Hall Ticket No | | | | | | | | | | | Question Paper Code: AHS001

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IARE – R16

ENGLISH FOR COMMUNICATION

(Common for CSE/ECE/EEE/IT)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) What speakers can do to ensure better listening? Explain various types of listening. **[8M]**
   (b) What are the productive approaches to listening? Enlist some positive and negative comments for interpretation. **[6M]**

2. (a) 'No communication process is complete without listening'. Support the statement with appropriate real life examples. **[6M]**
   (b) Explain 'the role of listening skills' in productive note-taking. What is the difference between listening and hearing and how to avoid poor listening habits? **[8M]**

UNIT – II

3. (a) write a note on verbal communication. **[7M]**
   (b) What are the challenges one faces during a formal speech? **[7M]**

4. (a) What is the significance of developing speaking abilities? **[7M]**
   (b) Draft the criterias required for a good presentation skill. **[7M]**

UNIT – III

5. (a) 'A good vocabulary is essential for effective reading skills'? Distinguish between active reading and passive reading. **[9M]**
   (b) How to master reading comprehension skills and reading between the lines? **[5M]**

6. (a) Read the following passage and answer the following questions. **[8M]**

   In recent years though there has been a trend in many parts of the world to more gender neutral socialization. Young parents, female professionals and well-educated parents, in particular are more likely to socialize their children into more equal gender roles. However, this is not always an easy task. One study of parents who wanted to bring up their children in a more non-sexist way found that it was very difficult to do. The parents complained about toy stores being filled with gender-specific toys – war toys for boys and domestic toys for girls. They also commented that while they might be able to give their gender-neutral toys themselves, it was difficult to get relatives and friends to do this. Almost all the children in the study owned and played with gender specific toys given to them by other people. The parents also found it hard to fight against the gender lessons of books, the peer group and school.

i. What do you understand by gender-neutral socialization?
ii. How can gender discrimination be eradicated?
iii. Write synonyms of the words – Difficult, Domestic.
iv. Write antonyms of the words – Specific, Professional

(b) Define and explain various types of reading skills with suitable examples. **[6M]**

UNIT – IV

7. Write the guidelines for drafting a CV. Draft a suitable CV for a candidate applying for a software engineer. **[14M]**

8. Illustrate briefly about the techniques of developing a good paragraph. **[14M]**

UNIT – V

9. (a) Explain the following with suitable examples. **[8M]**
   i. adjectives
   ii. prepositions
   iii. simple past tense
   iv. present perfect tense

   (b) Give the meaning and frame a sentence for the following idioms. **[6M]**
   i. to face the music
   ii. to keep one's fingers crossed
   iii. a black sheep

10. Do as directed. **[14M]**

- Complete the sentence with the correct preposition from the choices given.
  i. We are very excited _____ our trip to Spain next week. (AT, WITH, ABOUT, OVER)
  ii. I am very fond _____ drinking green tea. (FOR, OF, ABOUT, AT)
  iii. Almost all politicians were involved _____ the scandal. (IN, AT, WITH, FROM)
  iv. I am looking forward _____ having a meeting with you next week. (WITH, AT, TO, FROM)
  v. At the moment, she is recovering _____ her injuries. (AT, OF, FROM, WITH)
- Write a sentence of your own using the following idioms:
  i. A hot potato
  ii. A penny for your thoughts
  iii. At the drop of a hat
- Choose the correct synonyms for the underlined words
  i. I think the decision is **biased**.
  ii. Now, I am ok, the pain has **abated**.
  iii. They have met with a **fatal** road accident.

• Choose the one which can be substituted for the given word/sentence.

Extreme old age when a man behaves like a fool

i. Imbecility
ii. Senility
iii. Dotage
iv. Superannuation

That which cannot be corrected

i. Unintelligible
ii. Indelible
iii. Illegible
iv. Incorrigible

The study of ancient societies

i. Anthropology
ii. Archaeology
iii. History
iv. Ethnology

Hall Ticket No | | | | | | | | | | | Question Paper Code: AHS003

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IA-R16

COMPUTATIONAL MATHEMATICS AND INTEGRAL CALCULUS
(Common for AE/CE/ME)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Evaluate a real root of $4\sin x = e^x$ by using bisection method. **[7M]**

   (b) Construct difference table and then express y as function of x .The corresponding values of x and y are given as **[7M]**

X	0	1	2	3	4
Y	3	6	11	18	27

2. (a) Find the root of $x^4 - x - 9 = 0$ by using Newton Raphson's method **[7M]**

   (b) Using Gauss's forward interpolation formula find f(30) from the following table **[7M]**

X	21	25	29	33	37
Y	18.4708	17.8144	17.1070	116.3422	15.5154

UNIT – II

3. (a) Fit an exponential curve of the form $y = ae^{bx}$ by the method of least squares for the following data. **[7M]**

x	5	6	7	8	9	10
y	133	55	23	7	2	2

   (b) Given $y' = 3x + \frac{y}{2}, y(0) = 1$. Compute , $y(0.2)$ by taking h=0.2 using Runge–Kutta methods of fourth order. **[7M]**

4. (a) Use Modified Euler's method to solve $y' = x + \sqrt{y}$ in the range $0 \le x \le 0.4$ by taking h=0.2 given that y =1 at x=0. **[7M]**

   (b) Fit a Parabola $y = a + bx + cx^2$ by the method of least squares for the following data: **[7M]**

x	2	4	6	8	10
y	3.07	12.85	31.47	57.38	91.29

UNIT – III

5. (a) Evaluate $\iint\limits_R xydxdy$ where R is the region bounded by $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ and $\frac{x}{a}+\frac{y}{b}=1$ **[7M]**

   (b) Evaluate $\int\limits_1^e \int\limits_1^{\log\log y} \int\limits_1^{e^x} \log z dxdydz.$ **[7M]**

6. (a) Change the order of integration evaluate **[7M]**

   $\int\limits_0^{4a} \int\limits_{x^2/4a}^{2\sqrt{ax}} dydx$

   (b) Find the area enclosed by the parabolas $x^2=y$ and $y^2=x$ **[7M]**

UNIT – IV

7. (a) Prove that force field given by $\vec{F}=2xyz^3\vec{i}+x^2z^3\vec{j}+3x^2yz^2\vec{k}$ is conservative .Find the scalar potential function. **[7M]**

   (b) Evaluate $\iint\limits_S \vec{F}.\vec{n}\,ds$ if $\vec{F}=yz\vec{i}+2y^2\vec{j}+xz^2\vec{k}$ and S is the surface of the cylinder $x^2+y^2=9$, contained in the first octant between the planes z=0 and z=2. **[7M]**

8. (a) Find the angle between the normals to the surface $xy=z^2$ at (1, 4, 2) and (-3, -3, 3). **[7M]**

   (b) Using Gauss – divergence theorem evaluate $\iint\limits_s \overline{f}.\overline{n}\,ds$ over the entire surface of the region above xy plane bounded by the cone $z^2=x^2+y^2$ and the plane z=4 where $\vec{f}=4+zi+xyz^2j+3zk$ **[7M]**

UNIT – V

9. (a) Prove that $\int\limits_0^{\pi/2} \text{Sin}^2\theta\,\text{Cos}^4\theta d\theta=\frac{\pi}{32}$ **[7M]**

   (b) Obtain the series solution of $\frac{d^2y}{dx^2}+xy=0$ **[7M]**

10. (a) Show that **[7M]**

    i. $\cos x = J_0 - 2J_2 + \ldots\ldots\ldots$

    ii. $\sin x = 2J_1 - 2J_3 + \ldots\ldots\ldots$

    (b) State and Prove generating function of Bessel's. **[7M]**

Hall Ticket No | | | | | | | | | | | Question Paper Code: AHS004

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IA-R16

COMPLEX ANALYSIS AND PROBABILITY DISTRIBUTION

(Electronics and Communication Engineering)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Examine the nature of the function **[7M]**

$f(z) = \left\{ \begin{array}{c} \frac{x^2y^5(x+iy)}{x^4+y^{10}} \\ 0, z=0 \end{array} \right\}, z \neq 0$ in the region including the origin.

(b) Construct an analytic function $f(z) = u + iv$ given that **[7M]**
$u - v = (x-y)\left(x^2 + 4xy + y^2\right)$

2. (a) Prove that $f(z) = |Z|^2$ is continuous everywhere but nowhere differentiable except at the origin. **[7M]**

(b) Determine Cauchy-Riemann equations in Polar form. **[7M]**

UNIT – II

3. (a) Evaluate $\int_{1-i}^{2+3i} \left(z^2 + z\right) dz$ along the line joining points (1, –1) and (2, 3) . **[7M]**

(b) Let $g(a) = \int_C \frac{2z^2-z-2}{z-a}\, dz$, ,($|a| \neq 3$) where $C : |z| = 3$. Find g(2) using Cauchy's integral formula. What is the value of g(a) if $|a| > 3$. **[7M]**

4. (a) Evaluate $\int_C \frac{e^{\pi z}.dz}{(2z-i)^3}$ Using Cauchy integral formula, where C is |Z|=1. **[7M]**

(b) Evaluate $\int_0^{1+i} \left(x - y + ix^2\right) dz$ along real axis Z=0 to Z=1, and then along the line Parallel to imaginary axis from Z=1 to 1+i . **[7M]**

UNIT – III

5. (a) Determine the Poles and Residues of $\frac{Z}{(Z+1)^2(Z^2+4)}$ **[7M]**

(b) Expand $\frac{Z}{(Z-1)(2-Z)}$ in Laurent Series valid for$|Z-1| < 1$. **[7M]**

6. (a) Find the bilinear transformation which maps the points z = 1, i, –1 onto the points w = i, 0, –i . **[7M]**

(b) Evaluate $\int_C \frac{dz}{(z^2+4)^2}$ where $C : |z-i| = 2$,by residue theorem. **[7M]**

UNIT – IV

7. (a) Cumulative distribution function of a discrete random variable 'X' is **[7M]**

X	1	2	3	4	5	6	7
F(x)	0.05	0.15	0.35	0.65	0.85	0.95	k

i. k

ii. probability mass function

iii. P(X > 2)

(b) Let 'X' be a random variable which can take on the values –3, 6, and 9 with probabilities 1/6, 1/2 and 1/3. Calculate third moment about the mean. **[7M]**

8. (a) A perfect coin is tossed twice. Find the Moment generating function of the number of heads. Find Mean and Variance. **[7M]**

(b) Probability density function of a continuous random variable is $f(x) = e^{-x}$, $x > 0$, find the third moment about the mean. **[7M]**

UNIT – V

9. (a) It has been claimed that in 60% of all solar heat installations the utility bill is reduced by at least one-third. Accordingly, what are the probabilities that the utility bill will be reduced by at least one-third in **[7M]**

i. four of five installations

ii. at least four of five installations.

(b) Derive mean of the normal distribution. **[7M]**

10. (a) A communication channel receives independent pulses at the rate of 12 pulse per micro second. The Probability of Transmission error is 0.001 for each micro second use Poisson distribution compute. **[7M]**

i. No error during a micro second

ii. atleast one error per microsecond

iii. atmost two errors.

(b) An air line knows that 5% of the people making reservations on a certain flight will not turn up. Consequently their policy is to sell 52 tickets for a flight that can only hold 50 passengers what is the probability that there will be a seat for every passenger who turns up? **[7M]**

Hall Ticket No | | | | | | | | | | | Question Paper Code: AHS008

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IA-R16

MODERN PHYSICS

(Common for AE/CE/ME)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Define coordination number and atomic packing factor. Calculate the atomic packing factor for SC and BCC structures. **[7M]**

   (b) Draw and explain the structure of diamond with a neat sketch and show that atomic packing factor of diamond is 0.34. **[7M]**

2. (a) DHow do you find Miller indices of a given plane? An X-ray beam of wavelength 0.7 A^o undergoes minimum order, Bragg reflection from the plane (3 0 2) of cubic crystal at glancing angle 35^0. Calculate the lattice constant. **[7M]**

   (b) Explain the unit cell and bravias lattice with neat figures. Sketch the following plane in a cubic unit cell (1 1 2), (1 2 1), (1 0 1). **[7M]**

UNIT – II

3. (a) State and prove the Braggs law. **[7M]**

   (b) Explain the Frenkel defect and Schottky defect with figures. **[7M]**

4. (a) Discuss the Laue equations with figure. **[7M]**

   (b) What are the major applications of X-ray techniques in different fields. **[7M]**

UNIT – III

5. (a) Explain the construction and working of a semiconductor diode laser. **[7M]**

   (b) Explain the two conditions for laser action. A ruby laser omits a pulse of 20ns duration with average power per pulse being 100 KW. If the numbers of photons in each pulse is 6.98×10^{-14}, calculate the wavelength of photons. **[7M]**

6. (a) Explain the working of a pressure sensor with a diagram. **[7M]**

   (b) What are active and passive sensors? What are the advantages of optical fiber sensors? **[7M]**

UNIT – IV

7. (a) What is acceptance angle? Obtain an expression for acceptance angle. **[7M]**

   (b) Calculate the numerical aperture and acceptance angle for an optical fiber with core and cladding refractive indices being 1.563 and 1.498 respectively. **[7M]**

8. (a) What is attenuation? Explain the factors contributing to the fibers loss. **[7M]**

   (b) Explain the modes of propagation of optical fibers with figure. A fiber with an input power of 9 dBm has a loss of 1.5 db/km. If the fiber is 3000 m long, what is the output power. **[7M]**

UNIT – V

9. (a) Obtain the expression for interference due to reflected light in thin films. **[7M]**

   (b) what is diffraction of light? A diffraction grating used at normal incidence gives a line (5400 A^o) in a certain order superposed on the violet line (4000 A^o) of the next higher order. If the angle of diffraction is 30^0, how many lines per cm are there in the grating? **[7M]**

10. (a) Distinguish between interference and diffraction. In a Newton's rings experiment, show that the rings get closer as the order increases. **[7M]**

    (b) Calculate the thickness of the air film at 10^{th} dark ring in a Newton's rings system viewed normally by a reflected light of wavelength 500 nm.The diameter of the 10^{th} dark ring is 2 mm. **[7M]**

Hall Ticket No | | | | | | | | | | | Question Paper Code: AHS009

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IA-R16

ENVIRONMENTAL STUDIES

(Common for all branches)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Explain the scope of Environmental studies. **[7M]**
   (b) What is an ecosystem? Explain the structures and functions of ecosystem. **[7M]**
2. (a) Discuss how an environmental study is a multidisciplinary subject? **[7M]**
   (b) What are the impacts of deforestation on environment? How to overcome them. **[7M]**

UNIT – II

3. (a) Analyze the serious ecological problems created by hydroelectric power generation with examples. **[7M]**
   (b) Explain the applications of Solar energy and photovoltaic energy. **[7M]**
4. (a) Explain the role of an individual in conservation of natural resources. **[7M]**
   (b) Write a detailed note on effects of dams on forests and tribal people. **[7M]**

UNIT – III

5. (a) Describe in – situ and ex- situ conservation? Explain them briefly. **[7M]**
   (b) Write a short note on conservation of biodiversity in India. **[7M]**
6. (a) Define Biogeography. What are Endemic and Endangered species? **[7M]**
   (b) What is Biodiversity? Give its significance. What are the three types of biodiversity? Explain them. **[7M]**

UNIT – IV

7. (a) Discuss the causes, effects and control on noise pollution. **[7M]**
   (b) Define e-waste. Discuss how e-waste can be managed to prevent environmental pollution. **[7M]**
8. (a) Explain the methods of disposal of municipal solid waste. **[7M]**
   (b) Write a short note on Global warming and ozone depletion. **[7M]**

UNIT – V

9. (a) What is meant by environmental impact assessment and state its importance? **[7M]**
   (b) What is global warming? Explain the global warming causes. **[7M]**

10. (a) Mention the causes and effects of water pollution. Explain strategies to tackle them. **[7M]**
    (b) Explain solid waste management. Mention the affects of solid waste pollution. **[7M]**

Hall Ticket No | | | | | | | | | | | Question Paper Code: AHS010

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IARE – R16

PROBABILITY AND STATISTICS

(Common for CSE/IT)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) A random variable x has the density function **[7M]**

$$P(x) = \begin{cases} kx^2, -3 \le x \le 3 \\ 0, elsewhere \end{cases}$$

   i. Evaluate K
   ii. P(1≤x<2)
   iii. P(x≤2)

   (b) The savings bank account of a customer showed an average balance of Rs.150 and a standard deviation of Rs. 50. Assuming the account balances are normally distributed, find what percentage of account is. **[7M]**
   i. Over Rs.200
   ii. Between Rs.120 and Rs.170
   iii. less than Rs.75

2. (a) A recent study by a marketing research firm showed that 15% of the homes had a video recorder for recording TV programs. A sample of 200 homes is obtained. (Let X be the number of homes). What is the probability that less than 40 homes in the sample have video recorders? What is the probability that more than 24 homes in the sample have video recorders **[7M]**

   (b) A continuous random variable X has the distribution function **[7M]**

$$f(x) = \begin{cases} 0, & if\ x \le 1 \\ k(x-1)^4, & 1 \le x \le 3 \\ 1, & x > 3 \end{cases}$$ Determine

   i. k
   ii. Mean

UNIT – II

3. (a) A fair coin is tossed thrice. The random variables X and Y are defined as follows: X= 0 or 1 according as head or tail occurs on the first toss. Y= Number of heads **[7M]**
   i. Determine the distributions of X and Y

ii. Determine Joint distribution of X and Y.

(b) Find the correlation coefficient from the following data **[7M]**

X	1	2	3	4	5	6	7	8	9	10
Y	10	12	16	28	25	36	41	49	40	50

4. (a) If X and Y are continuous random variables having the Joint density function, **[7M]**

$$f(x,y) = \begin{cases} c\left(x^2+y^2\right), 0 \le x \le 1, 0 \le y \le 1 \\ 0, \text{elsewhere} \end{cases}$$

Determine c

(b) The following data gives the age of husband (x) and the age of wife (y) in years. Find the correlation coefficient. **[7M]**

X	36	23	27	28	28	29	30	31	33	35
Y	39	18	20	22	27	21	29	27	29	28

UNIT – III

5. (a) A population consists of 4 numbers 3,7,11,15. If N, n denotes respectively the population size and sample size σ and$\sigma_{\bar{x}}$respectively denotes population S.D and S.D of the sampling distribution of means consider all the possible samples of size 2 that can be drawn without replacement, Verify that **[7M]**

i. $\sigma^2_{\bar{x}} = \frac{\sigma^2}{n}\left[\frac{N-n}{N-1}\right]$

ii. $\mu_{\bar{x}} = \mu$ where $\mu_{\bar{x}}$ is the mean of this distribution and μ is population mean.

(b) If the mean of an infinite population is 575 with standard deviation of 8.3 how large a sample must be used in order that there be one chance in 100 that the mean of the sample is less than 572? **[7M]**

6. (a) Discuss about type-I and Type –II errors in hypothesis testing **[7M]**

(b) Explain Different types of sampling techniques **[7M]**

UNIT – IV

7. (a) The scores on an aptitude test required for entry into a certain job position have a mean of 500 and a standard deviation of 120. If a random sample of 36 applicants has a mean of 546, is there evidence that their mean score is different from the mean that is expected from all applicants? **[7M]**

(b) An oil company claims that less than 20% of all car owners have not tried its gasoline. Test this claim at the 0.01 level of significance, if a random check reveals that 22 out of 200 car owners have not tried the oil company's gasoline. **[7M]**

8. (a) The mean of two large samples of 1000 and 2000 members are 168.75 cm and 170 cms respectively can the samples be regarded as drawn from the same population of standard deviation 6.25 cm. Test at 1% Level of significance **[7M]**

(b) The failure rate of typhoid patient is believed to be 17.26%. Ina certain year, 640 patients suffered from typhoid weretreated in a metropolitan hospital and only 63 patients died.Can you consider thehospital efficient? Test at 1% Level of significance. **[7M]**

UNIT – V

9. (a) Discuss about F distribution and its properties. **[7M]**

   (b) It is believed that the precision of an instrument is no more than 0.16.test the belief at 1% Level of significance based on the following measurements, 2.3, 2.4, 2.3, 2.5, 2.7, 2.5, 2.6, 2.6, 2.7, 2.5, 2.5 **[7M]**

10. The heights of six randomly chosen sailors are in inches : 63, 65,68, 69, 71, 72. Those of 10 randomly chosen soldiers are 61, 62, 65, 66, 69, 69, 70, 71, 72, 73. Test, if sailors are on the average taller than soldiers **[14M]**

Hall Ticket No | | | | | | | | | | | Question Paper Code: AHS011

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IA-R16

MATHEMATICAL TRANSFORM TECHNIQUES

(Electronics and Electrical Engineering)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Find the Fourier Series of $f(x) = \begin{cases} 4-x, 3<x<4 \\ x-4, 4<x<5 \end{cases}$ **[7M]**

   (b) Find the Cosine Series of $f(x) = \sin x$ in $(0,)$. **[7M]**

2. Obtain the Fourier series for $f(x) = \begin{cases} 0 \quad for \ -\pi < x < 0 \\ \sin x \quad for \ 0 < x < \pi \end{cases}$ in $(-\pi, \pi)$ **[14M]**

UNIT – II

3. (a) Find the Fourier transform of $f(x) = \begin{cases} 1-|x|, |x| \le 1 \\ 0, |x| > 1 \end{cases}$ and hence deduce that $\int_0^\infty \frac{\sin^2 t}{t^2} dt = \frac{\pi}{2}$. **[7M]**

   (b) Solve the integral equation, $\int_0^\infty f(\theta)\cos(\theta\alpha)\, d\theta = \begin{cases} 1-\alpha, 0 \le \alpha \le 1 \\ 0, \alpha > 1 \end{cases}$ **[7M]**

4. (a) Find the Fourier Cosine transform of e^{-ax} and hence that the Fourier Cosine transform of e^{-ax}. Further evaluate $\int_0^\infty \frac{\cos \pi x}{x^2+a^2} dx$ **[7M]**

   (b) Find the Fourier transform of, $f(x) = \begin{cases} 1, |x| \le a \\ 0, |x| > a \end{cases}$ where a is a Positive Constant hence evaluate $\int_{-\infty}^{\infty} \frac{\sin ax \cos \alpha x}{x} dx$ **[7M]**

UNIT – III

5. (a) Find the Laplace transform of **[7M]**
   i. $\left\{\frac{\cos 2t - \cos 3t}{t}\right\}$
   ii. $t \sin at$

(b) Given $f\ (t) = \begin{cases} \mathrm{E}, 0 < t < {}^{\mathrm{a}}/_{2} \\ -\mathrm{E}, {}^{\mathrm{a}}/_{2} < t < a \end{cases}$, $f\,(t+a) = f\,(t)$

Show that $\mathrm{L}\{\mathrm{f(t)}\} = \frac{\mathrm{E}}{\mathrm{S}} \tan \mathrm{h}\,({}^{\mathrm{as}}/_{4})$

6. (a) Find $\mathrm{L}^{-1}\left\{\frac{5S+3}{(S-1)(S^2+2S+5)}\right\}$ **[7M]**

(b) Verify Convolution theorem for $f\,(t) = t$ and $g\,(t) = \cos t$ **[7M]**

UNIT – IV

7. (a) Using Partial fraction method, find the inverse Z – transform of $\frac{Z^3-20Z}{(Z-2)^3(Z-4)}$ **[7M]**

(b) Using Z – transform solve $Y_{n+2} + 2Y_{n+1} + Y_n = n, Y_0 = Y_1 = 0$ **[7M]**

8. (a) Using Convolution theorem, find the inverse Z – transform of $\left(\frac{Z}{Z-2}\right)^3$ **[7M]**

(b) Using Z – transform, solve, $Y_{n+2} + 4Y_{n+1} + 4Y_n = 7, Y_0 = 1, Y_1 = 2.$ **[7M]**

UNIT – V

9. (a) Solve $4\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 3u$ and $u = e^{-5y}$ when x=0 for all values of y. **[7M]**

(b) Solve the partial differential equation $x(y-z)p + y(z-x)q = z(x-y)$. **[7M]**

10. The ends A and B of a rod of 20 cm long, have the temperature at and until steady state prevails. The temperature of the ends are changed to $40°C$ and $60°C$ respectively. Find the temperature distribution in the rod at time. **[14M]**

Hall Ticket No | | | | | | | | | | |

Question Paper Code: ACS001

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IARE – R16

Computer Programming

(Common for AE/CE/ME)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) What are the rules for naming an identifier and list some valid identifiers. **[7M]**
   (b) Write a C program to find whether a given year is leap year or not using ternary operator. **[7M]**
2. (a) Explain with examples any 4 data type to store numeric' s in C programming language? **[4M]**
   (b) Write a C program to evaluate the polynomial shown below: **[6M]**
   $4x^4 + 9x^3 + 7x - 28$
   (c) What is type casting? Explain with example. **[4M]**

UNIT – II

3. (a) Explain about dangling else problem with an example. **[6M]**
   (b) Write a program to reverse a given string without using string library functions. **[8M]**
4. (a) Describe multi branching statement in C using its syntax and flow chart. **[5M]**
   (b) Write a C program to remove duplicate elements in an integer array. **[9M]**

UNIT – III

5. (a) Using an example compare the declarations char a[ ] and char *a. **[5M]**
   (b) Write a C program to demonstrate the Call By Value and Call By Reference functions by taking an example of swapping the values of two variables. **[9M]**
6. (a) Explain the following pre-processor directives briefly. #define, #include, #undef, #ifndef. **[8M]**
   (b) Write a C program to find largest element in an array using pointers. **[6M]**

UNIT – IV

7. (a) What is dynamic memory allocation? What are the functions used for it? Explain. **[8M]**
   (b) Write a C Program to add two complex numbers by passing structure to a function. **[6M]**

8. (a) What is Structure in C ? Create a Structure to store DATE and write a function to add 2 dates. **[8M]**

   (b) Explain following with example: **[6M]**

   i. malloc()
   ii. calloc()
   iii. realloc()

UNIT – V

9. (a) Give the syntax for opening a file. Explain various modes of opening a file. **[7M]**

   (b) Write a C program to count no of lines, words and characters in a file. **[7M]**

10. (a) Give the syntax and description of the following. **[8M]**

   i. fgets()
   ii. fgetc()
   iii. fputs()
   iv. fputc()

   (b) Write a C program to add two numbers using command line arguments. **[6M]**

Hall Ticket No | | | | | | | | | | | Question Paper Code: ACS002

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IARE – R16

DATA STRUCTURES

(Common for CSE/IT/ECE/EEE)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Explain the method to calculate the address of an element in an array. A 25×4 matrix array DATA is stored in memory in 'row-major order'. If base address is 200 and 4 ω = words per memory cell. Calculate the address of DATA [12, 3] . **[6M]**

   (b) Bubble sort algorithm is inefficient because it continues execution even after an array is sorted by performing unnecessary comparisons. Therefore, the number of comparisons in the best and worst cases are the same. Modify the algorithm in such a fashion that it will not make the next pass when the array is already sorted. **[8M]**

2. (a) Describe insertion sort and its time complexity. **[7M]**

   (b) What are the characteristics of a good algorithm? What is the relation between the time and space complexities of an algorithm? **[7M]**

UNIT – II

3. (a) Explain how to implement two stacks in one array A[1..n] in such a way that neither stack overflows unless the total number of elements in both stacks together is n. The PUSH and POP operations should run in O(1) time. **[7M]**

   (b) Suppose a queue is maintained by a circular array QUEUE with N = 12 memory cells. Find the number of elements in QUEUE if **[7M]**

   i. Front = 4, Rear =8.
   ii. Front = 10, Rear = 3.
   iii. Front = 5, Rear = 6 and then two elements are deleted.

4. (a) Using stacks, write an algorithm to determine whether the infix expression has balanced parenthesis or not. **[7M]**

   (b) Define double ended queue and its types and give its applications in real time scenario. **[7M]**

UNIT – III

5. (a) Two linked lists contain information of the same type in ascending order. Write a module to merge them to a single linked list that is sorted. **[9M]**

   (b) Write an algorithm to count number of nodes in the circular linked list. **[5M]**

6. (a) Write an algorithm and show diagrammatic representation to insert an element k in double linked list at **[7M]**
   i. Start of linked list
   ii. After a given position P of list
   iii. End of linked list.

   (b) Write an algorithm that will split a circularly linked list into two circularly linked lists. **[7M]**

UNIT – IV

7. (a) Consider the following undirected graph and answer the following questions. **[8M]**

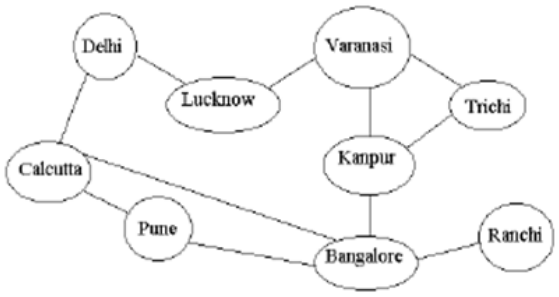

Figure 1

Assume that the edges are ordered alphabetically (i.e. when facing with alternatives, choose the edges in alphabetical order)
   i. List the nodes (cities) of the graph by depth first search starting from Varanasi.
   ii. List the nodes (cities) of the graph by breadth first search starting from Calcutta.

   (b) What are priority Queues? How can priority queues be implemented? Explain in brief. **[6M]**

8. (a) Describe Kruskal's algorithm to find minimum spanning trees. Apply Kruskal's algorithm from node a for the below figure 2. **[7M]**

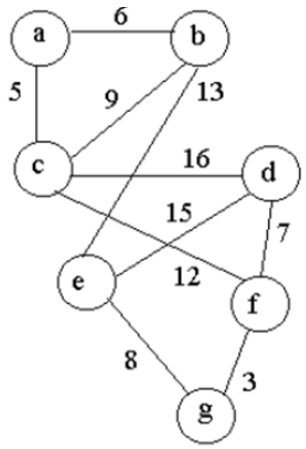

Figure 2

   (b) What is a binary tree? Write an algorithm for the preorder traversal of a binary tree using stacks. **[7M]**

UNIT – V

9. (a) What do you mean by hash clash? Explain in detail any one method to resolve hash collisions. **[5M]**

   (b) What is a height balanced tree? Explain how the height is balanced after addition/deletion of nodes in it? **[9M]**

10. (a) Define hashing. Describe any two commonly used hash functions. Describe one method of collision resolution. **[7M]**

    (b) Draw a B-tree of order 3 for the following sequence of keys: **[7M]**
    2, 4, 9, 8, 7, 6, 3, 1, 5, 10

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Hall Ticket No | | | | | | | | | | | Question Paper Code: AME002

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IARE – R16

ENGINEERING MECHANICS

(Common for AE/CE/ME)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) A body moving with uniform acceleration is observed to travel 33m in eighth second and 53m in the thirteenth second of its travel. Calculate the velocity at start and uniform acceleration. **[7M]**

   (b) A bullet is fired upwards at an angle of 30° to the horizontal from a point P on a hill and it strikes a target which is 80m lower than P. The initial velocity of the bullet is 100 m/s. Calculate
   i. The maximum height to which the bullet will rise above the horizontal. **[7M]**
   ii. The actual velocity with which it will strike the target.
   iii. The total time required for the flight of the bullet.
   iv. Horizontal distance between hill position and the target.

2. (a) Two stones are thrown vertically upwards, one from the ground with a velocity of 30 m/s and another from a point 40m above with a velocity of 10 m/s. When and where will they meet? **[7M]**

   (b) A cannon ball has a range 'r' on a horizontal plane. It h and h' are the greatest heights in the two paths for which this is possible, show that $r = \sqrt{hh'}$ **[7M]**

UNIT – II

3. Two blocks A and B are held on an inclined plane as shown in 1. The coefficient of friction for block A and B with inclined plane are 0.3 and 0.2 respectively. If the blocks begin to slide down simultaneously calculate the time and distance traveled by each block before block B touches block A. Suppose if they continue to move as a single unit. Determine the contact force exerting between them. Weight of block A = 300N and Weight of block B = 500N. **[14M]**

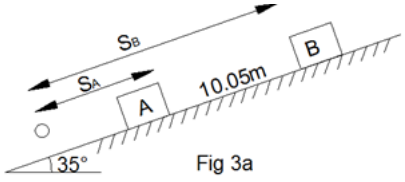

Figure 1

4. (a) A bullet of mass 0.8 kg is fired from a cannon of mass 920 kg with a velocity of 280 m/s in a horizontal direction. A cannon rests on a smooth horizontal surface against a spring buffer whose spring constant is 12 N/mm compression. Calculate the amount of compression of spring due to fire. **[7M]**

   (b) The block A weighs 250N, B weighs 500 N as shown in figure2. The coefficients of friction are 0.4 between A and B, 0.1 between B and the plane and 0.3 between the fixed drum C and the cable. Determine the least value of block D for motion of the block D to impend. **[7M]**

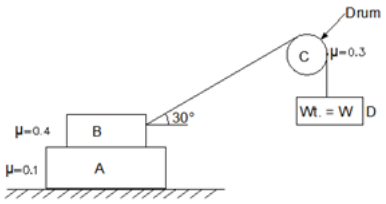

Figure 2

UNIT – III

5. Two bodies of mass 15kg and 9kg respectively hang on light strings 3m long side by side and are just in contact. The heavier body is drawn aside, keeping string taut, until its centre of gravity is raised through a vertical distance of 700 mm. It is then released and on impact, the two masses adhere. Calculate **[14M]**

   i. the velocity of 15kg mass just before impact.

   ii. the common velocity immediately after the impact

   iii. the loss of kinetic energy on impact.

   iv. the vertical height through which the centre of gravity of the combined system will rise.

   v. tension in the string of 15 kg mass just before impact.

6. (a) A mass 12 kg travelling to the right with a speed of 7.5 m/s collides with another mass 24 kg, travelling to the left with a speed of 25 m/s. If the coefficient of restitution is 0.6, find the velocities of the particles after collision and loss in kinetic energy. What is the impulse acting on either particle during the impact? **[7M]**

   (b) A machine raised a load of 360 N through a distance of 200mm. The effort, a force of 60 N moved 1.8m during the process. Calculate by using virtual work method. **[7M]**

   i. Mechanical advantages.

   ii. Velocity.

   iii. Efficiency at this load.

   iv. Effort of friction.

UNIT – IV

7. (a) A block of weight 12N falls at a distance of 0.75 m on top of the spring. Determine the spring constant if it is compressed by 150 mm to bring the weight momentarily to rest. **[7M]**

   (b) A 5 kg block slides from rest at point A along a frictionless inclined plane making an angle of 25° with horizontal. Determine the speed of the block at B at a distance of 3m from A. **[7M]**

8. A pile driver of mass M kg falls from a height of h metre on to the top of a pile of mass m kg and drives it into the ground, a distance of x metre. Assume the resistance of the ground to be constant and the pile to be inelastic, determine **[14M]**

   i. The resistance of the ground.

   ii. The time the pile is in motion.

   iii. kinetic energy lost due to impact.

UNIT – V

9. (a) Explain the concept of Simple Harmonic Motion. **[2M]**

   (b) Mention the causes of 'vibrations' in machines and 'structures'. **[2M]**

   (c) A particle executes Simple harmonic motion with a frequency of 12 oscillations per minute.when the particle lies at a distance of 10cm from the mean position,its velocity equals 65 percent of maximum velocity.Determine **[10M]**

      i. The distance between two extreme positions of the particle.

      ii. The maximum acceleration of the particle

      iii. Velocity of the particle and the time that lapses when it is at a distance of 8cm from the center of oscillation.

10. (a) Mention some of the Harmful effects of vibrations. **[4M]**

   (b) A horizontal steel disc 40cm in diameter and 4cm thick is fitted at its centre to a 1m diameter as shown in the 3.The upper end of the shaft is fixed.Calculate the Frequency and Time period of the assembly.Assume the Modulus of Rigidity of brass as $35 \times 10^9 N/m^2$ and Density of steel as 7860kg/m^3. **[10M]**

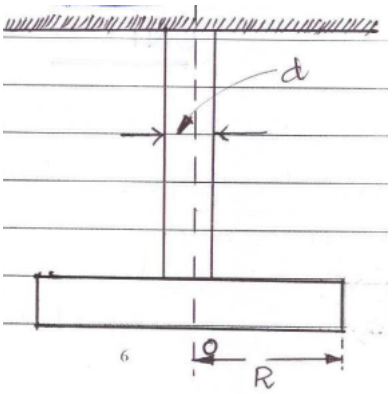

Figure 3

Hall Ticket No | | | | | | | | | | | Question Paper Code: AEE001

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IARE – R16

FUNDAMENTAL OF ELECTRICAL AND ELECTRONICS ENGINEERING

(Common for CSE/IT)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Differentiate between **[7M]**
   i. voltage and current source
   ii. active and passsive elements.

   (b) A dc circuit comprises of two resistors; resistor A of value 25 ohm and resistor B of unknown value, connected in parallel, together with a third resistor C of value 5 ohm, connected in series with the parallel branch. Find the voltage to be applied across the whole circuit and the value of the resistor B if the potential difference across C is 90V, and the total power consumed is 4320W. **[7M]**

2. (a) Find the value of R shown in figure 1, such that the power dissipated in the 5Ω resistor is 100W. Assume that the internal resistance of the battery of 50V is 1Ω. **[7M]**

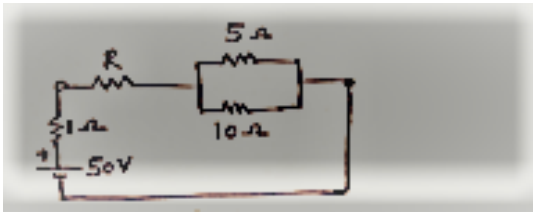

Figure 1

   (b) A voltage v=10 sin 314t is applied to an inductance of 5mH. Determine i, instantaneous power p and average power p_{avg}. **[7M]**

UNIT – II

3. (a) Find the voltage across 1Ω resistor and current through 2Ω resistor for the circuit shown in figure 2 using nodal method. **[7M]**

Figure 2

(b) State and explain Thevenin's and Norton's theorems using any example. **[7M]**

4. (a) Define and explain the following terms: **[6M]**
   i. Twigs
   ii. Co-tree
   iii. Links
   iv. Branch.

   (b) Determine the basic cutset matrix for the oriented graph given in figure 3 where in the elements 1,2 and 3 are tree branches. **[8M]**

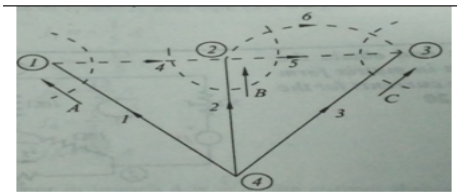

Figure 3

UNIT – III

5. (a) Derive the delta – star transformation of a resistive network. **[7M]**

   (b) Explain how reactive power could be measured in a three phase circuit using single wattmeter method. **[7M]**

6. (a) A choke coil has a resistance of 2 ohm and inductance of 5H. A capacitor C is connected in series with the choke coil and the combination is fed from a 230V, 50Hz supply. What should be the value of C so that the voltage across the choKe coil is 250V. **[7M]**

   (b) Explain the power measurement methods in **[7M]**

   i. balanced three phase loads

   ii. unbalanced three phase loads.

UNIT – IV

7. (a) Prove that the ripple factor for the full wave rectifier circuit is 0.48. **[7M]**

   (b) What are the advantages and disadvantages of a full wave rectifier circuit? **[7M]**

8. (a) Explain the operation of a zener diode as a voltage regulator with its connection diagram and characteristic curve. **[7M]**

   (b) Compare a full wave bridge rectifies with a full wave rectifies with two diodes (with centre tapped transformer). Define PIV of the rectifier. **[7M]**

UNIT – V

9. (a) Explain the need for biasing the transistor. **[7M]**

   (b) Explain the operation of a npn CE amplifier. Draw its input and output characteristics. **[7M]**

10. (a) Explain the working of a transistor as an amplifier. Mention the different configurations of transistor amplifier. **[7M]**

    (b) Explain the operation of a common collector npn transistor. Mention any one application of it. **[7M]**

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Hall Ticket No | | | | | | | | | | | Question Paper Code: AEE002

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2017

Regulation: IARE – R16

ELECTRICAL CIRCUITS

(Common for ECE/EEE)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Using Kirchhoff's current law, find the value of I_s in the circuit shown in figure1. Take $V_1 = 2$V. **[7M]**

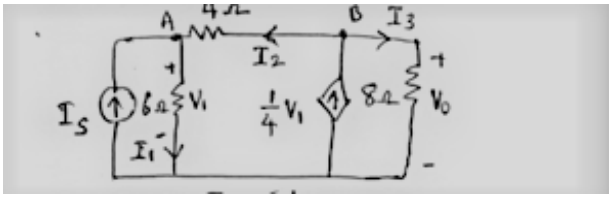

Figure 1

(b) Differentiate between **[7M]**
   i. dependent and independent sources
   ii. ideal and practical sources.

2. (a) A bulb rated 110V, 60W is connected with another bulb rated 110V, 100 W across a 220V mains. Calculate the resistance which should be joined in parallel with the first bulb so that both the bulbs may take their rated power. **[7M]**

(b) A current as shown in figure2 is applied across a 5Ω resistor. Find and Plot v(t) and p(t). **[7M]**

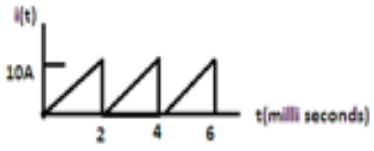

Figure 2

UNIT – II

3. (a) What is meant by dual of a network? Draw the dual circuit for the given circuit shown in figure3 **[7M]**

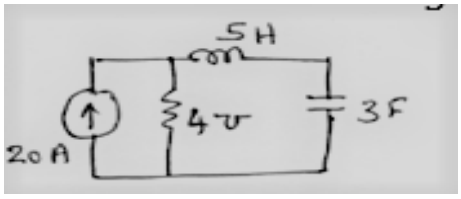

Figure 3

(b) Using nodal analysis find the current through the branch AB for the network shown in figure4. **[7M]**

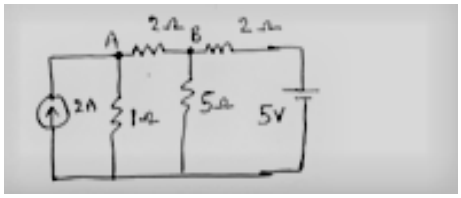

Figure 4

4. (a) In the network shown in figure5, find the current I_1 supplied by the battery using star/delta transformation. **[7M]**

Figure 5

(b) Using an appropriate circuit, explain graph, tree and basic tie set matrix. **[7M]**

UNIT – III

5. (a) Draw the phasor diagram for the series circuit shown in figure6 when the current in the circuit is 2A. Find the values of V_1 and V_2 and show these voltages on the phasor diagram. **[7M]**

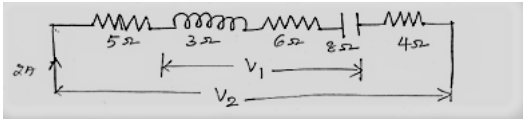

Figure 6

(b) A inductive coil draw 10A current and consumes 1KW power from a 200V, 50HZ AC supply. Determine Impedance, power factor, Real power and Reactive power. **[5M]**

6. (a) A resistance of 24Ω, a capacitor of 150μF and an inductor of 0.16H are connected in series with each other. A supply of 240V, 50Hz is applied to the ends. Calculate **[7M]**
   i. the current in the circuit
   ii. the potential difference across each element
   iii. the frequency to which the supply would need to be changed so that the current would be at unity power factor
   iv. find the current at this frequency.

   (b) Explain the relation between apparent power, active power and reactive power. Write their units. Also explain the significance of power factor. **[7M]**

UNIT – IV

7. (a) State and Explain Maximum Transfer Theorem for AC and DC excitations. **[7M]**

   (b) A series RLC circuit has R=10Ω,C=10μF and L=60mH.At a frequency of 25HZ the power factor of the circuit is 45^0 lead .At what frequency will the circuit be resonant? **[7M]**

8. (a) Explain **[7M]**
   i. Faraday's laws of electromagnetic induction
   ii. band width and Q factor of series resonance circuits.

   (b) A cast steel electromagnet has an air gap length of 3mm and iron path of length 40cm. Find the number of ampere-turns necessary to produce a flux density of 0.7wb/m^2 in the gap. Neglect leakage and fringing. Assume ampere turns required for air gap to be 70% of the total ampere turns. **[7M]**

UNIT – V

9. (a) State and explain reciprocity theorem. **[7M]**

   (b) State Millman's theorem. Calculate the current I for the circuit shown in Figure7 using Millman's theorem. **[7M]**

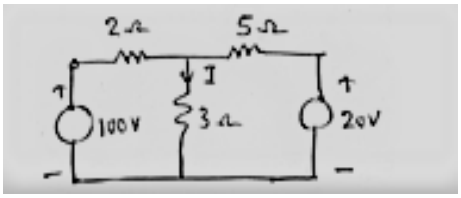

Figure 7

10. (a) State and Explain Tellegen's theorem. **[7M]**

    (b) With a suitable circuit explain the solution of a circuit using Thevenin's theorem. **[7M]**

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