BE (I Sem) EXAMINATION, Nov.-Dec., 2019
UIT (Autonomous), RGPV
Mathematics-I (AICTE)
BT - 102

Time: Three Hours   Maximum Marks: 105

Note: Attempt all the questions. Parts a, b, c of each question are compulsory consist of (3, 4, 4 marks) respectively, and d & e part will have an internal choice of (10 marks). All subparts of a question should be answered at one place.

Q.1 (a) Does the function $y=\sqrt{1-x^2}$ satisfy the conditions of Lagrange's mean value theorem in interval [-1, 1].

(b) Show that the Maclaurin's series for $f(x) = \cosh x$ is $\sum_{k=0}^{\infty} \frac{x^{2k}}{(2k)!}$. Given that $\cosh x = \frac{e^x + e^{-x}}{2}$.

(c) Find curvature of the curve $y = \sin x$ at $(\pi/2, 1)$

(d) Find the Taylor's series for the function $\tan^{-1} x$ at $x = 0$.

OR

(e) Prove that circle is of constant curvature.

Q.2 (a) Given a function $f(x, y) = x^2 y^3$. Given that $f(1, 2) = 27$. Then find $f(x, y)$ for $x = 1.05$ and $y = 2.99$. Use the differential to estimate.

(b) Find $\left.\frac{dy}{dx}\right|_{(1,-1)}$ if $x^2 y - x\sin(\pi y) - y^3 = 0$.

(c) Find the extreme values of the function $f(x, y) = xy - x^2 - y^2 - 2x - 2y + 4$.

(d) Using method of Lagrange's multiplier. Find the greatest and smallest values that the function

$f(x, y) = xy$ takes on the ellipse $\frac{x^2}{8} + \frac{y^2}{2} = 1$

OR

(e) If $u = e^{xyz}$, show that

$$\frac{\partial^3 u}{\partial x \partial y \partial z} = (1 + 3xyz + x^2 y^2 z^2) e^{xyz} .$$

Q.3 (a) Sketch the region of integration of $\int_0^2 \int_{x^2}^{2x} f(x, y) \, dx \, dy$

(b) Evaluate $\lim_{n \to \infty} \left\{ \left(\frac{1}{n+1} \right) + \left(\frac{1}{n+2} \right) + \left(\frac{1}{n+3} \right) + \dots + \left(\frac{1}{2n} \right) \right\}$.

(c) Using double integral, find the area of the region bounded by curves $y = x$ $y = x^2$.

(d) Show that $\frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)} = B(m,n)$

OR

(e) Change the order of integration in $\int_0^1 \int_{x^2}^{2-x} xy \, dx \, dy$ and hence evaluate the same.

Q.4 (a) Define rank of the matrix. Show that rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$ is 2.

(b) Test the following system for consistency
$$5x + 3y + 7z = 4$$
$$3x + 26y + 2z = 9$$
$$7x + 2y + 10z = 5$$

(c) Find Eigen values of the matrix $A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$.

(d) Verify Cayley-Hamilton theorem for the matrix.
$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$
Hence compute A^{-1}.

OR

(e) Find the Eigen vectors and Eigen values of the matrix :
$$A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$$

Q.5 (a) For a Boolean algebra (B, +, .), show that $(a+b)' = a' \bullet b'$ $\forall a, b \in B.$

(b) What do you mean by Tautology.

(c) Define the following terms with example.
(i) Spanning sub graph (ii) Walk (iii) Path.

(d) Prove that is any graph the number the number of points of odd degree is even.

OR

(e) Show that a tree with n vertices has (n-1) edges.

Time : Three Hours   Maximum Marks: 105

Note: - Attempt all questions. Parts a,b,c of each question are compulsory consist of (3,4,4 marks) respectively, and d & e part will have an internal choice of (10 marks). All subparts of a question should be answered at one place.

Unit-I

Q1. a) What are the purposes of output device? Explain two output devices in detail.
   b) What do you mean by System Software?
   c) What is a Register? How are registers used in the arithmetic logic?
   d) Give a classification of memory subsystem. Explain memory hierarchy.
                                  Or
   e) What do you understand by the instruction set? What is the step taken by the CPU to execute the instructions?

Unit-II

Q2. a) What is token?
   b) Explain the generation of computer language.
   c) What is Programming Language? Compare Assembly Language and High-Level Language.
   d) What is Flow Chart? Explain different Symbols used in Flowcharts.
                                  Or
   e) Write an Algorithm to find Largest number from array of n numbers.

Unit-III

Q3. a) What is Virtual Function?
   b) What is inheritance? Discuss the different form of Inheritance.
   c) What is Scope Resolution Operator?
   d) What is Data Structures? Write the difference between stack and queues.
                                  Or
   e) What is constructor? What does it do? Write and explain about different types of constructors with suitable examples.

Unit-IV

Q4. a) What are the goals and applications of computer network? Explain.
   b) Differentiate between TCP and IP.
   c) What do you understand by computer ethics?
   d) Write a brief notes on different types of networking devices.
                                  Or
   e) Write a brief notes on Good Computer Security Habits.

Unit-V

Q5. a) Define terms data and information.
   b) Explain DDL commands with the help of example.
   c) Write in brief concept of Cloud Infrastructure.
   d) What are the disadvantages of using file system over database system?
                                  Or
   e) What is Data Dictionary? What types of information is stored in Data Dictionary?

Roll No O1O1CS191128

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BT-206

B.Tech./B.E. I & II Semester (UIT) Autonomous

Examination, Nov.-Dec. 2019

Fundamentals of Mechanical Engineering

Time : Three Hours

Maximum Marks : 105

Note: Attempt all questions. Parts a, b, c of each question are compulsory consist of (3, 4, 4 marks) respectively, and d and e part will have an internal choice of (10 marks), all subparts of a question should be answered at one place.

1. a) Explain the following terms   3
   Hardness, Ductility, Malleability.

   b) Discuss the composition, properties and uses of cast iron
   and high carbon steel.   4

   c) What is wrought iron? Give the chemical composition of
   wrought iron and its uses.   4

   d) Draw the stress - strain diagram for ductile material and
   point out its salient features.   10

   OR

   e) What is the purpose of testing engineering materials?
   How the properties of cast iron are affected by the
   presence of silicon, phosphorus and sulphur.   10

2. a) What is calibration and why it is necessary for an
   instrument.   3

   b) Sketch a micrometer and explain its working.   4

c) Distinguish between   4
  i)   Range and span
  ii) Error and accuracy
  iii) Accuracy and precision
  iv) Threshold and resolution.

d) What is sine bar? Explain how sine bar are used for setting an angle and for finding an unknown angle.   10

OR

e) Describe the construction and use of dial gauge.   10

3. a) Define a fluid and distinguish between ideal and real fluid.
                                                                                3

  b) Enumerate important characteristics of   4
    i)   Laminar flow.
    ii) Turbulent flow.

  c) Find the kinematic viscosity of a liquid in stokes whose specific gravity is 0.95 and dynamic viscosity is 0.012 poise.   4

  d) Determine the specific volume density enthalpy and entropy of wet saturated steam of 20 bar pressure and 0.9 dryness fraction.   10

OR

  e) A pressure cooker has 1.0 kg of steam 0.8 dry at 3.0 bar. What amount of heat needs to be supplied to raise its pressure to 4.0 bar.   10

4. a) Define the terms: 3
    System, Types of system and Thermodynamic Equilibrium.

  b) State the first law of thermodynamics what are its limitations.   4

c) Distinguish between heat engine, heat pump and refrigerators. 4

d) Describe with neat sketches, the sequence of events in the working of four stroke diesel engine. 10

OR

e) Mention the relative merits and demerits of two stroke engines when compared with four stroke engine. 10

5. a) Define COP and unit of refrigeration. 3

b) Differentiate between mountings and accessories. 4

c) Explain the different methods of refrigeration. 4

d) Explain the working of vapour compression refrigeration cycle. 10

OR

e) Explain the working of reversed Carnot cycle. 10

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ENROLLMENT NUMBER 0101CS191128

Examination: B.Tech. I & II Semester

Subject: Engineering Mechanics & Basic Civil Engineering

Subject Code: BT – 112

Month: Nov, Year: 2019
Time: Three Hours
Maximum Marks: 105
Minimum Marks: 33

Instructions: *(1)* Answer all questions. Attempt one complete question from each unit, consisting of parts (a), (b), (c) are compulsory and part (d) have an internal choices. *(2)* The distribution of marks for part a, b, c & d are 3, 4, 4 & 10 respectively in each unit. *(3)* Any missing data may be suitably assumed, if any.

UNIT-I

Q.[1]: (a) List out engineering tests on stones and explain any two tests in detail with their standard values as per Bureau of Indian Standard (BIS).

(b) State the classification, characteristics, and various tests performed to ascertain the quality of good building bricks.

(c) What are the characteristics of good mortar? Why sea sand is not used for mortar making? Briefly explain three types of special mortar.

(d) (i) List out various types of cement which are commonly used. State the chemical composition of Ordinary Portland Cement (OPC) and their functions.

(ii) Find out the quantity of cement, sand and aggregate to prepare 5 m³ volume of M20 (1:1½:3) cement concrete.

OR

(e) (i) What do you understand by concrete proportioning? What are the various methods of preparing of concrete? Explain in detail about arbitrary and Indian Standard (BIS) method of concrete proportioning.

(ii) Calculate the gel space ratio and the theoretical strength of a sample of concrete made with 500g of cement with water cement ratio as 60% on full hydration and on 75% hydration.

UNIT-II

Q.[2]: (a) What is the function of foundation in building? If the soil is black cotton then enlist what type of foundations are preferred?

(b) What are the rules of bonding in good brick works? What are the various types of bonds in brick masonry?

(c) What is the significance of orientation during planning of building? Mention guidelines for better orientation in Indian conditions.

(d) (i) Compare English bond and Flemish bond in brick masonry.

(ii) Draw the plan of alternate courses in English bond for cross junction of two walls of 1½ brick thickness.

OR

(e) (i) What are the various types of stone masonry joints? Sketch the stone masonry joints.

(ii) What do you understand by 'Green-Building'. Explain.

UNIT-III

Q [3]: (a) Explain the principles of surveying. Differentiate plane surveying and geodetic surveying.

(b) What are the temporary adjustments of dumpy level? Explain how are they performed.

(c) Define local attraction and mention some of its sources.

(d) (i) Compare whole circle bearing (WCB) system and quadrant bearing (QB) system.

(ii) The following readings were observed in running a compass traverse. Find the correct fore and back bearings and the true bearings of the lines, given that the magnetic declination is 1°40' E.

| Lines	Fore Bearing	Back Bearing
AB	66°15'	244°00'

| BC | 129°45' | 313°00' |
| CD | 218°30' | 37°30' |
| DA | 306°45' | 126°45' |

OR

(e) (i) Explain about bench-mark, height of instrument and change point in case of leveling.
(ii) The following staff readings were observed successively with a level, the instrument having been moved after third, sixth and eighth readings.
2.228, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684 metres.
Enter the above readings in page of a level book and calculate the R.L. of points if the first reading was taken with a staff held on a bench mark of 100 m. Apply the usual checks.

UNIT-IV

Q [4]: (a) State and prove Lami's theorem.
(b) State and prove Varigon's theorem.
(c) Define centroid, centre of gravity and moment of inertia.
(d) Determine the moment of inertia about the both centroidal axis. [Figure (i)] **OR**
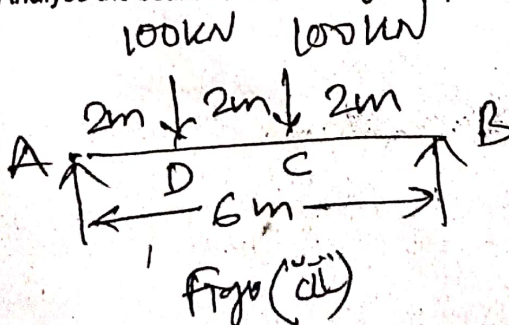(e) Determine the moment of inertia about the both centroidal axis.[Figure (ii)]

Figure (i) | **OR** | Figure (ii)
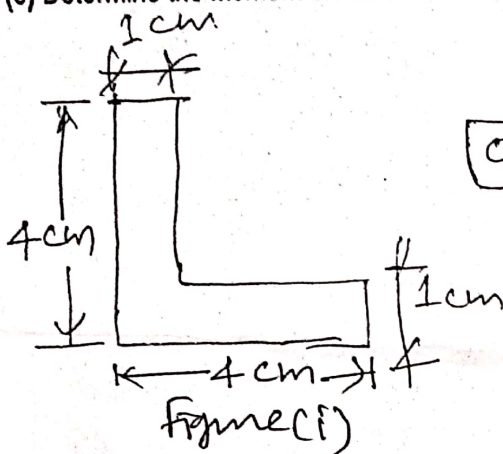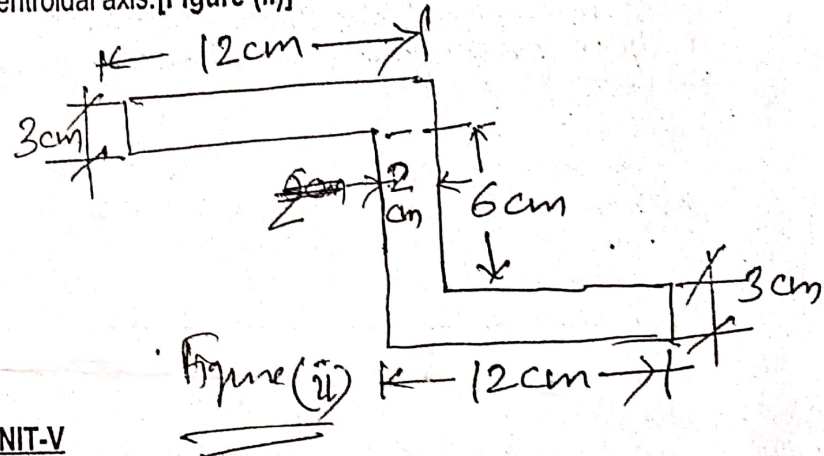
UNIT-V

(a) Describe about various types of beams in the structures.
(b) Write short notes on various types of supports and loads in a structures.
(c) What do you understand by point of contraflexure? Where is it found and how to be determined in a structures.
(d) (i) Define shear force and bending moment. What is the relation between the B.M. and S.F.
(ii) Analyse the beam as shown in figure (iii). Draw SFD and BMD.

OR

(e) Analyse the beam as shown in figure (iv). Draw SFD and BMD.

Fig. (iii) | **OR** | Fig. (iv)