Seat No. 30526

T.E. (Civil) (Part - I) (Semester - V) (Revised) Examination, May -2019
GEOTECHNICAL ENGINEERINE - I
Sub. Code : 66238

Day and Date : Monday, 6 - 05 - 2019
Time : 2.30 p.m. to 5.30 p.m.

Total Marks : 100

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Make assumptions wherever necessary.
4) Use of non-programmable calculator is allowed.

SECTION - I

Q1) Answer the following.

a) Derive the relation for unit weight of partially saturated soil in terms of specific gravity of soil solids, void ratio, degree of saturation and unit weight of water. **[6]**

b) Explain Casagrande's laboratory method for determination of liquid limit. **[6]**

c) 50 gm of oven dried soil passing 75 micron sieve was taken in a hydrometer analysis. The corrected hydrometer reading in 1000 ml soil suspension at 2 minute elapsed interval ws 25. The effective depth corresponding to above hydrometer reading is 12.1 cm. Considering specific gravity and poisson's ratio as 2.7 and 0.01 poise Calculate particle size in mm and percent finer of the soil. **[6]**

OR

A soil has liquid limit 22%, plastic limit 15%, flow index 12% and natural water content as 20%. Determine the plasticity index, toughness index, liquidity index and the relative consistency. **[6]**
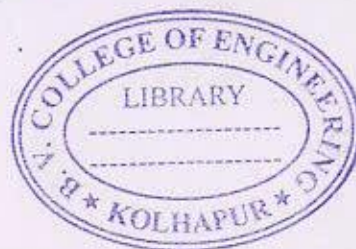
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Q6) Answer the following.

a) What are the different types of earth pressure and state the assumptions made in the Rankine's earth pressure theory. **[8]**

b) Compute the intensities of active and passive earth pressure at a depth of 6 m in dry cohesionless sand with an angle of internal friction of 30° and unit weight of 18 kN/m³. What will be the intensities of active and passive earth pressures if the water level rises to the ground level? Take saturated unit weight of sand as 22 kN/m³. **[8]**

OR

A retaining wall of 6 m height supports earth with its face vertical. The earth is cohesionless with specific gravity 2.69, = 35° and porosity 40.5%. The earth surface is horizontal and level with the top of the wall. Determine the active earth thrust and its point of application on the wall if the earth is water logged to level 2.5 m below the top surface. Neglect wall friction. Draw the pressure diagrams. **[8]**

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Seat
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T.E. (Mechanical Engineering) (Part - III) (Semester - VI) (Revised) Examination, May - 2019
INTERNAL COMBUSTION ENGINES
Sub. Code: 66841

Day and Date : Thursday, 23 - 05 - 2019
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 100

Instructions :
1) All the questions are compulsory.
2) Figure to the right indicates full marks.
3) Use suitable data wherever required and state it clearly.
4) Use of scientific non programmable calculator is allowed.

Q1) Solve any two of following.
a) Define the following: **[8]**
   i) Cubic capacity   ii) Stroke
   iii) Cetane number   iv) A/F ratio
b) Write classification of I.C. engine and explain each type, giving examples. **[8]**
c) Draw and explain port timing diagram for 2 stroke S.I. engine. **[8]**

Q2) Solve any two of following.
a) Explain with neat sketch CRDI system in details. **[8]**
OR
Derive equation for air fuel ratio for simple carburetor by neglecting effect of compressibility. **[8]**
b) A simple jet carburetor is required to supply 5 kg of air and 0.5 kg of fuel per minute. The fuel specific gravity is 0.75. The air is initially at 1 bar and 300k. Calculate the throat diameter of choke for a flow velocity of 100m/s. velocity coefficient is 0.8. If the pressure drop across the fuel metering orifice is 0.80 of that of the choke, calculate orifice diameter assuming, Cdf = 0.60 and $\Upsilon = 1.4$. **[8]**

Q3) Solve any two of the following.
a) What is octane number? How it is determined? What are the additives used to improve the octane number? **[8]**
b) Explain the effects of various engine variables on detonation. **[8]**
c) Write in details the various mixture requirements of S.I. engine to be fulfilled by carburetor. **[8]**

P.T.O.

Q4) Solve any two of following:

a) Explain the types of combustion chambers for C I engines and highlight its requirements. [8]

b) Which are the different methods of generating air swirl in C.I. Engine combustion chamber? Explain any one method with neat sketch. [8]

c) Explain the stages of combustion in C.I. engines with p-θ diagram. [8]

Q5) Solve the following: [8]

a) Define:
   i) Performance curve ii) Mechanical efficiency
   iii) Break thermal efficiency iv) BSFC

OR

What do you mean by heat balance sheet of I.C. Engine? Explain how engine heat balance sheet is prepared. [8]

b) Following data relate to 4-cylinder four stroke petrol engine. Airfuel ratio by weight = 16:1, calorific value of fuel = 45200 KJ/Kg, mechanical efficiency = 82%, air standard efficiency=52%,relative efficiency = 70%, volumetric efficiency = 78%, stroke/bore ratio = 1.25, suction conditions = 1 bar, 25 °C, rpm=2400 and brake power = 72 kW. [10]
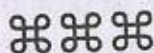
Calculate:
   i) Compression ratio
   ii) Indicated thermal efficiency
   iii) Brake specific fuel consumption
   iv) Bore and stroke

Q6) Write short note on any three: [18]

a) Selection of I.C. engine for agriculture.
b) Morse test.
c) EGR for emission control.
d) Standard pollution control.
e) Alternative fuel for S.I. engine.

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iii) Regret criterion

iv) Laplace criterion

v) Hurwicz criterion with $a = 0.6$

b) The following table gives the activity time of a certain project together with immediate predecessor requirements.

Activity	Immediate predecessor	Time in days
A	---	15
B	---	15
C	A	3
D	A	5
E	B,C	8
F	B,C	12
G	E	1
H	E	14
I	D,G	3
J	F, H, I	14

i) Draw the network

ii) Determine the expected project completed time

iii) Find critical path

c) Find the sequence, for the following seven jobs, that will minimize the total elapsed time for the completion of all jobs. Each job is processed in the same order M1, M2, M3 Entries give the time in hours of the machine.

		Jobs						
		A	B	C	D	E	F	G
Time	M1	3	8	7	4	9	8	7
on M/C	M2	4	3	2	5	1	4	3
	M3	6	7	5	11	5	6	12

What is the minimum elapsed time?

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Seat No.	

T.E. (Mechanical) (Part-III) (Semester - VI) (Revised) (New)

Examination, May - 2019

INDUSTRIAL MANAGEMENT AND OPERATIONS RESEARCH

Sub. Code: 66837

Day and Date : Monday, 13- 05 - 2019   **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :   1)   All question are compulsory.

2)   Figures to the right indicate full marks.

3)   Assume suitable data if necessary.

Q1) Attempt any four from the following :   [20]

a) What are the significant aspects of environment which must be forecasted for the purpose of planning?

b) Discuss managerial strategy using Herzberg's theory for motivating employees.

c) Compare recruitment and selection.

d) What causes distortion in upward communication? How can these distortions be minimized?

e) What is control? How is it related with other functions of management?

Q2) Attempt any two from the following :   [12]

a) Explain in brief steps involved in feasibility report writing for a product in order to set up a small-scale industry?

b) What are the sources of new ideas? Explain with examples.

c) What are the possible reasons for accidents in different sections of a forging unit? Which preventive measures do you suggest to prevent those accidents?

P.T.O.

3) Write short notes on any three : [18]
   a) Types of markets
   b) Salesmanship
   c) Functions of Purchase department
   d) Cost control.

4) Attempt any three from the following : [18]
   a) Discuss in brief the role of OR in decision making.
   b) Use Graphical method to solve the following LPP

   Minimize $Z = 60x_1 + 40x_2$

   subjected to constraints,

   $30x_1 + 10x_2 \geq 240,$

   $10x_1 + 10x_2 \geq 160$

   $204x_1 + 60x_2 \geq 480$

   $x_1, x_2 \geq 0$

   c) A firm plans to purchase at least 200 quintals of scrap containing high quality metal X and low quality metal Y. Scrap can be purchased from two suppliers A & B. Scrap must contain 100 quintals of metal X and no more than 35 quintals of metal Y. The percentage of X & Y in metals. in terms of weight in the scrap supplied by A & B is given as

Metal	Supplier A	Supplier B
X	25%	75%
Y	10%	20%

   The prices of A's Scrap is Rs. 200 per quintal and that of B's is Rs 400 per quintal. Formulate the LPP to determine the quantity to be purchased from each supplier so that the cost is minimum.

   d) What is difference between simplex solution procedure for a Maximization and Minimization problem?

5) Attempt any two from the following : [14]
   a) State three different methods used to obtain initial basic feasible solution in transportation problem. Comment on each method.

   b) The four different jobs are to done on four different machines. Table indicates cost of producing job i on machine j in rupees. Assign jobs to different machine to minimize the cost.

Jobs	Machines			
	M1	M2	M3	M4
J1	5	7	11	6
J2	8	5	9	6
J3	4	7	10	7
J4	10	4	8	3

   c) Find an optimal solution to the following transportation problem

From	Transportation cost in Rs Per unit				Supply
	To				
	1	2	3	4	
A	7	3	8	6	60
B	4	2	5	10	100
C	2	6	5	1	40
Demand	20	50	50	80	

Q6) Attempt any two from the following : [18]
   a) The following matrix gives the payoff of different strategies by research organization for variants of products S_1, S_2, S_3 and S_4 against different conditions of estimated levels of sales N_1, N_2, N_3, and N_4

	N1	N2	N3
S1	30,000	10,000	10,000
S2	40,000	15,000	5,000
S3	55,000	20,000	3,000

   What will be your decision under the following approach.
   i)   Pessimistic criterion
   ii) Optimistic criterion

)5) Solve any two :

a) Explain different methods of reducing cutting forces in press working. [6]

b) Explain strip layout in press working. [6]

c) Estimate the blanking force to cut a blank 25mm wide and 30mm long from a 1.5mm thick metal strip, if the ultimate shear stress of material is 400N/mm². Also determine the work done if the percentage penetration is 25 percent of material thickness. [6]

)6) Write short notes on any Three. [12]

a) Automatic tool changer.

b) Milling tooling system.

c) Tool presetting.

d) Construction and working of DNC.

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T.E. (Mechanical) (Part - III) (Semester - V) (Revised) Examination, May - 2019
MANUFACTURING ENGINEERING
Sub. Code : 66245

)ay and Date : Wednesday, 08 - 05 - 2019   Total Marks : 100

?ime : 2.30 p.m. to 6.30 p.m.

nstructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data wherever necessary and state it clearly.
4) Use of non-programmable calculator is allowed.

)1) Solve any Two.

a) Explain mechanics of chip formation with neat sketch. [8]

b) Explain different types of tool material and list important properties of tool material. [8]

c) During machining of C-40 steel with 0-10-6-6-8-90-1mm (ORS) shaped carbide cutting tool, the following observations have been made:

Depth of cut	=1.5mm
Feed	= 0.15 mm/rev
Speed	= 120 m/min
Tangential cutting force	= 1500 N
Feed thrust force	= 900 N
Chip thickness	= 0.3 mm

Calculate :

Chip thickness ratio, shear angle, shear force and normal force at shear plane, friction force and normal force on tool face and coefficient of friction. [8]

P.T.O.
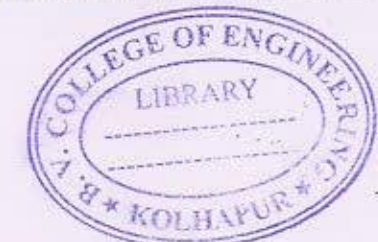
Q2) Solve any Two.

a) Discuss in brief types and selection criteria of cutting fluid. **[8]**

b) Draw tool geometry of drill and explain nomenclature in detail. **[8]**

c) The following equation for tool life has been obtained for HSS tool:

$$VT^{0.12}.f^{0.75}.d^{035} = C$$

A 60 mm. tool life was obtained using the following cutting conditions:

$$V = 30 \text{ m/min}; f = 0.3 \text{ mm}; d = 2.5 \text{ mm}$$

Calculate the effect on tool life if speed, feed and depth of cut are together increased by 20% and also if they are increased individually by 20%. **[8]**

Q3) The component shown in Fig. 1 is to be processed on a single spindle automat. Study the component and prepare: **[18]**

a) Detailed process sheet

b) Tool layout

c) Cam profile for drilling operation

Material : M.S. polish bar φ30mm

Fig. 1
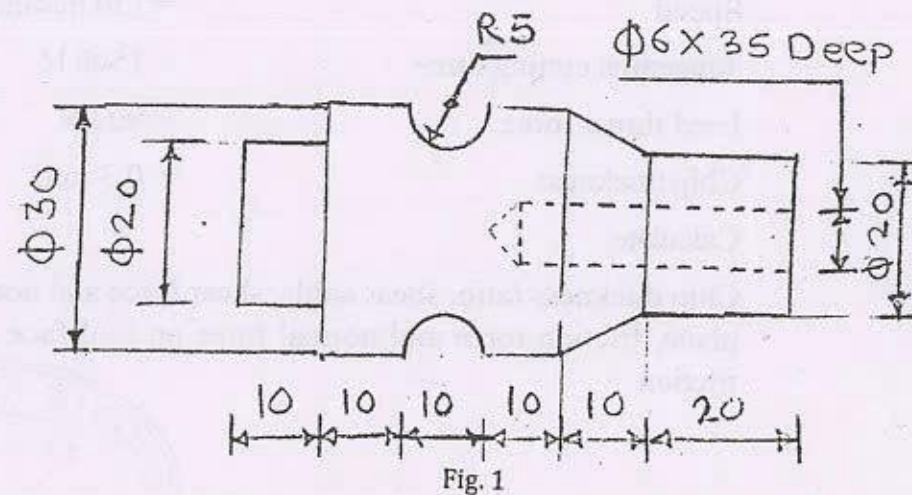
Q4) Solve any One

a) Design and draw a neat dimensional drawing in three views with one sectional view of a suitable drilling jig for drilling two holes of φ 18 mm as shown in Fig. 2. Show clearly the details of location, clamping and guiding of tool. Assume this as a final operation. **[26]**
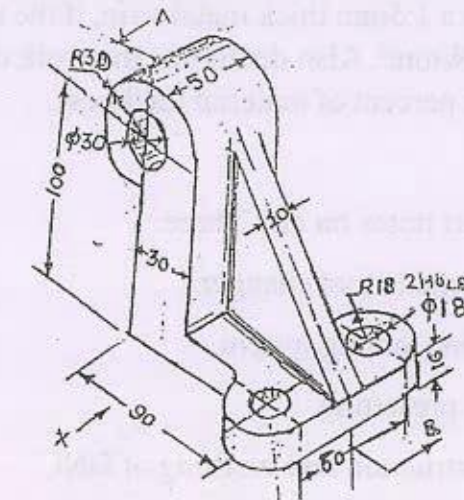
Fig. 2

OR

b) Design and draw a dimensional drawing in three views with one sectional view of a milling fixture, for producing the 30 mm wide slot at the component shown in Fig. 3. Show clearly the details of location, clamping and setting of cutter. Assume this as a final operation. **[26]**
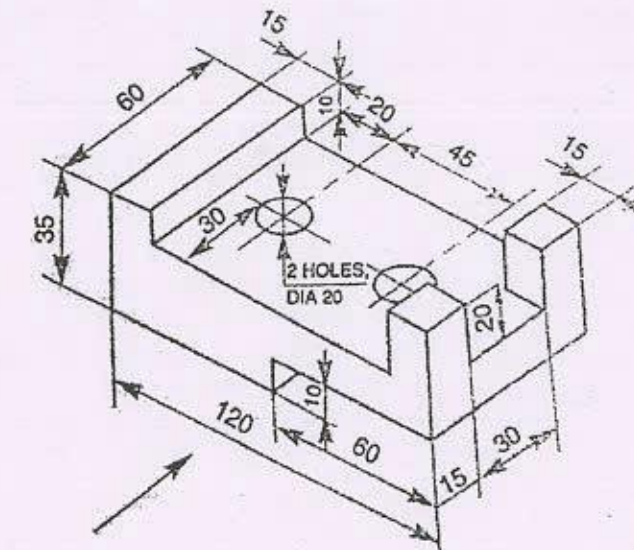
Fig. 3

Seat No.	

T.E. (Mech.) (Part - III) (Semester - V) Examination, May - 2019
HEAT AND MASS TRANSFER
Sub. Code: 66243

Day and Date : Friday, 03 - 05 - 2019   **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :   1)   All questions are compulsory.

                2)   Figures to the right indicates full marks.

                3)   Assume suitable data whenever necessary and state it clearly.

                4)   Use of specific calculators is permitted.

Q1) Solve any three.

   a)   Define critical radius of insulation. Also derive equation for critical radius of insulation for hollow sphere.   **[6]**

   b)   Define overall heat transfer coefficient. Also derive the expression of overall heat transfer for a wall having thickness b and conductivity K. Inside and outside heat transfer coefficient as h_i and h_o.   **[6]**

   c)   A steam pipe of 5cm ID and 6.5cm OD is insulated with 2.75cm thick insulation (K = 1.1 W/mK) the inside and outside heat transfer coefficient are 4650W/m²K and 11.5 W/m²K respectively. The K of pipe material is 45W/mK if steam temperature is 200°C and ambient air is 20°C. Determine :   **[6]**

      i)   Heat loss per meter length of pipe.

      ii)   Interface temperature.

   d)   A wall of cold storage consist of three layers, and outside layer of bricks 25cm thick, middle layer of cork, 10cm thick and an inner layer of cement 6cm, the K of materials are 0.7, 0.043 and 0.72 W/mK respectively the temperature of outside surface of wall is 30°C and that of inner is –15°C calculate :   **[6]**

      i)   Heat transfer per unit area.

      ii)   Temperature at interfaces at composite wall.

P.T.O.

2) Solve any two.

a) Derive the general heat conduction equation in Cartesian Co-ordinate system. Also write the special cases of this equation. [8]

b) Derive expression for temperature variation for a solid body with respect to time by using lumped heat capacity approach. [8]

c) A long rod of radius 50cm having K = 10W/mK, which generates heat uniformly within the cylinder at the rate of $0.3 \times 10^5 W/m^3$. The rod is cooled by convection form it's cylindrical surface at $T_f = 50°C$ with h = 60W/m²K. Determine the temperature at the centre and outside surface of cylindrical rod. [8]

3) Solve any two.

a) Write short notes on: [8]

   i) Explain classification of fins with neat sketch.

   ii) Fin efficiency and fin effectiveness.

b) Derive the expression for temperature distribution in a fin of finite length with insulated end. [8]

c) What are the initial and boundary conditions and their types? Explain with suitable examples. [8]

4) Solve any two of the following.

a) Explain in detail the phenomenon of natural and forced convection with suitable examples.

b) Define Nusselt number and Reynolds number and prove that they are dimensionless numbers.

c) A liquid metal flows at the rate of 4 kg/s through a constant heat flux 60 mm inner diameter tube in a nuclear reactor. The fluid at 200°C is to be heated with the tube wall 40°C above the fluid temperature. Determine the length of thue tube required for 25°C rise in bulk fluid temperature. Use the correlation, Nu = 0.625 $(Re.Pr)^{0.4}$. Take $\rho = 7.7 \times 10^3 kg/m^3$, $v = 8 \times 10^{-8} m^2/s$, $C_p = 130 J/kg °C$, k = 12 W/m K and Pr = 0.011.

5) Solve any two of the following. [16]

a) State Planks law and derive Stefan Boltzmann law from Planks law.

b) Determine the shape factor F_{12} between small area dA_1 and parallel circular disc A_2. The small area is located at the axis of the disc A_2 at a distance L.

c) Explain the following terms:

   i) Intensity of radiation

   ii) Lambert cosine rule

   iii) Absorptivity

   iv) Reflectivity

6) Solve any three of the following.

a) Derive an expression for effectiveness of parallel flow heat exchanger.[6]

b) Discuss the advantages of NTU method over LMTD method. [6]

c) Design considerations for heat exchangers. [6]

d) Nusselt's theory of filmwise condensation. [6]

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