for eradication of untouchability.
8. Describe the provisions of the Hindu Code Bill and its impact on women's empowerment.



No. of Pages: 2

GACR

PG 3rd SEMESTER EXAMINATION-2019

Sub.- ZOOLOGY

Time: 4 Hours

PAPER : P-301

Full Marks: 60

The figure in the right hand margin indicate marks.

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

Group - A

[2 x 6

1. **Answer any SIX of the following.**

- a) How can you define secondary production?
- b) Which biogeochemical cycle is both sedimentary and gaseous and why?
- c) What is polyclimax theory?
- d) What is diversity-stability hypothesis?
- e) What are the main differences between populations exhibiting J-shaped and S-shaped growth curves?
- f) Define antibiosis.
- g) Write down the effects of pollutants on soil microflora.
- h) What is the significance of biological oxygen demand?

P.T.O.

Group - B**Answer any FOUR questions.**

2. Give an account of the pattern of primary production and biomass in the major ecosystems of the world.
3. Discuss the mechanism of succession in natural communities.
4. Explain various steps involved in the structural analysis of a plant community.
5. Give an account of the life history traits of r-selected and k-selected species.
6. Differentiate between weather and climate. Provide an updated status of global climate change.
7. Discuss the sources and effects of water pollution.
8. Write notes on:
 - a) Biotic potential
 - b) Food web in an aquatic ecosystem.



PG, 3RD SEMESTER EXAMINATION-2019

Sub: STATISTICS

Full Marks: 60

Paper: 301

Time: 4 Hours

*Answer the questions as per instruction.**The figure in the right hand margin indicate marks.**Question No. 1 is mandatory.***1. Answer any SIX questions.**

[2x6]

(a) If $X \sim N(\mu, \Sigma)$, then the linear combination of $C^T X = C_1 X_1 + C_2 X_2 + \dots + C_p X_p$ has mean _____ and variance _____.

(b) The inverse of the covariance matrix $\Sigma = \begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{21} & \sigma_{22} \end{bmatrix}$ is _____.

(c) The multiple correlation coefficient between Y and X_1, X_2, X_3 is 0.98, and between Y and X_1, X_2 is 0.91. The partial correlation coefficient between Y and X_3 after removing the effect of X_1 and X_2 is _____.

(d) A.P. variate multivariate normal distribution is generalization of _____.

(e) Technique for classifying a set of observations into predefined classes is _____.

(f) $X_i, i = 1, 2, 3$ are *iid* standard normal random variables $E(2x_1 + 3x_2 / 3x_2 - x_3 = 4)$ is _____.

[12x4]

Answer the questions.

2. Define P-variate normal distribution and obtain its characteristic function. Assume mean vector μ and dispersion matrix Σ .

(P.T.O...)

[2]

OR

IF X is distributed as $N_p(\mu, \Sigma)$, then show that any subset of components of x is also multivariate normal.

3. Define Hotelling T^2 statistic. Derive the distribution of this statistic. Write its relationship between Mahalanobis D^2 -Statistic.

OR

Obtain the sampling distribution of sample partial correlation coefficients.

4. Explain the likelihood method of discrimination. Discuss the procedure of classification into more than two multivariate normal populations.

OR

Explain the probabilities of missclassification. State the underlying assumptions. Also explain the Fisher's method of discriminants.

5. Define canonical correlation. Explain the method of extraction of canonical variables.

OR

Define Wishart distribution and obtain its Characteristic function.

- x - x - x -

PG 3rd SEMESTER EXAMINATION-2019

Sub.- CHEMISTRY

Time: 4 Hours

PAPER : 301

Full Marks: 60

The figure in the right hand margin indicate marks.

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

SECTION - A

[2 x 6]

1. Answer any SIX questions of the following
- Write the order of π - bonding ability of the following molecules:-
NO, CO and N_2
 - Predict which of the following has shortest C–O bond length-
 $V(CO)_6^-$, $Cr(CO)_6$ and $Mn(CO)_6^+$
 - Draw the structure of $Co_2(CO)_8$ in solid and solution state.
 - Why step-wise formation constants follows the trend $K_1 > K_2 > K_3 \dots \dots > K_n$
 - Over all formation constant of $[Co(NH_3)_6]^{3+}$ is lower than that of $[Co(en)_3]^{3+}$.
 - Chelate complex aquates at a lower rate than non-chelates.
 - Discuss the microcyclic effect.
 - What are Metalloboranes?

Group -B

Answer Any FOUR questions.

2. a) Derive the step-wise and overall formation constants. Establish the relation between these two. [6]
- b) Describe the spectrophotometric method of determination of binary formation constant of a metal complex. [6]
3. a) What are metal carbonyls? Discuss in detail the bonding in metal carbonyls. [6]
- b) What are metal nitrosyl complexes? Discuss the bonding in metal nitrosyl complexes. [6]
4. a) Write the important assumption of Crystal Field Theory (CFT) . [5]
- b) What is acid hydrolysis? What are the factors influencing the acid hydrolysis reaction? [7]
5. a) Give a comparative account of inner-sphere and outer-sphere electron transfer reactions.
- b) Discuss the substitution reactions of a square planar complex.
6. a) Discuss about the anation reaction of $[Cr(OH_2)_6]^{3+}$ by Cl^- follow I_a path . [6]
- b) Discuss about the base hydrolysis rate constants of Trans $[Co(en)_2 Cl_2]^+$ is higher than that of corresponding Cis - isomer. [6]

7. a) How can you synthesise $Fe_2(CO)_9$? Discuss the structure hybridisation and magnetic properties of $Fe_2(CO)_9$. [4]
- b) Explain the trans effect with examples. [4]
- c) Write short note on Metal halide clusters. [4]
8. a) Write the limitations of Valence Bond Theory (VBT) of Metal complexes. Discuss the geometry and magnetic properties of the following complexes on the basis of VBT. [8]
- (i) $Ni(CO)_4$,
- (ii) $[Fe(CN_6)]^{3-}$
- (iii) $[Cu(NH_3)_4]^{2+}$
- b) Write notes Marcus-Hush Theory. [4]



PG, 3RD SEMESTER EXAMINATION-2019**Sub: COMP. SCINECE**

Full Marks: 80

Paper: 301

Time: 4 Hours

*Answer the questions as per instruction.
The figure in the right hand margin indicate marks.
Question No. 1 is mandatory.*

SECTION-A (Compulsory)**1. Answer any Eight questions.**

[2x8]

- (a) What is Recurrent Network?
- (b) Define linguistic variable in fuzzy logic.
- (c) What is the main difference between probability & fuzzy logic?
- (d) What is the role of activation function in Neural network?
- (e) What is Reinforcement learning?
- (f) What are intelligent agents & how they are used in AI?
- (g) What is informed & uninformed search?
- (h) Which method is used to search better by learning?
- (i) Which search Algorithm is known as blind search?
- (j) Symbolise the following expression "Everybody loves a lover".

SECTION-B**Answer any FOUR questions.**

2. What is defuzzification? Explain different defuzzification methods with example. [16]
3. Write the difference between ANN & biological Neural Network. Describe different learning methods of Neural Network. [16]

[2]

4. (a) What is NLP? Discuss different steps in NLP. [8]

(b) Verify the validity of the follow argument: [8]

Every living thing is a plant or an animal.

Rama's dog is alive & it is not a plant.

All animals have hearts.

Therefore Rama's dog has a heart.

5. (a) Compare two uninformed search strategies with examples. [8]

(b) Explain constraint satis problem in AI. [8]

6. (a) Let $I = \{0.7, 0.2, 1, 0.5, 0.2\}$ [10]

$V = \{0.5, 0.7, 1, 0.1, 0.9\}$ and $C = \{0.7, 1, 0.3\}$

Find (i) Using Fuzzy cartesian product $P = VXI$ and $T = IXC$.

(ii) Using Max-Min composition $E = P.T$.

(b) Fuzzy sets A & B are defined in the interval $X = \{0, 1, 2, \dots, 10\}$ of real numbers by the membership function [6]

$\mu_A(x) = \frac{x}{x+2}$, $\mu_B(x) = 2^{-x}$, Determine (i) $A \cup B$

(ii) $A \cap B$ (iii) \bar{A} (iv) \bar{B}

7. Consider a set $P = \{P_1, P_2, P_3, P_4\}$ of four varities pf paddy plants, set $D = \{D_1, D_2, D_3, D_4\}$ of the various diseases affecting of plants and $S = \{S_1, S_2, S_3, S_4\}$ be the common symptoms of the diseases. Let R be a relation on $P \times D$ & S be a relation on $D \times S$ for [16]

	D_1	D_2	D_3	D_4
P_1	0.6	0.6	0.9	0.8
P_2	0.1	0.2	0.9	0.8
P_3	0.9	0.3	0.4	0.8
P_4	0.9	0.8	0.1	0.2

[3]

	S_1	S_2	S_3	S_4
D_1	0.1	0.2	0.7	0.9
D_2	1	1	0.4	0.6
D_3	0	0	0.5	0.9
D_4	0.9	1	0.8	0.2

Obtain the association of the plants with the different symptoms of the diseases using max-min composition.

8. Write short notes on (Any four) [4x4]

(a) Script

(b) Greedy best first search

(c) Sentence tree

(d) MCP Neuron

(e) Semantic Network

- x - x - x -

PG 3rd SEMESTER EXAMINATION-2019

Sub.- Mathematics
PAPER : P-301

Time: 3 Hours
Full Marks: 60

The figure in the right hand margin indicate marks.
Question No.1 is compulsory, answer any FOUR from the rest.

1. **Answer any SIX of the following.** [6 x 2]
- List all random variable corresponding to difference of heads and tails obtained in six tosses of a coin.
 - Write the conditions for pairwise independency of three events.
 - Prove that geometric mean of regression coefficients is correlation coefficient.
 - Define Bivariate normal distribution.
 - State weak law of large numbers.
 - Write the distribution function of Chi-square distribution with n degrees of freedom.
 - Define stochastic process.
 - Define sample variance.

Answer any FOUR questions.

2. a) Compute the cumulative distribution function for the random variable X with probability distribution function as [6]

$$f(x) \begin{cases} x & \text{for } 0 < x \leq 1 \\ 2-x & \text{for } 1 \leq x < 2 \\ 0 & \text{for } x > 2 \end{cases}$$

- b) For what value of K does the function $f(x, y) = K(x+y^2)$, $x = 0, 1, 2, 3$; $y = 0, 1, 2$, will represent a bivariate probability distribution function. Hence find $f(3,2)$ [6]

3. a) Calculate the coefficient of correlation for [6]

X	78	36	98	25	75	82	90	62	65	39
Y	84	51	91	60	68	62	86	58	53	47

- b) Calculate moment generating function for normal distribution. [6]

4. a) If X is the number appearing on a die when it is thrown. Then prove that the law of large number theorem gives $P[|X - \mu| > 2.5] < 0. + 47$ while μ is mean and actual probability is zero. [6]

- b) In a normal distribution with mean 56 and standard deviation 21, how large a sample must be taken so that there will be at least 90% chance that its mean is greater than 52 ? [6]

5. a) State and prove strong law of large number. [6]

- b) A normal population has a mean of 0.1 standard deviation of 2.1, find the probability that mean of a sample of size 900 will be negative. [6]

6. a) If s^2 is the variance of a sample of size n taken from a normal population having the variance [6]

of δ^2 , then prove that $X^2 = \frac{(n-1)s^2}{\delta^2}$ is a [6]

random variable having chi-square distribution with parameter $v = n - 1$.

- b) In a normal distribution 7% items are under 35 and 89% are under 63. Find mean and variance.

7. a) State and prove central limit theorem.

- b) Derive chapman Kolomogorov equation.

8. Write short notes on any TWO. [6+6]

- a) Covariance

- b) Exponential Family of distribution

- c) Exact sampling distribution.

- d) Markov chains.



GACR
PG 3rd Semester End Examination-2019
(SCIENCE)

SUBJECT : PHYSICS

Full marks - 60

PAPER : 301

Time: 4 Hours

The figures in the right hand margin indicate marks
Question No 1 is compulsory, answer any FOUR from the rest

- (1) Answer any SIX questions [2×6]
- (a) What are regular and irregular doublet laws in X-rays?
 - (b) Explain fine structure observed in X-ray emission spectrum.
 - (c) What is Lamb shift?
 - (d) What is Ritz combination principle?
 - (e) What is meant by hyperfine structure of spectral lines?
 - (f) Explain population inversion.
 - (g) State Frank-Condon principle.
 - (h) What is isotope shift?
- (2) (a) State Moseley's law in X-rays and explain it from Bohr theory. [7]
(b) If the K_{α} -radiation of Mo ($Z=42$) has wavelength of 0.71\AA , calculate the wavelength of the corresponding radiation of Cu ($Z=29$). [5]
- (3) (a) Explain the characteristic X-ray spectra in emission and absorption. How do they differ from the optical spectra? [7]
(b) What is Auger effect? Explain in brief. [5]
- (4) Distinguish between L-S and j-j coupling schemes in the case of two valence electrons Under what conditions can a transition from L-S to

j-j coupling scheme has been observed? Give your answer with examples. [12]

(5) The quantum numbers of the two optical electrons in a two valence electron atoms are : $n_1 = 6$, $l_1 = 3$, $s_1 = 1/2$; $n_2 = 5$, $l_2 = 1$, $s_2 = 1/2$

(a) Assuming L-S coupling, find the possible values of L and hence of J

(b) Assuming j-j coupling, find the possible value of J. [12]

(6) Derive an expression for the spin orbit interaction energy. Draw energy level diagram for hydrogen atom, comparing the results of Bohr, Sommerfeld and Dirac theories. [12]

(7) Distinguish between normal Zeeman, anomalous Zeeman and Paschen-Back effects. Determine the Lande g-values for the various levels of 3P and 3D multiplets. [12]

(8) (a) Discuss the main features of the vibrational and rotational Raman spectra of a diatomic molecule. How they can be explained with the help of an appropriate theory ? [6]

(b) Explain stimulated absorption, spontaneous emission, and stimulated emission of radiation. Obtain a relation between transition probabilities for the two emissions. [6]
