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INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

Bargarh/Fulia/Guwahati/Jodhpur/Salem/Varanasi/Champa/Kannur/KHTI-Gadag/SPKM-Venkatagiri

Diploma in Handloom & Textile Technology

SEMESTER EXAMINATION - APRIL/MAY-2022

(Regulation-2021)

Semester : **FIRST SEMESTER**

Time:3 Hours

Course Code & Title : **BS101 : MATHEMATICS-I**

Maximum Marks: 100

PART-A

(2×10=20 Marks)

Answer all the questions within two to three sentences

- 1 . Find the value of $\sin 15^\circ$.
- 2 . Find the value of $3\sin 10^\circ - 4\sin^3 10^\circ$.
- 3 . Find the value of $\lim_{x \rightarrow 0} \frac{\sin 7x}{x}$.
- 4 . If $y = x^4 + 1$ find $\frac{dy}{dx}$.
- 5 . Evaluate ${}^{10}C_3$.
- 6 . If ${}^nP_r = 720$ and ${}^nC_r = 120$, find r.
- 7 . Let A and B be the event such that $P(B) = \frac{7}{13}$ and $P(A \cap B) = \frac{4}{13}$ find $P\left(\frac{A}{B}\right)$.
- 8 . Write the statement of Total probability theorem.
- 9 . If the mean of the data 7,8,x,11,14 is 19, find the value of x.
- 10 . Define Sampling Theory.

PART-B

(6+10)×5=80 Marks

Answer all the questions in detail

11. A. Prove that $\frac{\sin A + \sin 2A}{1 + \cos A + \cos 2A} = \tan A$. (6)
 - B. If A and B are acute angle and if $\sin A = \frac{1}{\sqrt{10}}$ and $\sin B = \frac{1}{\sqrt{5}}$ prove that $A+B = \frac{\pi}{4}$. (10)
- (OR)
- C. Prove that $\frac{\sin 3A}{1 + 2\cos 2A} = \sin A$. (6)

D. Prove that $\frac{\sin 2A - \sin 2B}{\cos 2A + \cos 2B} = \tan(A-B)$. (10)

12. A. If $y = 8x^3 - 5x^2 + 6x + 7$ find the value of $\frac{dy}{dx}$. (6)

B. If $y = \tan^{-1}\left(\frac{2\tan x}{1-\tan^2 x}\right)$ find $\frac{dy}{dx}$. (10)

(OR)

C. If $y = \log(\sec x + \tan x)$ find the value of $\frac{dy}{dx}$. (6)

D. If $y = \log\left(\frac{1-\cos x}{1+\cos x}\right)$ find the value of $\frac{dy}{dx}$. (10)

13. A. Expand $(x^2+2y)^5$ by the Binomial theorem. (6)

B. Find the 10th term of $(2x^2 + \frac{1}{x})^{12}$. (10)

(OR)

C. Using the Binomial theorem, find the value of $(102)^6$. (6)

D. Find the term independent of x in the expansion of $(x^2 + \frac{1}{x})^9$. (10)

14. A. A dice is rolled. If the outcome is an odd number, what is the probability that it is prime? (6)

B. A factory has three machines X, Y and Z, producing 1000, 2000 and 3000 bolts per day respectively. The machine X produces 1% defective bolts, Y produces 1.5% defective bolts and Z produces 2% defective bolts. At the end of the day, a bolt is drawn at random and it is found to be defective. What is the probability that this defective bolt has been produced by the machine X? (10)

(OR)

C. State and Prove Bayes's theorem. (6)

- D. There are three urns containing 3 white and 2 black balls; 2 white and 3 black balls; 1 black and 4 white balls respectively. There is equal probability of each urn being chosen. One ball is drawn from an urn chosen at random. What is the probability that a white ball is drawn? (10)

15. A. Draw the \bar{R} control chart of the following data: (6)

Sample No.	R(Range)
1	2
2	3
3	2
4	2
5	3

Given; $A_2=0.58$, $d_3=0$, $d_4=2.11$.

- B. Draw the \bar{X} control chart for the following data and state your conclusion: (10)

Sample No.	\bar{X} (Mean)	R(Range)
1	43	5
2	49	6
3	37	5
4	44	7
5	45	7
6	37	4
7	51	8
8	46	6
9	43	4
10	47	6

Given; $N=5$, $d_2=2.326$, $d_3=0.864$

(OR)

- C. The number of weekly customer complaints are monitored in a large hotel using a C- chart. Develop three sigma control limits using the data table below. (6)

Weeks	1	2	3	4	5
Number of complaints	2	4	1	5	3

- D. A production manager for a tire company has inspected the number of defective tires in five random samples with 20 tires in each sample. the table below shows the number of defective tires in each sample of 20 tires. Calculate the control limits. By using p-chart. (10)

Sample	Number of Defective Tires	Number of Tires in each Sample
1	3	20
2	2	20
3	1	20
4	2	20
5	2	20

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Diploma in Handloom & Textile Technology

SEMESTER EXAMINATION - APRIL/MAY-2022

(Regulation-2021)

Semester : FIRST SEMESTER

Time:3 Hours

Course Code & Title : **BS105 Applied Chemistry**

Maximum Marks: 100

PART-A

(2×10=20 Marks)

Answer all the questions within two to three sentences

- 1 . Define atom.
- 2 . Expand the term PPM.
- 3 . What is hardness? How it is classified?
- 4 . Mention any two problems caused by using hard water sample.
- 5 . Define the term metallurgy.
- 6 . Write the structure of PVC.
- 7 . Define octane number.
- 8 . Write any two properties of good lubricant.
- 9 . Define Oxidation.
- 10 . What is an electrochemical cell?

PART-B

(6+10) × 5= 80 Marks

Answer all the questions in detail

11. A. Write short note on formation of NaCl. (6)
- B. Explain Hund's rule and Pauli's exclusion principle with example. (10)
- (OR)
- C. Distinguish between sigma and pi bond. (6)
- D. Define the terms I) Ionic bond II) Covalent bond III) Coordinate covalent bond. Give one example of each. (10)
12. A. What are scales and sludges? Describe their disadvantages. (6)
- B. Explain the EDTA method of estimation of hardness of water. (10)
- (OR)
- C. Discuss the causes and prevention of priming and foaming. (6)

- D. Explain the demineralization of water by ion-exchange process. How are exhausted cation and anion exchange resins regenerated? (10)
13. A. What is the difference between an ore and a mineral? (6)
B. Define the term "Alloy". Discuss the composition, properties and uses of any two ferrous alloys. (10)
- (OR)
- C. Write a short note on vulcanization rubber. (6)
D. Write the preparation and the applications of thermoplastics. Give any two uses of it. (10)
14. A. Define gross and net calorific values of a fuel. How are they related? (6)
B. Explain the proximate analysis of coal. (10)
- (OR)
- C. What are LPG and CNG? Discuss the advantages of LPG over gaseous fuel and CNG over LPG. (6)
D. Explain the physical properties of lubricants. (10)
15. A. What is a dry cell? Give examples. (6)
B. Write a brief note on Lead – acid storage cell. (10)
- (OR)
- C. Explain the electronic concept of oxidation and reduction with suitable example. (6)
D. Describe the industrial application of electrolysis. (10)

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SEMESTER EXAMINATION - APRIL/MAY-2022

(Regulation-2021)

Semester : FIRST SEMESTER Time:3 Hours
Course Code & Title : **HS101 COMMUNICATION SKILLS** Maximum Marks: 100
IN ENGLISH

PART-A

(2×10=20 Marks)

Answer all the questions within two to three sentences

- 1 . What is 'Communication'?
- 2 . Define 'Self – analysis' as an important life skill.
- 3 . Explain 'Soft Skills'.
- 4 . What are the elements in process of communication?
- 5 . Identify the following lines and name the poem from which these have been taken:
I remember the night my mother
Was stung by a scorpion. Ten hours
Of steady rain had driven him
To crawl beneath a sack of rice.
- 6 . What is technical communication?
- 7 . Define 'Precis writing'?
- 8 . What is the moral of the story "The Gift of Magi"?
- 9 . What is E-Mail?
- 10 . Write one word for each of the sentences given below :
 1. Government rule by the people.
 2. Life history written by someone else.

PART-B

(6+10) ×5=80 Marks

Answer all the questions in detail

11. A. What are the types of communication? (6)
B. Explain the 7 Cs for effective communication. (10)

(OR)

- C. What are the art of effective communication? (6)
- D. Define communication and barriers of effective communication. (10)

12. A. Explain 'Leadership Skill'. (6)
- B. What are the soft skills and Hard skills? (10)

(OR)

- C. Explain 'Self-awareness' and 'Emotional intelligence' as the important life skills. (6)
- D. Define Soft Skills. Write the importance of Soft Skills? (10)

13. A. The woods are lovely, dark and deep, (6)
But I have promises to keep,
And miles to go before I sleep,
And miles to go before I sleep.

1. Write the name of the poem from which the above lines have been taken?
2. What do the last two lines of the poem symbolize?
3. The poem "Stopping By Woods on a Snowy Evening" is written by?

- B. Read the passage given below and answer the questions that follow: (10)

Rasipuram Krishnaswami Iyer Narayanasswami, born on 10 Oct, 1906 died in Madras on May 13, 2001. Malgudi Days is a collection of short stories written by R.K. Narayan, published in 1943 by Indian Thought Publications, the publishing company Narayan himself founded in 1942. Malgudi days is a collection of 32 fictional stories set in a small beautiful town called Malgudi in South India. Malgudi is a fictional town located in South India in the novels and short stories of R.K Narayan's work. The 1986 TV show Malgudi Days, based on Narayan's works and directed by Shankar Nag, become a phenomenon in no time. The show started with many senior actors, became a popular name with the portrayal of Swami.

1. How many stories are there in Malgudi Days?
2. What is Malgudi famous for?
3. Where did R.K.Narayan died?
4. What is the full name of R.K. Narayan?
5. When did "Malgudi Days" published?

(OR)

- C. Where the mind is without fear and the head is held high; (6)
Where knowledge is free;
Where the world has not been broken into fragments
By narrow domestic walls:

1. Who is the author of above mentioned poem?
2. What breaks the world into fragments?
3. What does 'without fear' mean here?

- D. Read the passage given below and answer the questions that follow: (10)

Swami is a small child in Malgudi living with his family and grandmother. Once while reading a newspaper; his father reads an article about bravery shown by an 8 year old boy and feels that swami should do something like that. Swami has the habit of sleeping with his grandmother after listening a story told by her. This irritates Swami's father. Swami's father then challenges, or rather forces, him to sleep in his office. When Swami tells his friends of the ordeal, his friends warn him about a ghost living near the office. When swami sleeps in his father's office he has nightmares about the ghost and wakes up with a start. At the same time, Swami spots an intruder breaking into the office. Mistaking him for the ghost, Swami grabs the intruder's leg and yells for help. The rest of the villagers rush inside the office and catch the intruder. The police tell Swami that the intruder was a thief wanted by the police and congratulate him. The incident is published in the Malgudi times but little swami is so scared after the incident that he started sleeping with his grandmother again.

1. Who is swami?
2. Who is the author of "Malgudi Days"?
3. What challenge did Swami's father give him?
4. Who appreciated Swami in the end?
5. After the nightmare with whom Swami started sleeping?

14. A. Read the passage given below and summaries it by giving appropriate title: (6)

Scientists are the backbone of a nation. Their contributions have been very massive to the society. Their inventions and discoveries have made people's lives easier and comfortable. Inventions like planes, cars etc. have

made it very accessible for people to travel and save precious time. Phone has been one of the greatest inventions which allow us to stay connected with one another in almost any part of the world. There are many more inventions and discoveries which have imparted our lives on a daily basis and without them our lives will be very difficult. So, the contributions of the scientists are indeed very important for the development of a nation.

- B. Write a letter to your friend inviting him / her to attend the 15th wedding anniversary of your parents. (10)

(OR)

- C. Write an email to your brother congratulating him on getting a job. (6)
D. Write a letter to a sports company ordering for some sports goods. (10)

15. A. Pick out the Adverbs in the following sentences : (6)

1. She got up quickly.
2. Ravi came today by running.
3. He always comes on time.
4. The player walked slowly.
5. He drove the car fast.
6. The boys spoke wisely.

- B. Explain different types of parts of speech with example? (10)

(OR)

- C. Pick out the Nouns in the following sentences : (6)

1. Nehru was a Prime Minister of India.
2. Gold is precious metal.
3. We read a play in class.
4. He attended the party.
5. Chennai is a big place.
6. Honesty is the best policy.

- D. Convert the following sentences into passive voice : (10)

1. Ram plays football.
2. Sita is writing a letter.
3. Ram killed Rawan.
4. Shah Jehan built the Taj Mahal.
5. I have bought a car.

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Diploma in Handloom & Textile Technology
SEMESTER EXAMINATION - APRIL/MAY-2022
(Regulation-2021)

Semester : **SECOND SEMESTER**

Time:3 Hours

Course Code & Title : **BS102 Mathematics-II**

Maximum Marks: 100

PART-A

(2 x 10=20 Marks)

Answer all the question within two to three sentences

1. Evaluate the determinant $\begin{vmatrix} 2 & 4 & 2 \\ -1 & 2 & -1 \\ 3 & 5 & 3 \end{vmatrix}$
2. If $A = \begin{bmatrix} 1 & 3 \\ 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then find AB.
3. Integrate, $\int (6x^2 + x^3 + 1) dx$.
4. Evaluate: $\int \sin 3x dx$.
5. Find the distance between the points (3, 4) and (-2, 1).
6. Find the equation of straight line passing through the points (2, 3) and (-4, 1).
7. Find the sum of the vectors $\vec{a} = \hat{i} - 2\hat{j} + \hat{k}$ and $\vec{b} = -2\hat{i} + 4\hat{j} + 5\hat{k}$.
8. Find the magnitude of the vector $\vec{a} = 3\hat{i} - 2\hat{j} + 6\hat{k}$.
9. What are parameters estimation?
10. Define the F- distribution.

PART-B

(6+10) x 5= 80 Marks

Answer all the questions in detail.

11. A) Find the minor and cofactors of the elements of the determinant $\begin{vmatrix} 1 & 2 & 1 \\ 2 & 1 & 3 \\ 1 & 4 & 2 \end{vmatrix}$ (6)

B) Solve the equations by using Cramer's rule. (10)

$$2x + y + 2z = 2, 3x + 2y + z = 2, -x + y + 3z = 6$$

(OR)

C) Verify that, $[AB]^T = B^T \cdot A^T$ Where $A = \begin{bmatrix} 1 & 2 \\ 2 & 3 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 & 0 \\ 1 & 2 & 3 \end{bmatrix}$ (6)

D) Solve the equations by using matrix method. (10)

$$x + 2y - 3z = 4, 2x + 4y - 5z = 12, 3x - y + z = 3$$

12. A) Evaluate, $\int (x^2 + \sqrt{x})^2 dx$. (6)

B) Integrate, $\int x^2 \sin ax dx$. (10)

(OR)

C) Evaluate, $\int \frac{4x+5}{x^2+x-2} dx$. (6)

D) Integrate, $2 \int_0^{\pi/2} \sin^3 x dx$. (10)

13. A) Show that the points A (-1, 4), B (0, 2) and (2, -2) are collinear. (6)

B) Prove that the points (0, -1), (-2, 3), (6, 7) and (8, 3) are vertices of a rectangle. (10)

(OR)

C) Find the equation of the circle with centre at (-1, 2) which passes through the point (3, 1). (6)

D) Find the co-ordinates of the vertex the focus, the length of latus rectum, the equation of the directrix, of the parabola $3x^2 + 12x - 8y = 0$. (10)

14. A) Find $(\vec{a} + 3\vec{b}) \cdot (2\vec{a} - \vec{b})$ if $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$ and $\vec{b} = 3\hat{i} + 2\hat{j} - \hat{k}$. (6)

B) Find the angle between the vectors $\hat{i} - 2\hat{j} + 3\hat{k}$ and $3\hat{i} - 3\hat{j} + \hat{k}$. (10)

(OR)

C) Find $\vec{a} \times \vec{b}$ if $\vec{a} = 2\hat{i} + \hat{k}$ and $\vec{b} = \hat{i} + \hat{j} + \hat{k}$. (6)

- D) Find the area of the parallelogram whose sides are vector $\hat{i} + 2\hat{j} + 3\hat{k}$ and $-3\hat{i} - 2\hat{j} + \hat{k}$. (10)
15. A) Find the mean and variance of the finite population that consist of the 10 numbers 15, 13, 18, 10, 06, 21, 07, 11, 20 and 09. (6)
- B) Explain the theorem of chi-square distribution. (10)

(OR)

- C) In 16 one-hour test runs, the gasoline consumption of an engine averaged 16.4 gallons with a standard deviation of 2.1 gallons. Test the claim that the average gasoline consumption of this engine is 12.0 gallons per hour. (6)
- D) Prove that, if \bar{x} is the mean of a random sample of size n from a finite population of size N with the mean μ and variance σ^2 , then $E(\bar{X}) = \mu$ and $\text{Var}(\bar{X}) = \frac{\mu^2}{n} \cdot \frac{N-n}{N-1}$ (10)

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Diploma in Handloom & Textile Technology

SEMESTER EXAMINATION - APRIL/MAY-2022

(Regulation-2021)

Semester : SECOND SEMESTER

Time:3 Hours

Course Code & Title : **BS103 APPLIED PHYSICS**

Maximum Marks: 100

PART-A

(2×10=20 Marks)

Answer all the questions within two to three sentences

- 1 . How many significant figures are there in (i) 0.4560 (ii) 3.00607
- 2 . What are derived quantities?
- 3 . Define elasticity.
- 4 . What is the effect of temperature on viscosity of liquids?
- 5 . Convert 180 K to degree Celsius.
- 6 . Define coefficient of thermal conductivity.
- 7 . What are the conditions to achieve total internal reflection?
- 8 . List out the characteristics of a laser.
- 9 . State Ohm's law.
- 10 . What are the three terminals of a transistor?

PART-B

(6+10)×5=80 Marks

Answer all the questions in detail

11. A. Check by dimensional analysis whether the equation is correct: (6)
 $E = mgh + \frac{1}{2}mv^2$, where 'E' is energy; 'm' is mass; 'g' is acceleration due to gravity; 'h' is height and 'v' is velocity.
 - B. Discuss the applications of dimensional equations with examples. (10)
- (OR)**
- C. Define the absolute, systematic and random errors. (6)
 - D. Prove by dimensional method 1 joule = 10⁷ erg. (10)
12. A. The terminal velocity of a copper ball of radius 2 mm falling through a tank of oil is 6.5 cm/s. Compute the viscosity constant of oil if density of oil is 1.5×10³ kg/m³ and density of copper is 8.9×10³ kg/m³. Consider acceleration due to gravity as 10 m/s². (6)

- B. Explain stress - strain curve with a neat sketch. (10)
- (OR)**
- C. A solid sphere of mass 50 g and radius 8 cm is revolving about an axis through its centre in a circular path. Find the moment of inertia of the body. (6)
- D. What is friction? Define the types of friction and give examples. (10)
13. A. A rod 0.25 m long and $0.892 \times 10^{-4} \text{ m}^2$ area of cross section is heated at one end through 393 K while the other end is kept at 323 K. The quantity of heat which will flow in 15 minutes along the rod is 8.811×10^3 joule. Calculate thermal conductivity of the rod. (6)
- B. Discuss about heat conduction and heat convection with examples. (10)
- (OR)**
- C. Define coefficient of real and apparent expansion of liquids. (6)
- D. Derive the relation between coefficient of linear expansion and volume expansion of solids. (10)
14. A. Describe the laws of reflection and refraction. (6)
- B. Discuss damped and forced vibrations in details. (10)
- (OR)**
- C. Describe stimulated emission process with a neat sketch. (6)
- D. Illustrate the image formation by convex lens with neat diagrams. (10)
15. A. Summarize about extrinsic semiconductors. (6)
- B. Derive an expression for equivalent capacitance when the capacitors are connected in series and parallel. (10)
- (OR)**
- C. Explain Kirchhoff's voltage law with an example. (6)
- D. Explain the construction and working of NPN transistor. (10)

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Diploma in Handloom & Textile Technology

SEMESTER EXAMINATION - APRIL/MAY-2022

(Regulation-2021)

Semester : SECOND SEMESTER

Time:3 Hours

Course Code & Title : ES102 INTRODUCTION TO IT SYSTEM

Maximum Marks: 100

PART-A

(2×10=20 Marks)

Answer all the questions within two to three sentences

- 1 . Define Table tag.
- 2 . What is downloading and uploading? Differentiate between uploading and downloading.
- 3 . What is browser?
- 4 . What is kernel?
- 5 . What is mean by GUI and CLI?
- 6 . What is webpage?
- 7 . Write the name of four application software.
- 8 . What is power point presentation?
- 9 . What is high level language?
- 10 . Explain about translator.

PART-B

(6+10) ×5=80 Marks

Answer all the questions in detail

11. A. Describe input and output device. Explain with examples. (6)
- B. Draw a block diagram of computer and explain its parts briefly. What are the different types of computer? (10)

(OR)

- C. What is Internet? Write the difference between internet and intranet. (6)
 - D. What are the generations of computer? Differentiate between browser and search engine. (10)
12. A. What is operating system? Differentiate between Linux and Unix. (6)

B. What is Shell? Explain in detail. (10)

(OR)

C. What is Unix Command? (6)

D. How Windows operating system is distinct from Unix. (10)

13. A. What is HTML? Explain. (6)

B. What is CSS? Why CSS is used in HTML document? Explain its three ways to add or insert CSS in HTML document. (10)

(OR)

C. Explain form tag. Design a form using different HTML tag. (6)

D. Who Developed HTML? Discuss the features and versions of HTML. (10)

14. A. What is Microsoft office? Explain with examples. (6)

B. What is Microsoft word? Write the process of making resume explain with example. (10)

(OR)

C. What is MS Excel? Explain. (6)

D. What is software? Define its types. (10)

15. A. Describe C language. Explain the structure of C program with example. (6)

B. What are the different data types used in C language? Explain. (10)

(OR)

C. What are the conditional statements in C Language? Explain. (6)

D. Who developed C language? Write the characteristics of C language? (10)

Differentiate between compiler and interpreter.

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SEMESTER EXAMINATION - APRIL/MAY-2022

(Regulation-2021)

Semester : SECOND SEMESTER Time:3 Hours

Course Code & Title : ES104 FUNDAMENTALS OF ELECTRICAL,
ELECTRONICS ENGINEERING Maximum Marks: 100

PART-A

(2×10=20 Marks)

Answer all the questions within two to three sentences

- 1 . Define Passive and active components.
- 2 . Draw NOT Gate functional Block diagram and write its truth table.
- 3 . Define Slew Rate and write its mathematical expression.
- 4 . Draw the circuit diagram of op-amp as a differentiator and write an expression for its output voltage.
- 5 . What is the analogy between electric and magnetic circuits?
- 6 . Define self-induced emf and mutually induced emf and mention their SI units?
- 7 . How many types of power are in A.C circuit? Also Discuss about power triangle.
- 8 . What is power factor? Write any two importance of power factor.
- 9 . Write different type of losses present in transformer.
- 10 . What is slip? Write an expression for rotor frequency in terms of supply frequency.

PART-B

(6+10) ×5=80 Marks

Answer all the questions in detail

11. A. Explain the Ideal and Non ideal voltage/current sources with appropriate circuit diagram. (6)
 - B. Write a short note on: (i) Periodic and non-periodic signal (ii) Flip-Flops. (10)
- (OR)**
- C. Define and describe their applications of the following: (6)
(i) Transistor (ii) MOSFET

D. Define truth table. What do you mean by Logic Gates? Classify the Logic Gates. (10)

12. A. What is an op-amp? Explain the ideal op-amp characteristics. (6)

B. Define op-amp as an inverting amplifier and derive an expression for its output voltage. (10)

(OR)

C. What is CMRR? Calculate the output voltage if $V_1 = V_2 = 0.15$ V in figure1. (6)

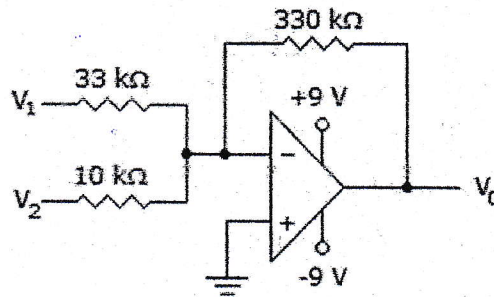


Figure 1

D. Derive an expression for output voltage of op-amp as summing amplifier. (10)

13. A. Explain Faraday's Laws of Electromagnetic Induction with suitable Diagram. (6)

B. What is permeability and reluctance. Mention the formula of reluctance in form of area and length? (10)

(OR)

C. Give the Definition of EMF, Current and power in an appropriate manner. (6)

D. Write short notes on Magnetic Hysteresis Phenomenon and Draw Hysteresis loop. (10)

14. A. Draw STAR connections of A.C. circuit. Also write voltage and current relationship between phase and line. (6)

B. Explain series R-L-C circuit with phasor diagram and derive equation of resonance frequency (f_r). (10)

(OR)

- C. The Instantaneous value of voltage and current in particular circuit is given by (6)
 $V = 283 \sin 314t$ & $I = 4 \sin (314t - 45^\circ)$. Find -
(i) Circuit Element & their values.
(ii) Power factor and power consumed by circuit.
- D. Derive the expression for RMS value and Average value of an alternating (10)
quantity. Also formulate Form factor and Peak factor.
15. A. Explain working principle of transformer with suitable diagram? (6)
- B. Derive an E.M.F equation of transformer. Also Give comparison between (10)
Conventional transformer and auto-transformer.
- (OR)**
- C. Explain working principal of 3-phase induction motor with suitable diagram. (6)
- D. A 3-phase, 4 pole Induction motor connected to 3-phase 400 V, 50 Hz a.c (10)
supply. Calculate:
(a) Synchronous speed (b) Rotor speed at 4 % slip
(c) Rotor frequency when rotor speed is 600 rpm.

Registration Number

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INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

Bargarh/Fulia/Guwahati/Jodhpur/Salem/Varanasi/Champa/Kannur/KHTI-Gadag/SPKM-Venkatagiri

Diploma in Handloom & Textile Technology

SEMESTER EXAMINATION - APRIL/MAY-2022

(Regulation-2021)

Semester : SECOND SEMESTER

Time:3 Hours

Course Code & Title : **ES106 ENGINEERING MECHANICS** Maximum Marks:100

PART-A

(2×10=20 Marks)

Answer all the questions within two to three sentences

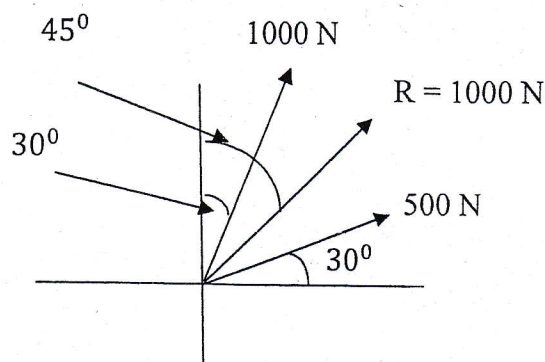
- 1 What is the Newton's third law?
- 2 What is the law of transmissibility?
- 3 What are the conditions for a body to be in equilibrium state?
- 4 Define the free body diagram for a body with example.
- 5 What is the friction?
- 6 Define the angle of repose.
- 7 What is meant by the Centre of gravity of an object?
- 8 What will be Centroid of rectangular surface which has 10 cm length and 5 cm width?
- 9 Define the mechanical advantage and the velocity ratio for a simple lifting machine.
- 10 What is the efficiency of a simple machine?

PART-B

(6+10) × 5 = 80 Marks

Answer all the questions in detail

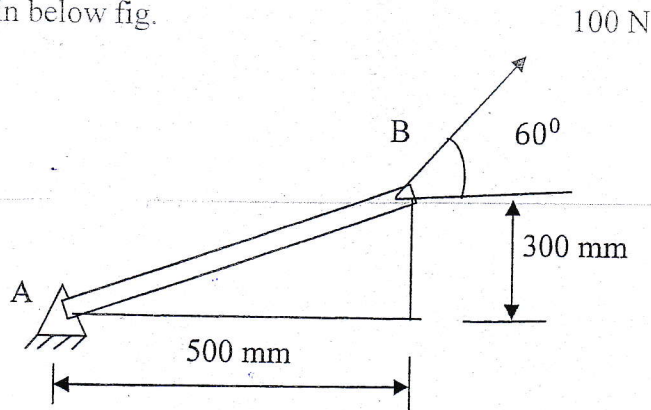
11. A. Two forces acting on a body are 500 N and 1000 N as shown in fig. below. (6)
Determine the third force F such that the resultant of all the three forces is 1000 N directed at 45° to x – axis.



- B. What is the parallelogram law of forces? Derive the relation for the resultant (10)
of two forces acting on a body at an angle.

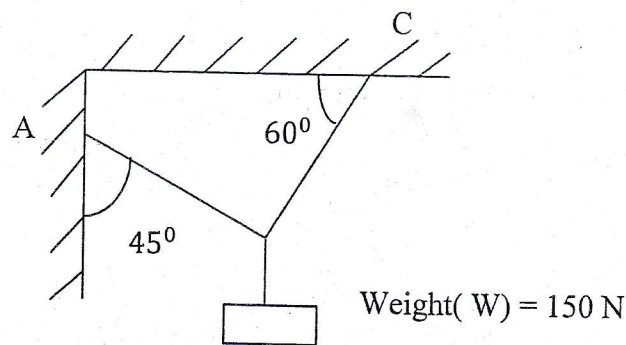
(OR)

- C. Determine the moment of 100 N force acting at B about moment centre A as (6)
shown in below fig.



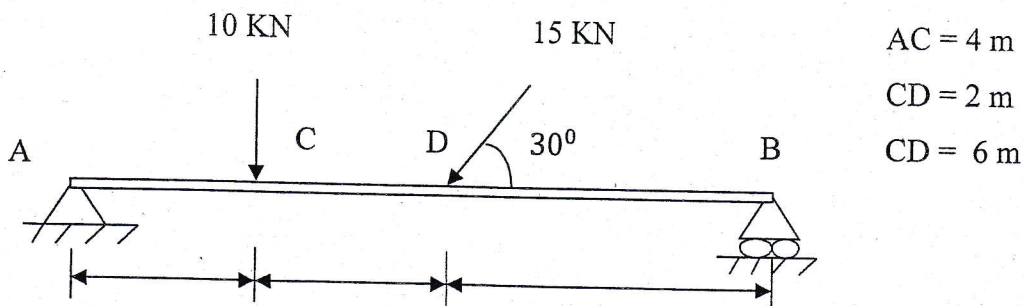
- D. Define the moment, couple and varignons theorem with example. (10)

12. A. Define the beam, give the classification of beam with brief explanation. (6)
B. Find the forces developed in the wires, supporting an electronic fixture as (10)
shown in below fig.

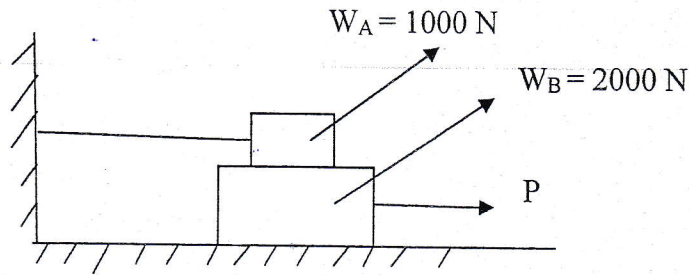


(OR)

- C. Explain different types of loads acting on the beam. (6)
D. A beam of span 12 m as shown in the below fig. is hinged at A and is on (10)
rollers at B determine the reactions developed at A and B.

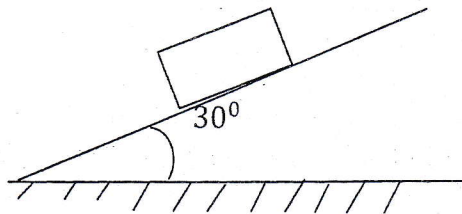


13. A. Establish relation between the friction angle and the angle of repose of a body sliding on inclined plane. (6)
- B. Block A weighing 1000 N rests over block B which weighs 2000 N as shown in below fig. block A is tied to wall with a horizontal string. if coefficient of friction between blocks A and B is 0.25 and between B and floor is $\frac{1}{3}$, what should be the value of P to move the block B. (10)

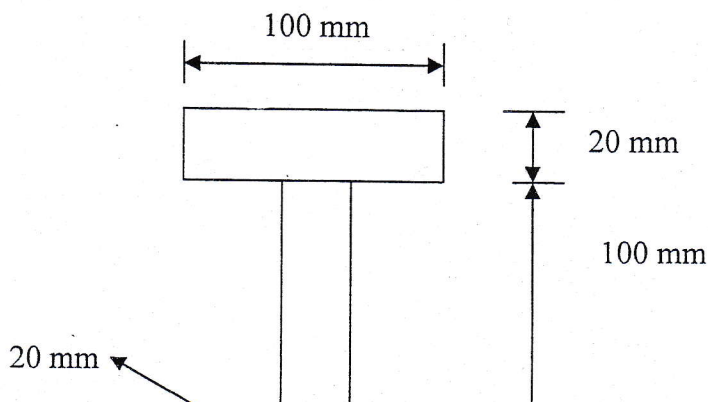


(OR)

- C. What is the law of friction and the limiting friction? Explain briefly. (6)
- D. A block 1000 N is on an inclined plane as shown in fig. below, if the coefficient of friction between surfaces is 0.25 and block is about to move down, then what will be friction force between the surfaces of block and plane? (10)

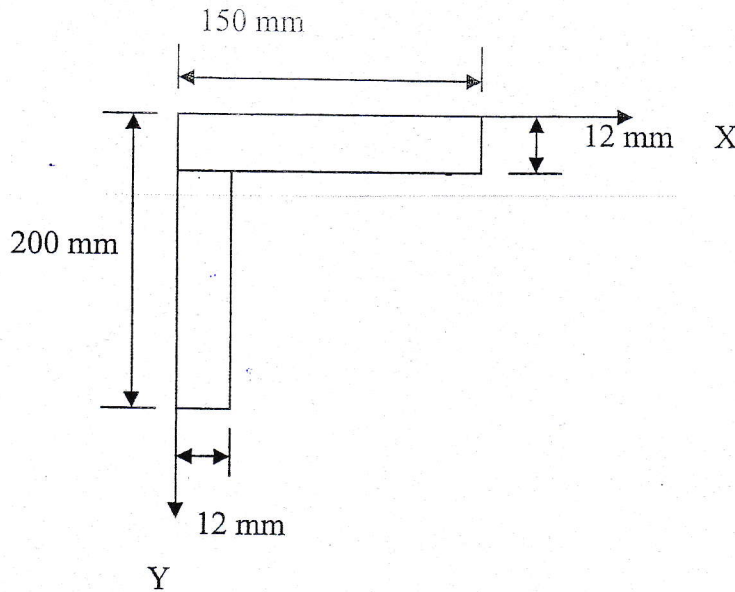


14. A. What is the centre of gravity and centroid of an object? Write the centroids of some common figures. (6)
- B. Locate the centroid of T-section shown in the fig below. (10)



(OR)

- C. Determine the centroid of a Semicircle of radius(R) from the first principle (6)
- D. Find the centroid of the unequal angle 200x150x12 mm, as shown in below (10) fig.



15. A. Define the simple lifting machine along with mechanical advantage, velocity ratio and the efficiency. (6)
- B. Describe simple screw jack with M.A, V.R and efficiency. (10)

(OR)

- C. Describe the law of machine and related terms like frictional losses and efficiency. (6)
- D. In a lifting machine, an effort of 500 N is to be moved by a distance of 20 m (10) to raise a load of 10,000 N by a distance of 0.8 m. Determine the velocity ratio, mechanical advantage, efficiency, ideal effort and effort loss in friction.
