3E1631

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3E1631

B.Tech. III Semester (Main/Back) Examination, Dec. - 2016
Aeronautical Engg.
3AN1 Mechanics of Solids
AE, ME, PI, AN

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 26

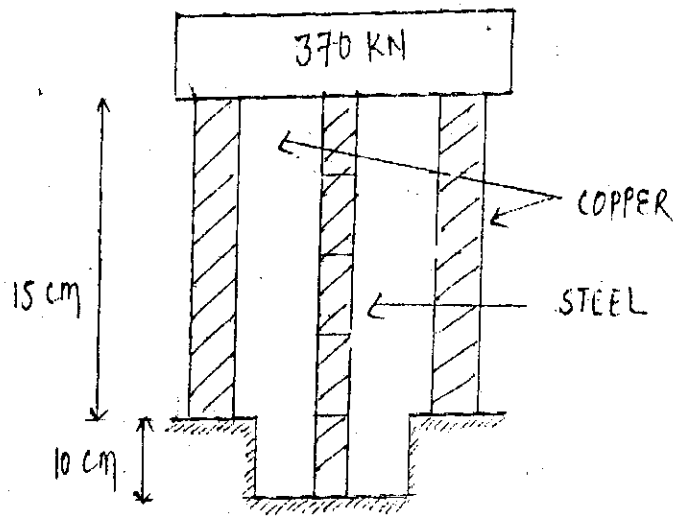
Instructions to Candidates:

*Attempt any **five** questions, selecting one question from **each unit**. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Derive an expression between modulus of elasticity and modulus of rigidity. **(6)**

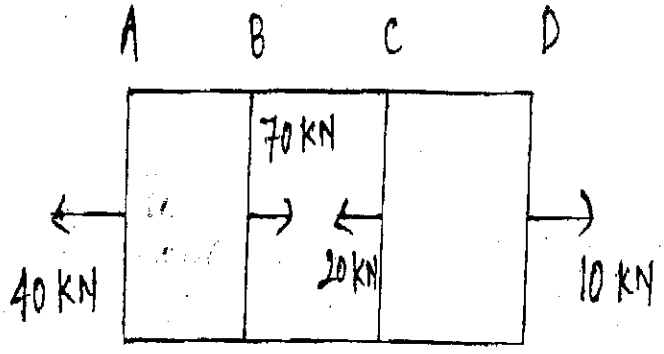
   b) A steel rod and two copper rods together support a load of 370 kN of shown in fig. The cross sectional area of steel rod is 2500 mm^2 and of each copper rod is 1600 mm^2. Find the stresses if two rods. Take E for steel = $2 \times 10^5 N/mm^2$ and for copper = $1 \times 10^5 N/mm^2$. **(10)**



OR

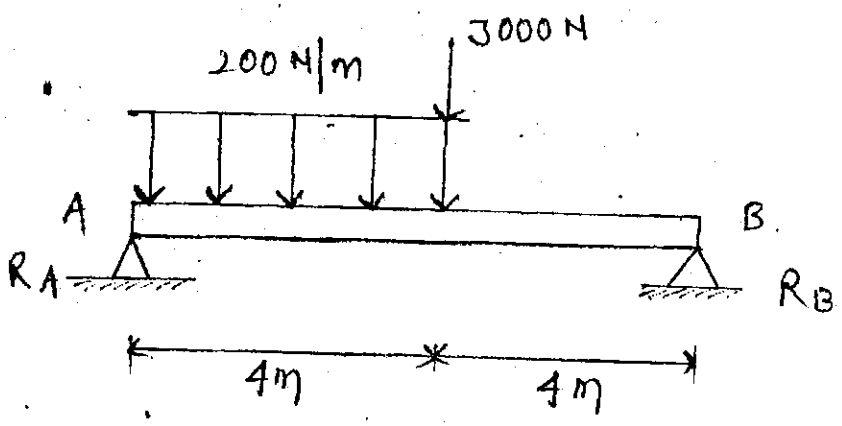
1. a) Prove that the total expansion of a uniform tapering rod of dia D_1 and D_2, when the rod is subjected to an axial load P. $dL = \frac{4PL}{\pi E D_1 D_2}$, L = length of rod. **(8)**

b) A brass bar, having cross sectional area of 900mm^2 is subjected to axial forces as shown in fig in which AB = 0.6 m, BC = 0.8 m. and CD = 1.0 m. **(8)**



Unit - II

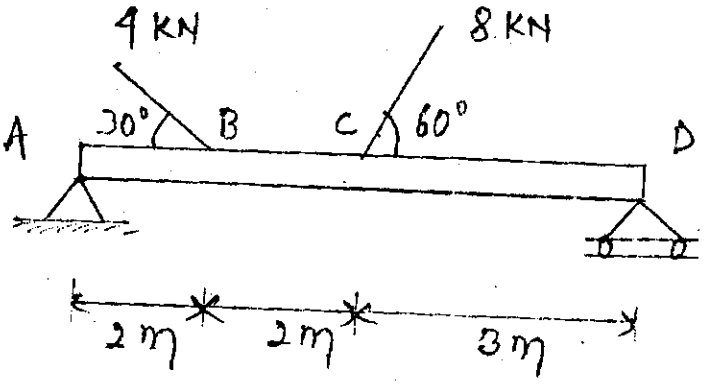
2. a) A loaded beam as shown below. Draw its SFD and BMD. **(12)**



b) What do you mean by thrust diagram? **(4)**

OR

2. a) A loaded beam as shown below. Draw its SFD and BMD. **(12)**



b) What do you mean by point of contraflexure? (4)

Unit - III

3. At a point with in a body subjected to two mutually perpendicular directions, the stresses are 80N/mm^2 tensile and 40N/mm^2 tensile. Each of the above stresses is accompanied by a shear stress of 60 N/mm^2 .Determine the normal stress, shear stress and resultant stress on an oblique plane inclined at an angle of 45° .with the axis of minor tensile stress. (16)

OR

3. At a certain point in a strained material, the intensities of stresses on two planes at right angles to each other are 20 N/mm^2 and 10 N/mm^2 both tensile. They are accompanied by a shear stress of magnitude 10N/mm^2 . Find graphically or otherwise by the location of principle planes and evaluate the principle stresses. (16)

Unit - IV

4. a) Derive the relation for a circular shaft when subjected to torsion as given below.

$$\frac{T}{J}=\frac{\tau}{R}=\frac{\theta C}{L}$$

T = torque, J = polar moment, τ = max. shear stress, C = modules of rigidity, θ = Angle of twist, R = Radius of shaft, L = Length of Shaft. (8)

b) Find the max. shear stress induced in a solid circular shaft of dia 20 cm. When the shaft transmit 187.5 kw at 200 RPM. (8)

OR

4. a) Prove that rippling stress by Euler's formula is given by (8)

$$f_c=\frac{\pi^2 E}{(L_e/k)^2}$$

b) Define the following terms

a. Column

b. Strut

c. Crippling load (8)

Unit - V

5. A thin cylinder of shell 120 cm dia. 1.5 cm thick 6 m. long is subjected to internal fluid pressure 2.5 N/mm^2 of the value. E = 2×10^5N/mm^2, $\mu = 0.3$

Find : (i) change in dia (ii) change in length (iii) change in volume (16)

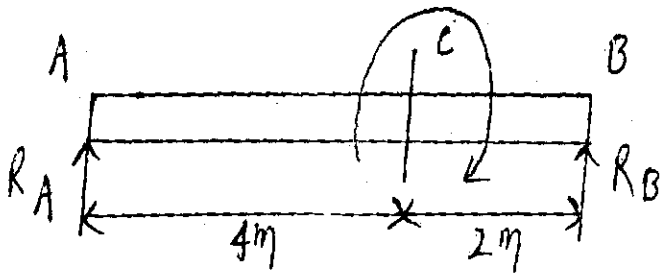
OR

5. A horizontal beam is simply supported at A and B, 6 m apart. The beam is subjected to a clockwise couple of 300 KN at a distance of 4m. From the left end as shown in fig. If $E = 2\times10^5 N/mm^2$ and $I = 2\times10^8 mm^4$

Determine :

i. Deflecting at the point where couple is acting and

ii. The max. deflecting. **(16)**



3E1632

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3E1632

B.Tech. III Semester (Main/Back) Examination Dec. - 2016
Automobile Engg.
3AE2A Material Science and Engg.
AE, ME, PI

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five** questions, selecting **one question** from **each unit**. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) What are Miller indices? How are they determined?

   b) Draw neat sketches of unit cells of simple cubic, BCC and FCC crystal structures. Calculate the number of atoms in each case.

   c) Differentiate elastic and plastic deformation. **(6+6+4)**

OR

1. a) Distinguish between following :

   i. Slip and twin mechanisms

   ii. Hot and cold working. **(4+4)**

   b) What is recovery and recrystallization? Draw suitable graph to explain. **(8)**

Unit - II

2. Draw neat labelled Iron - Carbide equilibrium diagram. Explain invariant reactions occur in this diagram. **(16)**

OR

2. a) Derive an expression for critical resolved shear stress in a material subjected to uniaxial tensile loading.

   b) How steel is classified? Discus mechanism of crystallization. **(8+8)**

Unit - III

3. a) Differentiate hardness and hardenability.

   b) Distinguish annealing and stress relief process.

   c) Explain the following transformation :

      i. Austenite to Bainite

      ii. Austenite to Parlite. **(4+4+8)**

OR

3. a) Draw a neat sketch of the TTT diagram for a eutectoid steel and label the regions.

   b) Explain nitriding process of heat treatment of steps. **(8+8)**

Unit - IV

4. a) Write a short notes on HSLA steel.

   b) What is solid solution?

   c) Disquss effect of various alloying element on the properties of carbon steels. **(4+4+8)**

OR

4. What are constituents, properties and engineering application of PVC, PMMA, ABS, PTFE and PA? **(16)**

Unit - V

5. a) Differentiate various kinds of hardness test.

   b) What is significance of fatigue test?

   c) Discuss the stress - strain curve for a ductile materials. **(5+5+6)**

OR

5. a) What are Nano materials?

   b) Discuss various kind approaches for synthesis of nano materials.

   c) Write short notes on mechanism of creep . **(5+5+6)**

3E1633

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3E1633

B.Tech. III Semester (Main/Back) Examination, Dec. - 2016

Automobile Engineering

3AE3A Engg. Thermodynamics

AE, ME, PI

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

Instructions to Candidates:

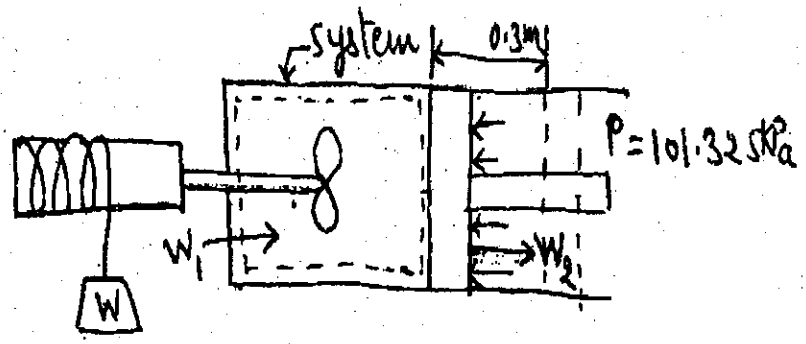
*Attempt any **five** questions, selecting **one** question from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit - I

1. Write down the short notes on following :
   - i) Internal combustion engines. **(8)**
   - ii) Jule - Thomson coefficient (Explain). **(4)**
   - iii) Fuel cells **(4)**

OR

1. i) What is a constant volume gas thermometer? Why is it preferred to a constant pressure gas thermometer? **(8)**
   ii) A piston and cylinder machine containing a fluid system has a stirring device in the cylinder (fig. 1). The piston is frictionless, and it is held down against the fluid due to the atmospheric pressure of 101.325KPa. The stirring device is turned 10,000 revolutions with an average torque against the fluid of 1.275MN. Mean while the piston of 0.6 m diameter moves out 0.8 m. Find the net work transfer for the system. **(8)**



Unit - II

2. i) What is a carnot cycle? What are the four process which contribute the cycle? **(8)**

ii) Establish the equality of ideal gas temperature and kelvin temperature. **(8)**

OR

2. i) How does the efficiency of a reversible engine vary as the source and sink efficiency become 100%? **(8)**

ii) What is the qualitative and quantitative difference between heat and work not completely interchangeable forms of energy? **(8)**

Unit - III

3. i) Explain the thermodynamic properties of gaseous mixture. Prove that the internal energy of an ideal gas is a function of only temperature. **(8)**

ii) Derive ideal gas equation with the help of various law's and explain vander Waals gas equation. **(8)**

OR

3. i) What is Dalton's law of partial pressure? Explain Gibb's Dalton's law. **(8)**

ii) Derive an expression for the change in enthalpy of a gas follows the equation of state P(V-b) = RT. **(8)**

Unit - IV

4. i) What is Heat capacities. Derive an expression $C_p - C_v = \frac{Tv\beta^2}{K_T}$ **(8)**

ii) Derive clapeyron's equation which are used for estimating the total heat of vaporization. **(8)**

OR

4. Write notes on following :

a) Air standard efficiency of a diesel cycle.

b) Otto cycle. **(8+8)**

Unit - V

5. i) Express the overall efficiency of a steam plant as the product of boiler, turbine, generator and cycle efficiencies. **(8)**

ii) What is refrigeration? How is (i) ice and (ii) dry ice used for the purpose of refrigeration? **(8)**

OR

5. i) What are cyclic and non cyclic heat engines? Give examples. **(8)**

ii) Explain Feed water heating cogeneration cycle. **(8)**

3E1634

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3E1634

B.Tech. III Semester (Main/Back) Examination, Dec. - 2016
Automobile Engineering
3AE4A Manufacturing Processes
AE, ME

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Describe the various kinds of patterns in use. What are the allowances provided, when making a pattern? How does the pattern from the casting required? **(8)**

   b) Describe desirable properties of a moulding sand and state what defects can arise due to absence of these. Also mention other casting defects possible. **(8)**

OR

1. a) With the help of neat sketch explain die casting process. What are the advantage and applications of die casting? **(8)**

   b) What is the principle of investment casting? Why is it so called? Why is this process widely used for small size casting? Explain. **(8)**

Unit - II

2. a) Explain briefly the following welding techniques with the help of neat sketches.
      i) Plasma arc welding
      ii) Electron beam welding **(8)**

   b) Describe the types of fluxes used in soldering and their applications. **(8)**

OR

2. a) What are the differences between soldering brazing and welding? Explain. **(8)**

   b) Explain the following with the help of neat sketches :
      i) TIG welding
      ii) Laser beam welding
      iii) Ultrasonic welding process **(8)**

[Contd....

Unit - III

3. a) Explain briefly the following metal forming process with the help of neat sketches.
   i) Extrusion Processes.
   ii) Forging **(8)**

   b) What is the principle of rolling process? Why is the strength of a rolled part considered usually better than a cast piece? **(8)**

OR

3. a) Define the concept of strain hardening. **(4)**

   b) What are the various metal working defects? Explain. **(4)**

   c) Explain briefly the following metal forming process : **(8)**
   i) Deep drawing
   ii) Wire drawing
   iii) Tube drawing
   iv) Riveting

Unit - IV

4. a) Define powder metallurgy. What are various important techniques for compacting of metal powder? **(8)**

   b) What are the secondary operations we apply in powder metallurgy methods? **(8)**

OR

4. a) What are rapid prototyping operations? Explain subtractive processes. **(8)**

   b) Write short notes on following : **(8)**
   i) Virtual prototyping
   ii) Stereo lithography process.

Unit - V

5. a) Discuss general properties and classifications of plastics. **(8)**

   b) Compare thermo - setting materials with thermo - plastic materials. **(8)**

OR

5. Write short notes on :
   i) Plastic processing methods.
   ii) Lamination of plastics
   iii) Thermoforming
   iv) Blow moulding **(16)**

3E1635

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3E1635

B.Tech. III Semester (Main/Back) Examination, Dec. - 2016
Aeronautical Engg.
3AN5 Object Oriented Programming in C++
AE,ME,AN

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit - I

1. Explain the basic characteristics of OPP's with example. (16)

OR

1. a) Differentiate the following with example
   i. User defined functions and library function
   ii. Passing by reference and passing by array in function. (4×2)
   b) i. What are in-line functions write its advantage. (4)
   ii. Write different types of operators available in C++. (4)

Unit - II

2. a) What are pointers and why they are important. (4)
   b) How an array of pointers are declared. Give an example. (4)
   c) Write a program in C++ to swap two numbers using Pointers. (8)

OR

2. a) How a string declared and initialized in C++. (4)
   b) List any 8 string manipulation function with example. (4)
   c) Write a program in C++ to reverse a number using Pointer. (8)

Unit - III

3. a) What is Inheritance. Explain various types of inheritance with example. (8)

b) Define the following :

i. Friend function

ii. Static data

iii. Virtual function

iv. Constructor (4×2)

OR

3. a) What is polymorphism. Explain various types of polymorphism. (8)

b) Write a program in C++ that overload binary operator "-". (8)

Unit - IV

4. a) What are templates. Write a program in C++ using templates. (8)

b) Write short note on following :

i. The standard template library

ii. Container class. (8)

OR

4. a) Explain classification of files with example. (8)

b) Write a C++ program to concatenate two string into third string. (8)

Unit - V

5. a) What is link lists. Discuss the operators done it. (8)

b) Write a program in C++ to insert a node in link list. (8)

OR

5. a) Discuss the advantages of link list over array. (4)

b) Discuss various functions used for dynamic memory allocation and deallocation. (4)

c) Write short note on

i. Double link list

ii. Circular link list (4×2)

3E1636

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3E1636

B.Tech. III - Semester (Main/Back) Examination, Dec. - 2016
Automobile Engg.
3AE6A Advanced Engg. Mathematics
AE,ME,PI

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five** questions, selecting **one question** from **each unit**. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Find the Inverse Discrete Fourier Transform of the sequence $\{D_0, D_1, D_2\} = \{0, 1-\omega^2, 1-\omega\}$ **(8)**

b) Obtain the Fourier transform of $f(x) = \begin{cases} x^2 & for\ |x| \le a \\ 0 & for\ |x| > a \end{cases}$ Hence evaluate

$$\int_0^\infty \cos\left(\frac{as}{2}\right)\left[\left(a^2s^2-2\right)\sin as + 2as\cos as\right] \Big/ 3 \; ds \quad \textbf{(8)}$$

OR

1. a) Solve the integral equation $\int_0^\infty F(x)\cos sx\,dx = \begin{cases} 1-s & 0 \le s \le 1 \\ 0 & s > 1 \end{cases}$ Hence deduce that

$$\int_0^\infty \frac{\sin^2 t}{t^2}\,dt = \pi/2 \quad \textbf{(8)}$$

b) Heat flow in an infinite bar with given initial temperature u(x,t) is governed by

$\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}; t > 0; -\infty < x < \infty$ satisfying u(x,0) = f(x). **(8)**

Unit - II

2. a) Find the Laplace transform of $\sin\sqrt{E}$. Hence deduce $L\left[\frac{\cos\sqrt{t}}{\sqrt{t}}\right] = \left(\frac{\pi}{s}\right)^{\frac{1}{2}} e^{\frac{-1}{4s}}$ **(8)**

b) i. Find $L^{-1}\left[\frac{S}{S^4+4a^4}\right]$ **(4)**

ii. Apply convolution theorem to evaluate $L^{-1}\left[\frac{1}{S^2(S^2-a^2)}\right]$ **(4)**

OR

2. a) Solve $ty''+y'+4ty=0$; given that $y(0)=3$; $y'(0)=0$. **(8)**

b) Solve $\frac{\partial u}{\partial t}=\frac{\partial^2 u}{\partial x^2}$; $u(x,0)=3\sin 2\pi x$ u (0, t) = 0; u (1, t) = 0, where 0<x<1, t>0. **(8)**

Unit - III

3. a) In a bolt factory, machines A,B and C manufacture reps. 25%, 35% and 40% of the total of their output 5,4,2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machine A, B or C. **(5)**

b) Six dice are thrown 729 times. How many times do you expect atleast three dice to show a five or a six? **(5)**

c) Assume that the probability of an individual coal mines being killed in a mine accident during a year is $\frac{1}{2400}$. Use Poisson's distribution to calculated the probability that in a mine employing 200 miners there will be at least one fatal accident in a year. **(6)**

OR

3. a) In a certain factory turning out razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10. Using Poisson distribution, find the number of packets containing no defective, one defective and two defective blades respectively in a consignment of 10,000 packets. **(8)**

b) In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and S.D of the distribution. **(8)**

Unit - IV

4. a) Define operators δ *and* μ. Prove that

$$\delta[f(x)g(x)]=\mu[f(x)]\delta[g(x)]+\mu[g(x)]\delta[f(x)]$$ **(4)**

b) Show that $\left(\frac{\Delta^2}{E}\right)e^x\frac{E(e^x)}{\Delta^2(e^x)}=e^x$ **(4)**

c) Use Stirling's formula to compute $u_{12.2}$ from the following table :

x_0 :	10	11	12	13	14
$10^5 u_x$:	23967	28060	31788	35209	38368

(8)

OR

4. a) Using Lagrange's interpolation formula, find f(4).

x :	0	2	3	6
f(x) :	-4	2	14	158

(8)

b) Find the value of y at x = 0.23 and x = 0.29 from the following tables of values.

x :	0.20	0.22	0.24	0.26	0.28	0.30
y :	1.6596	1.6698	1.6804	1.6912	1.7024	1.7139

(8)

Unit - V

5. a) Find $y'(0)$ *and* $y''(0)$ from the data :

x :	0	1	2	3	4	5
y :	4	8	15	7	6	2

(8)

b) Find the value of $\log_e^2$ from $\int_0^1 \frac{x^2}{1+x^3} dx$ by using Simpson's 1/3 rule **(8)**

OR

5. a) Use modified Euler's method to solve $\frac{dy}{dx} = x + \sqrt{y}$, with initial conditions y=1 at x=0, for x=0.6 in steps of 0.2. **(8)**

b) Use Milne's method to obtain y at x = 0.4 for the differential equation.

$\frac{dy}{dx} = 2e^x - y$ given that

x :	0	0.1	0.2	0.3
y :	2	2.01	2.04	2.09

(8)