22/11/2018

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Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.

End-Sem-I Exam

Nov. 2018

Max. Marks: **100 marks** Duration: 180 Min
Class: F.Y B.TECH **C/M/E** Semester: **I** Program:
Name of the Course: **Applied Chemistry –I** Course Code : BT-106

Instructions:

1 Question **No** (Q6) is compulsory
2 Attempt any 4 from Q1 Q2Q3 Q4 Q5

Que. No	Question	Points	CO	BL	PI
Q1					
a	Explain EDTA method for detection of hardness	**5**	1	2	2.2.3
b	Write difference between temporary hardness and permanent hardness	**5**	1	1	1.2.1
c	Explain lime soda process with chemical reactions. Write advantages of hot lime soda process over cold lime soda process	**10**	1	2	2.2.3
Q2					
a	Write short note on saponification value of lubricant with significance	**5**	4	1	1.2.1
b	Define lubricant. Explain volatile matter content and carbon residue with significance	**5**	4	1	1.3.1
c	Classify different types of lubricant	**10**	4	2	2.2.4
Q3					
a	Explain COD method for detection of organic matter content with chemical reaction	**5**	3	2	2.2.3
b	Write short note on TDS and its importance	**5**	3	1	1.2.1
c	Describe ion-exchange method for removal of metal cation ions from hard water with advantages and disadvantages	**10**	3	2	2.2.4
Q4					
a	Explain Reverse osmosis and ultra-filtration with its advantages over all method	**5**	1	2	2.2.3
b	How organic matter content removed using sewage treatment	**5**	1		1.2.1
c	Explain testing of Lubricant. write physical testing of lubricant with its	**10**	4	2	2.2.3

	significance				
Q5					
a	Explain applications of nanomaterials in different field	**5**	5	2	2.2.3
b	Write short note on carbon Nano tube	**5**	5	1	1.2.1
c	Explain the properties affected with Nano-size	**10**	5	2	2.2.3
Q6					
a	Convert the unit 40 PPM in to ^{0}Fr, ^{0}Cl, mg/L 65 ^{0}Cl in to ^{0}Fr , ppm, mg/L	**5**	1	2	2.1.3
b	Calculate the temporary , permanent and total hardness for water sample contain $Mg(HCO_3)_2$=50mg/L, $CaSO_4$= 30mg/L $CaCl_2$=40 mg/L	5	1	3	3.2.1
c	50 mL standard hard water containing 1.2 mg/mL CaCO3 consumed 50 mL of EDTA. 200 mL of unknown hard water sample consumed 25 ml of EDTA using EBT as indicator. After boiling, filtration of same hard water(200 mL) consumed 10 mL of EDTA using EBT as indicator Calculate total, permanent and temporary hardness of water	5	1	3	3.2.1
d	A 50 ml of a sewage water sample was reflexed with 10 ml of 0.25N K2Cr2O7in presence of dilute H_2SO_4 And Hg_2SO4. The Unreacted dichromate required 6.0 mL of 0.1N Ferrous Ammonium sulphate solution.10ml of $K2Cr_2O_7$ and 50ml of distilled water under same condition as the sample required 26.5 ml of 0.1N ferrous ammonium sulphate solution. Calculate the COD of Sample	**5**	1	3	3.2.1

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Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

November 2018

End semester-Examination

Maximum Points: 100 **Duration: 3 hours**

Class: F.Y.B.Tech **Semester: I** **Program:C/M/E**

Name of the Course: Engineering Mathematics I **Course Code : BS-BT101**

Instructions:

- **Question Number.1 is compulsory.**
- **Attempt any FOUR questions out of remaining SIX questions.**
- **Answers to all sub questions should be grouped together.**
- **Answer to question should be written in detail.**

Q.No.	Questions	Points	CO	BL	PI
1(a)	Find the n^{th} derivative of $y = \frac{x^4}{x+1}$	05	1	ii,iii, iv,v	2.4.1 2.3.1 2.3.2
1(b)	Find a unit vector normal to the surface $x^2y + 2xz = 4$ at point $(2,-2,3)$	05	4	ii,iii, iv,v	2.4.1 2.3.1 2.3.2
1(c)	*If* $u = f\left(\frac{y-x}{xy}, \frac{z-x}{zx}\right)$ *Show that* $x^2\frac{\partial u}{\partial x} + y^2\frac{\partial u}{\partial y} + z^2\frac{\partial u}{\partial z} = 0.$	05	2	i,ii,ii i	2.4.1 2.3.1 2.3.2
1(d)	If $x = uv, y = \frac{u+v}{u-v}$, find $\frac{\partial(u,v)}{\partial(x,y)}$. (Jacobian)	05	2	ii,iv, v	2.4.1 2.3.1 2.3.2
2(a)	Show that the function	06	2	iii,iv	2.4.1 2.3.1

	$f(x,y)=x^3+y^3-63(x+y)+12xy$ is maximum at $(-7,-7)$ and minimum at $(3,3)$.			,v,vi	2.3.2
2(b)	If $y=\tan^{-1}\left[\frac{a+x}{a-x}\right]$ prove that $(a^2+x^2)y_{n+2}+2(n+1)xy_{n+1}+n(n+1)y_n=0$	06	1	i,iii,iv	2.4.1 2.3.1 2.3.2
2(c)	If $a=\cos\alpha+i\sin\alpha$, $b=\cos\beta+i\sin\beta, c=\cos\gamma+i\sin\gamma$, then prove that $\frac{(b+c)(c+a)(a+b)}{abc}=8\cos\frac{\beta-\gamma}{2}\cos\frac{\gamma-\alpha}{2}\cos\frac{\alpha-\beta}{2}$	08	3	ii,iii, iv,v	2.4.1 2.3.1 2.3.2
3(a)	Verify Euler's theorem for $U=\frac{x^{1/4}+y^{1/4}}{x^{1/5}+y^{1/5}}$	06	2	i,iv	2.4.1 2.3.1 2.3.2
3(b)	Use De Moivre's theorem to show that $\tan 5\theta=\frac{5\tan\theta-10\tan^3\theta+\tan^5\theta}{1-10\tan^2\theta+5\tan^4\theta}$ and hence deduce that $5\tan^4\frac{\pi}{10}-10\tan^2\frac{\pi}{10}+1=0$	06	3	i,iv	2.4.1 2.3.1 2.3.2
3(c)	Show that $e^{e^x}=e\left[1+x+x^2+\frac{5x^3}{6}+\frac{5x^4}{8}+\ldots\ldots\ldots\right]$	08	1	iii,iv ,v	2.4.1 2.3.1 2.3.2
4(a)	Show that for real values of a and b, $e^{2ai\cot^{-1}b}\left[\frac{bi-1}{bi+1}\right]^{-a}=1$	06	3	iii,iv ,v	2.4.1 2.3.1 2.3.2
4(b)	Show that $\lim_{x\to0}\frac{\tan x\tan^{-1}x-x^2}{x^6}=\frac{2}{9}$	06	1	v,vi	2.4.1 2.3.1 2.3.2
4(c)	Find the directional derivative of $\varphi=xy^2+yz^3$ at the point $(2,-1,1)$ in the direction of the normal to the surface $x\log z-y^2+4=0$ at (-1, 2, 1)	08	4	iv,v, vi	2.4.1 2.3.1 2.3.2
5(a)	Evaluate $\lim_{x\to0}\frac{1}{3}\left[1^{1/x}+2^{1/x}+3^{1/x}\right]^{3x}$	06	1	ii,iii, iv,v	2.4.1 2.3.1 2.3.2
5(b)	Prove that $\nabla\left(\frac{\vec{a}\,.\,\vec{r}}{r^n}\right)=\frac{\vec{a}}{r^n}-\frac{n(\vec{a}.\vec{r})\vec{r}}{r^{n+2}}$	06	4	iv,v, vi	2.4.1 2.3.1 2.3.2

5(c)	If $z = x^n f_1\left(\frac{y}{x}\right) + y^{-n} f_2\left(\frac{x}{y}\right)$ prove that $x^2\frac{\partial^2 z}{\partial x^2} + 2xy\frac{\partial^2 z}{\partial x \partial y} - y^2\frac{\partial^2 z}{\partial y^2} + x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y} = n^2 z$	08	2	iv,v, vi	2.4.1 2.3.1 2.3.2
6(a)	Find the values of constants λ and μ so that the surfaces $\lambda x^2 - \mu yz = (\lambda+2)x$ and $4x^2y + z^3 = 4$ may intersect orthogonally at the point $(1,-1,2)$	06	4	I,ii,ii i,iv	2.4.1 2.3.1 2.3.2
6(b)	If $\alpha, \alpha^2, \alpha^3, \alpha^4$ are the roots of $x^5 - 1 = 0$ find them and show that $(1-\alpha)(1-\alpha^2)(1-\alpha^3)(1-\alpha^4) = 5$	06	3	ii,iii, iv,v, vi	2.4.1 2.3.1 2.3.2
6(c)	If $y = \tan^{-1} x$ prove that $y_n = (-1)^{n-1}(n-1)!\sin^n\theta \sin n\theta$ where $\theta = \tan^{-1}\left(\frac{1}{x}\right)$	08	3	ii,iii, iv,v	2.4.1 2.3.1 2.3.2
7(a)	If $u = \log(x^3 + y^3 + z^3 - 3xyz)$ prove that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{(x+y+z)^2}$	06	2	i,ii,ii i	2.4.1 2.3.1 2.3.2
7(b)	If $U = \operatorname{cosec}^{-1}\sqrt{\left(\frac{x^{1/2} + y^{1/2}}{x^{1/3} + y^{1/3}}\right)}$ prove that $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x \partial y} + y^2\frac{\partial^2 u}{\partial y^2} = \frac{\tan u}{12}\left(\frac{13}{12} + \frac{\tan^2 u}{12}\right)$	06	2	ii,iii, iv	2.4.1 2.3.1 2.3.2
7(c)	If $\sin(\theta + i\varphi) = \cos\alpha + i\sin\alpha \left(\text{or} = e^{i\alpha}\right)$, prove that $\cos^4\theta = \sin^2\alpha = \sinh^4\varphi$	08	3	ii,iii, iv	2.4.1 2.3.1 2.3.2

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SARDAR PATEL COLLEGE OF ENGINEERING

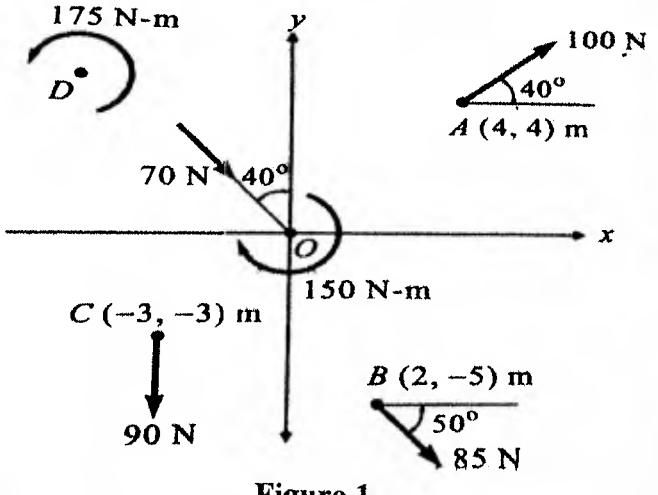
(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

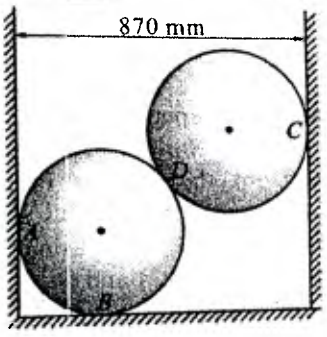
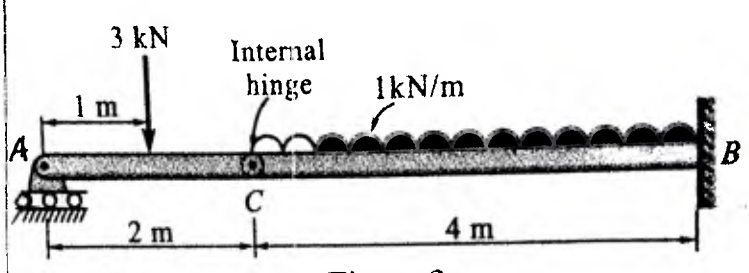
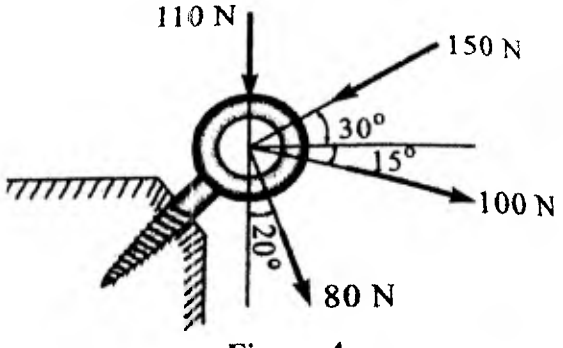
End Semester Examination - November 2018

Program: F.Y. B.Tech (C/M/E)
Course Code: ES-BT104
Course Name: Engineering Mechanics-I

Duration: 03 hours
Maximum Points: 100 marks
Semester: I

Notes: 1. Attempt **any FIVE** questions out of **SEVEN** questions.
2. Assume suitable data wherever required and state it clearly.
3. Figures to the right indicate full marks.

Q.No.	Questions	Points	CO	BL	PI
Q.1.					
a)	Find the resultant of the force system shown in **figure 1.** Also replace the given forces and couples by a single force and couple system at A.  **Figure 1.**	10	CO1	L1, L2	1.3.1, 2.1.1, 2.1.3, 2.2.2, 2.2.3,
b)	Two smooth spheres of weight 100 N and radius 250 mm each are in equilibrium in a horizontal channel of width 870 mm as shown in **figure 2.** below. Find the reactions at the surfaces of contact A, B, C, and D assuming all the surfaces to be smooth.	10	CO2	L1, L2, L3	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.3

	 Figure 2.				
Q.2.					
a)	Determine the reactions at all the supports of the beam shown in **figure 3.**below using conditions of equilibrium. Also determine the moment at the fixed support of the beam.  Figure 3.	10	CO2	L1, L2	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.3
b)	Four forces act on an eye bolt as shown in **figure 4.** Determine the magnitude of the resultant. Also find its direction.  **Figure 4.**	05	CO1	L1, L2	1.3.1, 2.1.1, 2.1.2, 2.1.3
c)	State and prove Varignon's Theorem.	05	CO1	L4	1.3.1, 2.1.1
Q.3.					
a)	For the pin jointed truss shown in **figure 5,** determine: i) The support reactions ii) The forces in all the members of the truss by **Method of Joints.** Also check if the truss is a perfect or imperfect truss	14	CO2	L1	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.3

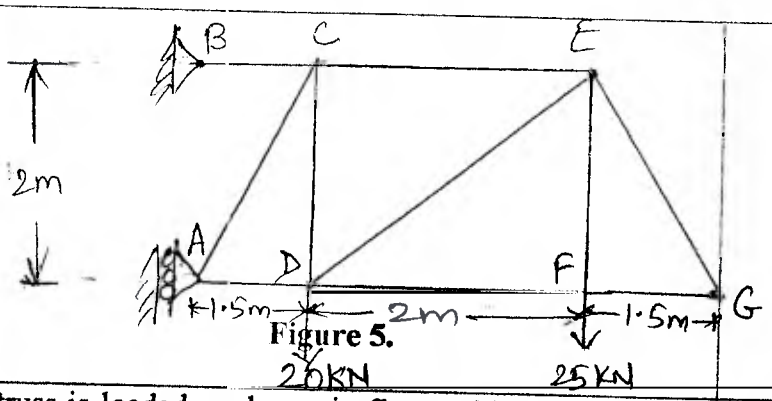


Figure 5.

b)	A truss is loaded as shown in **figure 6** below. Find the forces in the member BD and CE of the truss by **Method of sections only.**	06	CO2	L1	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.3

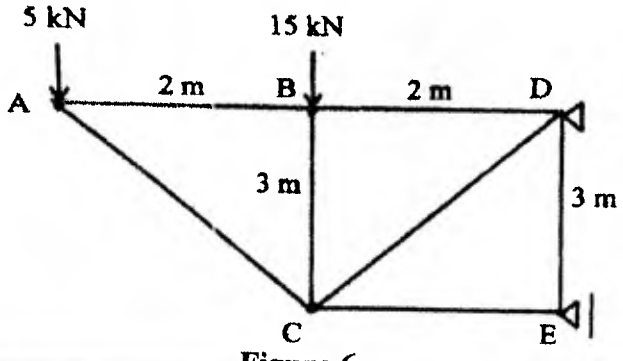


Figure 6.

Q.4.

a)	Determine the frictional force developed on the block shown in **figure 7**, when: i) P = 40N ii) P = 80N Coefficient of static friction between block and floor =0.3 Coefficient of kinetic friction between block and floor = 0.25 Also find the value of **'P'** when the block is about to move.	12	CO2	L1, L2	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.4.1

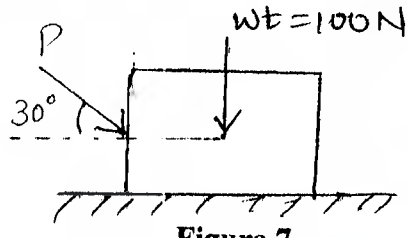


Figure 7.

b)	A ladder having a length of 5m is resting against a wall making an angle of 60^0 with the wall, having coefficient of friction as 0.3. Calculate the horizontal force 'P' required to be applied at the bottom end to avoid slipping of the ladder. Weight of the ladder is 300N and the floor is smooth.	08	CO2	L1, L2, L3	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.4.1

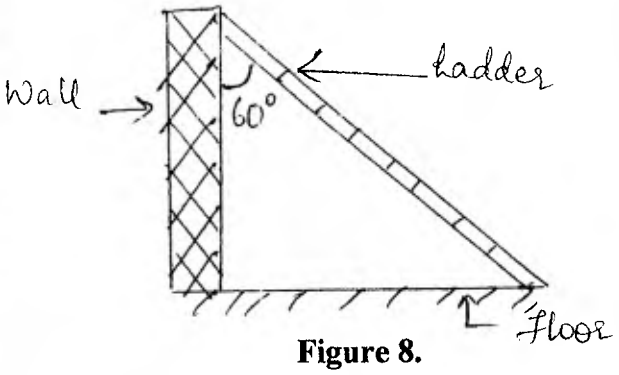


Figure 8.

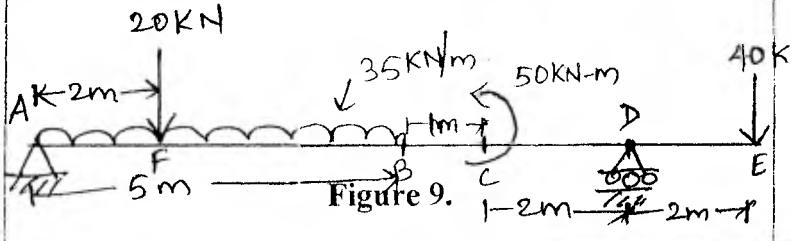
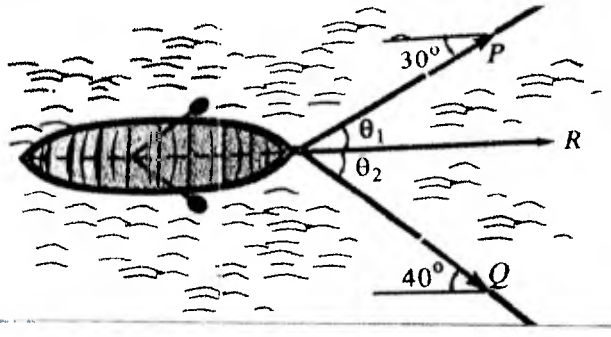
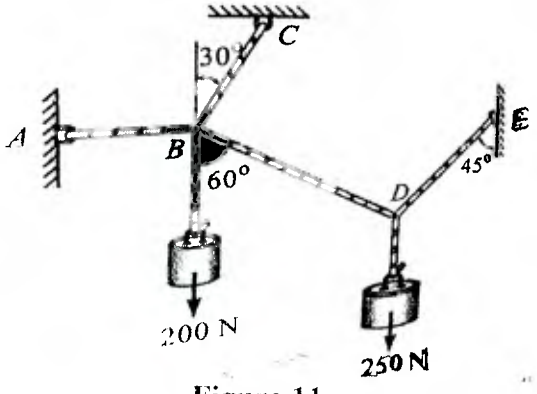
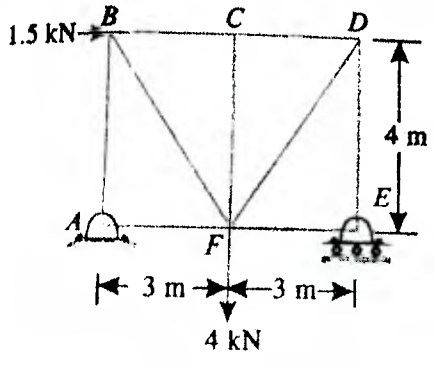
Q.5.					
a)	An overhanging beam ADE is subjected to loading as shown in **figure 9.** Calculate the support reactions using the principle of virtual work.  **Figure 9.**	15	CO3	L1	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.3
b)	What is a Zero Force member in a Truss? With examples, state the conditions for a zero force member in the truss.	05	CO2	L3	1.3.1, 2.1.3
Q.6.					
a)	Explain the following: i) Angle of repose ii) Angle of friction	04	CO2	L4	1.3.1
b)	To move a boat uniformly along the river at a given speed a resultant force R = 550 N is required. Two men pulling with force 'P' & 'Q' by means of ropes do this. The ropes make an angle of 30^0 and 40^0 respectively with the sides of the river as shown in **figure 10.** i) Determine the force 'P' & 'Q' ii) If $\theta_1 = 30^0$, find the value of θ_2 such that the force in rope 'Q' is minimum. What is the minimum force 'Q'?  	10	CO1	L1, L2	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.3

	Figure 10.				
c)	State and prove Parallelogram Law of Forces	06	CO1	L4	1.3.1
Q.7.					
a)	A system of connected flexible cables as shown in **figure 11** is supporting two vertical forces 200 N and 250 N at points B and D. Determine the forces in various segments of the cable.  Figure 11.	08	CO2	L1, L2	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.3
b)	A truss shown in **figure 12** is subjected to two point loads at B and F. Find the forces in all the members of the truss and tabulate the results.  **Figure 12.**	08	CO2	L1	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.3
c)	Explain the importance of Free Body Diagram.	04	CO2	L3, L4	1.3.1

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(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

End Sem I - November 2018 Examinations

Program: FYBTech
Duration: 3 hrs
Course Code: BS-BT105 **Maximum Points: 100**
Course Name: Applied Physics-1
Semester: I End Sem I
Instructions: November 2018

1) Constants : h = 6.626e-34 J-s; e=1.602e-19 C; m_e=9.11e-31 kg; c=3e8ms^{-1}
2) Draw neat diagrams wherever necessary.
3) All questions are compulsory.

Q.No.		Questions	Points	CO	BL	PI
1	a	Beginning with the conservation equations, derive the following relation for Compton shift: $\delta\lambda=\lambda_c(1-\cos\theta)$ where λ_c,θ are the Compton wavelength and the photon scattering angle respectively. What is the maximum value for $\delta\lambda$? Calculate λ_c using the fundamental constants.	20	1	2	1.3
	b	Distinguish between group and phase velocities. Determine the dispersion relation under which the phase velocity is the same as group velocity. In the case of the dispersion relation $\omega=\sqrt{gk}$ where g is a constant, show that the group velocity is one half the phase velocity.	20	2	3	2.6
	c	Show that $\psi(x)=Asin(\alpha x)+B\cos(\alpha x)$ where $\alpha=\frac{\sqrt{2mE}}{\hbar}$ is a solution for $\frac{d^2\psi}{dx^2}+\frac{2mE}{\hbar^2}\psi=0.$ Assuming that $\psi=0$ at x=0 and at x=L show that E varies as n^2 where n is a natural number.	20	3	5	3.4

PTO

		Evaluate the definite integral $\int_{x=0.4L}^{x=0.5L} \lvert\psi\rvert^2 dx$. What does this value represent?				
	d	State and explain Heisenberg's uncertainty principle. How does the principle relate to the wave nature of particles? How does Heisenberg's gamma ray microscope explain the uncertainty principle?	20	2	2	2.9
	e	Explain the origin of energy bands in solids on the basis of band theory. Hence classify solids as metals, semiconductors and insulators. Add a note on their energy structures. **OR** With reference to a cubic structure (answer I to iv): i. determine the atomic packing fraction for body centered cubic structure ii. draw the direction $[1\bar{2}2]$ iii. draw the plane $(1\bar{2}3)$ iv. What do you mean by a family of planes? Give an example. v. State and explain Bragg's diffraction formula.	20 20	4 5	2 2	4.1 5.1.8 5.3.2 5.3.1

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Sardar Patel College of Engineering

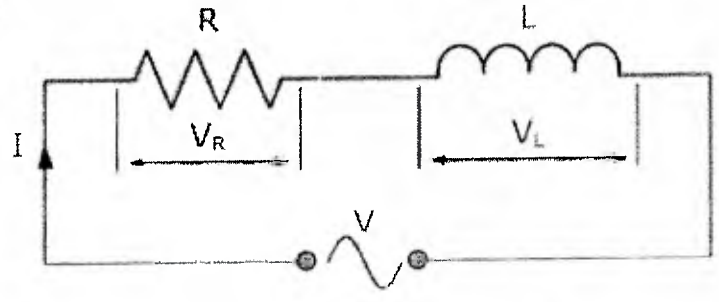
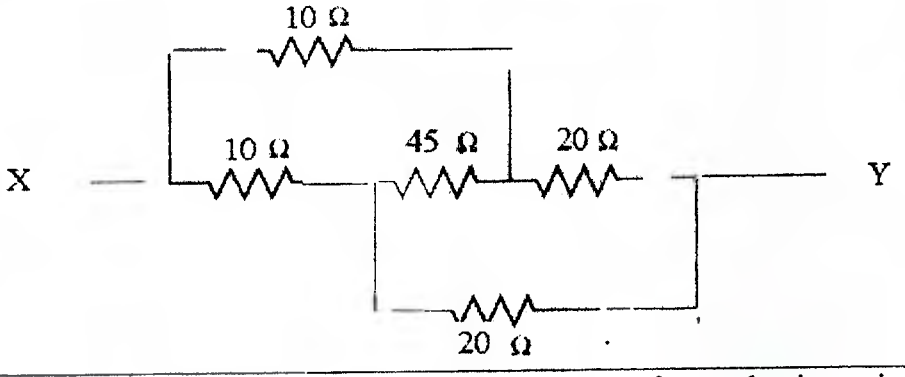
(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058

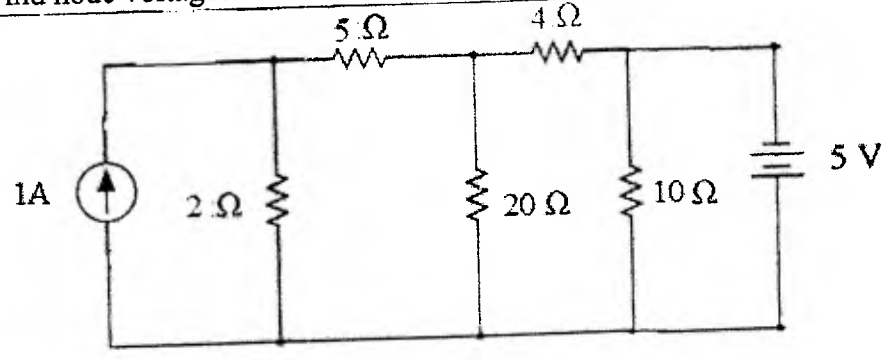
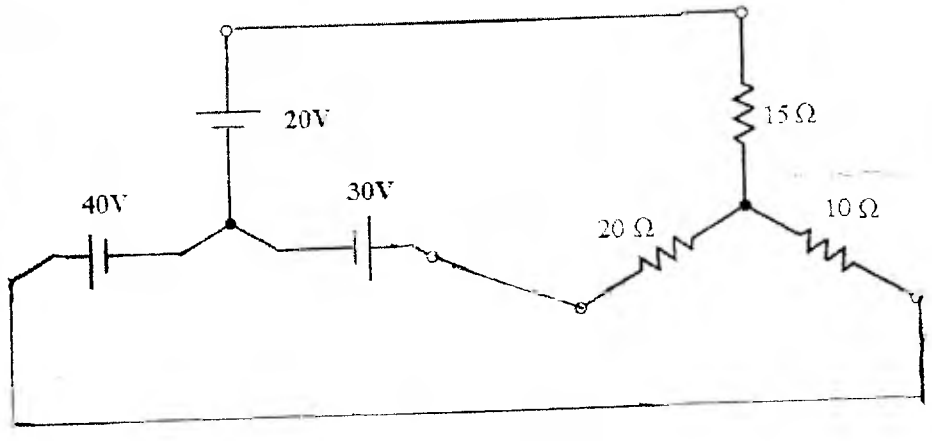
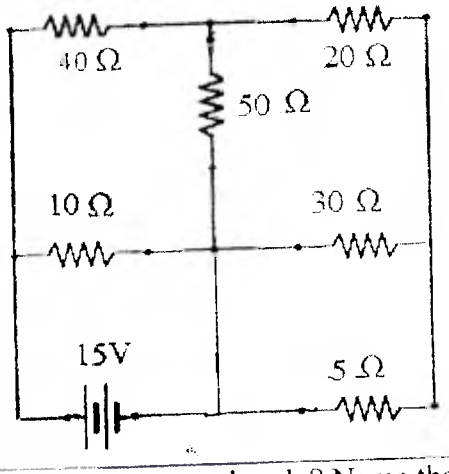
End Sem November 2018

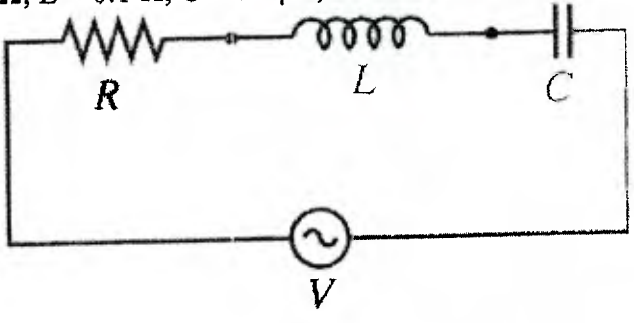
Program: C/M/E
Course code: ES-BT102
Name of the Course: Basic Electrical Engineering

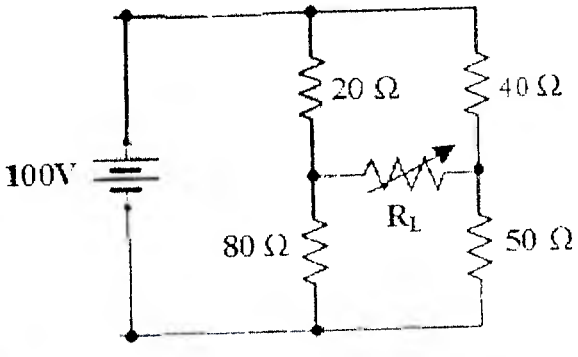
Date :
Duration: 3 Hour
Maximum Marks: 100
Semester: I

Solve any five questions out of seven.

Q. No.		Points	CO	BL	PI
1A (i)	Calculate impedance of the circuit. Given V_R= 16V, V_L= 12V, I = 5A. 	02	2	3	1.3.1
(ii)	Calculate R_{XY} 	02	1	3	1.3.1
(iii)	A resistor R connected to a secondary of a transformer having primary and secondary turns as N_1 and N_2 . Show that resistance seen from primary is equal to the $R\,(N_1/N_2)^2$	02	3	3	1.3.1
(iv)	In a 25 KVA transformer, Core loss and winding loss are 250W and 400 W respectively. Calculate efficiency of a transformer at half load at unity power factor.	02	3	3	1.3.1
(v)	Draw phasor diagram to show that for star connected system, phase difference between line and phase voltage is 30^0.	02	3	3	1.3.1
1 B (i)	List different types of DC motors. List different types of three phase induction motors.	02	3	1	1.3.1
(ii)	Determine the power factor if active and apparent powers of an a.c. circuit are equal in magnitude.	02	2	3	1.3.1
(iii)	In a single-phase transformer, if the iron and copper losses are 40.5 kW and 50 kW respectively, then at what fraction of load the efficiency of	02	3	3	1.3.1

	the transformed will be maximum?				
(iv)	Three identical resistors are connected in star to consume 4000W. If the resistances are connected in delta across the same supply, determine the power consumed.	02	1	3	1.3.1
(v)	State maximum power transfer theorem. Hence write expression for maximum power.	02	1	1	1.3.1
2A	Find node voltages at nodes A, B, C 	05	1	3	1.3.1
2B	Using superposition theorem, determine the current in each branch of the network shown below. 	10	1	3	1.3.1
2C	In the figure shown below, find current supplied by the battery using star delta transformation. 	05	1	3	1.3.1
3 A	What is the power triangle? Name the sides with units	05	2	1	1.3.1

B	Show that power absorbed by pure capacitor is zero.	05	2	3	1.3.1
C	An ideal choke takes a current of 8A when connected to an ac source of 100V, 50Hz. A pure resistor under the same conditions takes a current of 10 A. If the two are connected in series to an ac supply of 100V, 40Hz, then calculate current in the series combination of above resistor and inductor	05	2	3	1.3.1
D	Derive the condition for maximum efficiency of the transformer.	05	3	3	1.3.1
4A (i)	In the circuit shown below, determine (i) circuit impedance (ii) circuit current (iii) p.f. (iv) active power (v) reactive power . R = 20Ω, L = 0.1 H, C = 50 μF, V = 200V, 50 Hz  	06	2	3	1.3.1
(ii)	In an RLC series circuit voltage across the resistor, inductor and capacitor are 10V, 15V and 10 V respectively. Draw the phasor diagram and calculate magnitude and phase of the supply voltage.	04	2	3	1.3.1
4B	Two circuits A and B are connected in parallel across a 200V, 50Hz, mains. Circuit A consists of resistor 10 Ω and inductance of 0.12 H connected in series. Circuit B consists of resistor 20 Ω and capacitance of 40 μF connected in series. Draw the circuit diagram. Calculate (i) current in each branch (ii) source current (iii) p.f. (iv) total power dissipated	10	2	3	1.3.1
5A	With the help of phasor diagram show that two wattmeters are enough to measure total power in three phase circuit. Assume inductive load. Also derive expression for power factor.	10	2	3	1.3.1
B	A three phase delta connected load, each phase of which has an inductive reactance of 40 Ω and a resistance of 25Ω is fed from the 3 phase 415V, 50Hz supply, calculate (i) the current in each phase of the load. (ii) voltage across each phase of the load. (iii) line current (iv) total power taken from the supply. Calculate above parameters if the same load is connected in star configuration to the same supply.	10	2	3	1.3.1
6A	The daily variation of load of a 100 kVA transformer is as follows: 8 AM to 1 PM — 65 kW — 45 kVAR 1 PM to 6 PM — 80 kW — 50 kVAR 6 PM to 1 AM — 30 kW — 30 kVAR 1AM to 8 PM — No load This transformer has no-load core-loss of 370 W and a full load copper	10	3	3	1.3.1

	loss of 1200 W. Determine all-day efficiency (in %) of the transformer.				
B	Consider a 10 kVA, 400/230 V, 50 Hz transformer. The open circuit and the short circuit test results are obtained as below OC test 220 V 4.2 A 148 W SC test 86 V 10.5 A 360 W The measuring instruments are connected to HV side. Determine equivalent circuit of the transformer. Also determine percentage regulation and efficiency at full load 0.8 lagging power factor.	10	3	3	1.3.1
7 A	Describe the function of the following parts in a DC machine in one or two lines (i) Yoke (ii) Pole shoe (iii) Brush (iv) Commutator (v) Armature	10	1	1	1.3.1
	OR				
7 A	(i) Compare three phase induction motor and single phase induction motor	2	3	5	1.3.1
	(ii) Is single phase induction motor self starting? Justify	6	3	5	1.3.1
	(iii) List types of single phase induction machine.	2	3	1	1.3.1
7 B	In the network shown below R_L takes up values 5 Ω, 10 Ω and 20 Ω. Use the best suitable method to determine current through R_L. Justify the suitability of the method used.	10	1	5	1.3.1
					

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END SEMESTER EXAM NOVEMBER 2018

Program: F.Y. B. Tech Mechanical Engineering | **Duration: 03 Hours**

Course Code: ES-BT103 | **Maximum Points:100**

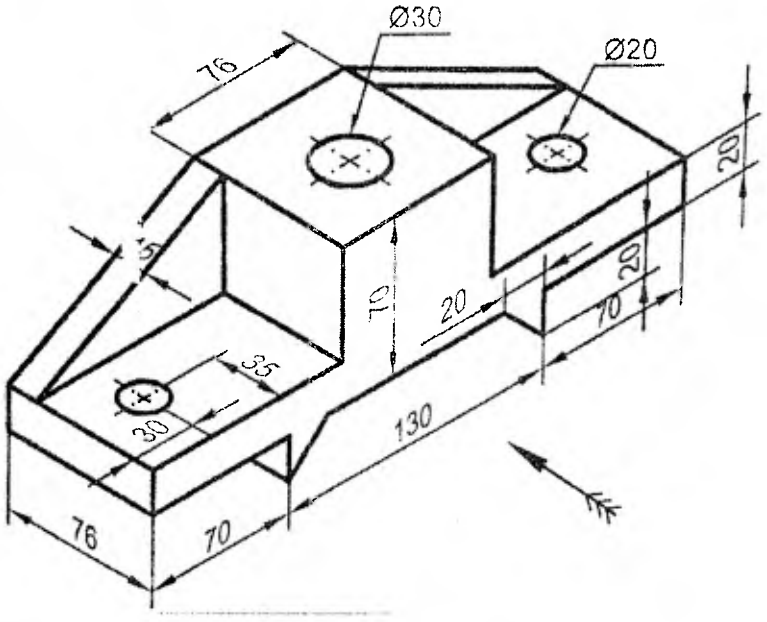
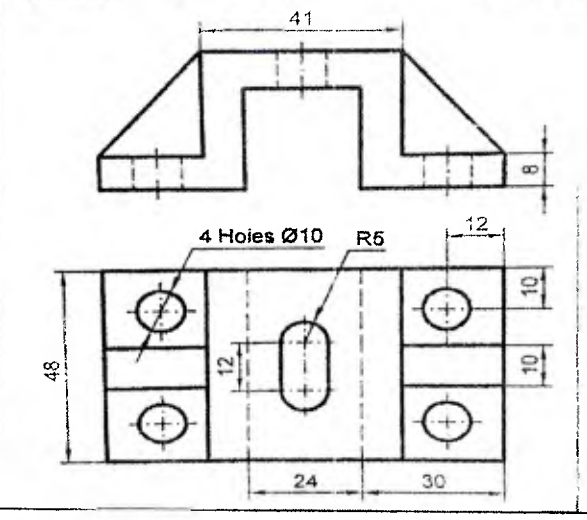
Course Name: Engineering Graphics I | **Semester: I**

SET A

Notes:

- Attempt any **Five** questions.
- Use separate AutoCAD files for each question and save the Files continuously.
- Before leaving the examination hall make sure that your work is uploaded on the server in front of you.
- Select appropriate scale.
- Assume suitable data wherever necessary and justify the same.

Q.No.	Questions	Points	CO	BL	PI
Q.1 (a)	A point P starts moving away from pole O and reaches a distance of 75 mm from O while moving around it for one convolution, its movement from O is uniform. Trace the locus of point P and name the curve.	10	I	L2, L3	1.2.1
Q.1 (b)	Two fixed points F1 and F2 are 100 mm apart. Trace the path of the point moving in the same plane in such a way that the sum of its distance from F1 and F2 is always same and equal to 125 mm. Draw an ellipse by arcs of circle method.	10	1	L2, L3	1.3.1
Q.2 (a)	The projection of a line measures 80 mm in the top view and 70 mm in the front view, The midpoint of the line is 45 mm infront of VP and 35 mm above HP. One end is 10 mm infront of VP and nearer to it. Draw the projections. Find true length and true inclinations with reference planes.	10	I, II	L2, L3	1.2.1
Q.2 (b)	Draw a projection of following points on a common reference line. 1. Point A is 25 mm above HP and 35 mm infront of VP. 2. Point B is 25 mm infront of VP and on HP.	10	I.II	L2, L3	1.3.1
Q.3 (a)	A line PQ is in the first quadrant, its end P and Q are 15 mm and 45 mm infront of the VP respectively. The distance between the end projectors is 55. The line is inclined at 30^0 to the HP and its HT is 8 mm above the XY line. Draw the projection of the line PQ and find its TL and locate its VT.	10	I,II	L2, L3	1.2.1
Q.3 (b)	The FV of a line AB makes an angle 30^0 with XY line. The HT of the line is 45 mm infront of VP, while its VT is 30 mm below the HP. End A is 12 mm above HP and end B is 105 mm infront of VP. Draw the projections of the line and find its true length,	10	I,II	L2, L3	1.3.1

	inclinations with the HP and VP.				
Q.4 (a)	A thin 30^0-60^0 set- square has its longest edge in VP and inclined at 30^0 to HP. Its surface makes 45^0 with VP. Draw its projections.	10	I,II	L2, L3	1.2.1
Q.4 (b)	A semi-circular lamina of 64mm diameter has its straight edge in VP and inclined at angle of 45^0 to HP. The surface of the lamina makes an angle of 30^0 with VP. Draw the projections.	10	I,II	L2, L3	1.3.1
Q.5 (a)	A cone of base 40mm diameter and 55mm height rest on its circular rim such that one of its generators is perpendicular to HP and axis parallel to VP. Draw its three views.	10	I,II	L2, L3	1.2.1
Q.5 (b)	A hexahedron of edge 35mm rest on HP one of its corners with a solid diagonal perpendicular to VP. Draw its projections.	10	I,II	L2, L3	1.3.1
Q.6	Draw FV, TV and SV for all the given components by using first angle method of projection:  	20	II	L6	1.4.1
Q.7 (a)	 Draw the isometric Projection of the following object:	10	I,II	L2, L3	1.4.1

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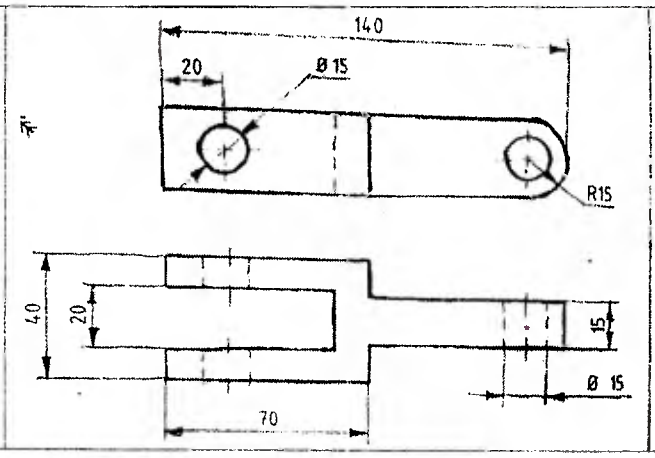
Q.7 (b)		Draw the isometric Projection of the following object:	10	I, II	L2, L3	1.4.1

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END SEMESTER EXAM NOVEMBER 2018

Program: F.Y. B. Tech Mechanical Engineering | **Duration: 03 Hours**

Course Code: ES-BT103 | **Maximum Points: 100**

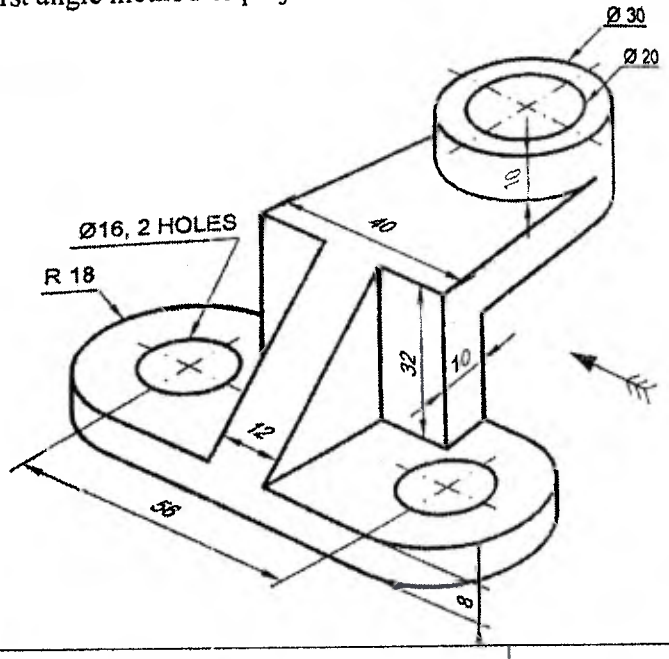
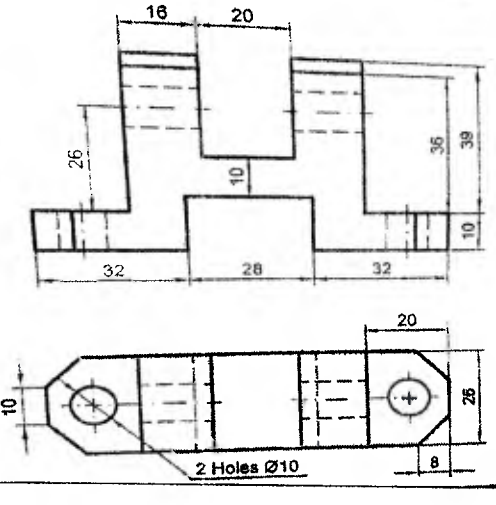
Course Name: Engineering Graphics I | **Semester: I**

SET B

Notes:

- Attempt any **Five** questions.
- Use separate AutoCAD files for each question and save the Files continuously.
- Before leaving the examination hall make sure that your work is uploaded on the server in front of you.
- Select appropriate scale, Assume suitable data wherever necessary and justify the same.

Q.No.	Questions	Points	CO	BL	PI
Q.1(a)	Construct an epicycloid generated by rolling circle of diameter 50 mm and a directing circle of diameter 150 mm. Draw tangent and normal to the curve at any point on the epicycloid.	10	I	L2, L3	1.2.1
Q.1(b)	Distance of focus from directrix is 60 mm. Point moves in such a way that eccentricity is equal to 1. Draw locus of the point and name the curve.	10	1	L2, L3	1.3.1
Q.2(a)	Draw a projection of following points on a common reference line. 1. Point A is 35 mm above HP and 25 mm infront of VP. 2. Point B is 40 mm below HP and 15 mm behind VP.	10	I, II	L2, L3	1.2.1
Q.2(b)	The distance between end projectors of two points A and B is 70 mm. A is 10 mm above HP and 15 mm infront of VP, B is 50 mm above HP and 40 mm infront of VP. Find the true inclinations of AB with VP and HP.	10	I.II	L2, L3	1.3.1
Q.3(a)	A line AB, inclined at 30^0 to the VP has its end points A and B 30 mm and 10 mm above the HP. The length of its FV is 44 mm and its VT is 6 mm above the HP. Determine the true length of AB, its inclination with the HP and its HT.	10	I,II	L2, L3	1.2.1
Q.3(b)	The projectors drawn from HT and VT of a straight line AB are 100 mm apart and those drawn from its ends A and B are 60 mm apart. Horizontal trace is located 50 mm behind of VP and Vertical trace 90 mm below the HP. The end A of the line lies in the HP. Draw the top view and front view of the line AB. Also determine its true length and inclinations to HP and VP respectively.	10	I,II	L2, L3	1.3.1
Q.4(a)	A circular lamina of 60mm diameter rests on HP on a point on the circumference. The lamina is inclined to HP such that the top view of it is an ellipse of minor axis 35mm. The top view	10	I,II	L2, L3	1.2.1

	of the diameter through the point makes an angle of 45^0 with VP. 1. Draw the projections. 2. Determine the angle made by the lamina with HP.				
Q.4(b)	A regular hexagonal lamina of 26mm side has a central hole of 30mm diameter. Draw the front and top views when the surface of the lamina is inclined at 45^0 to HP. A side of lamina is inclined at 35^0 to VP.	10		L2, L3	1.3.1
Q.5(a)	A tetrahedron of 40mm rest with of its edge on HP and inclined at 45^0 to VP. The triangular face containing that edge is inclined at 30^0 to HP. Draw the top and front views of the solid.	10		L2, L3	1.2.1
Q.5(b)	A cone 40 mm base and axis 50 mm long touches VP on a point of its base circle. The axis is inclined at 30^0 to VP and the front view of the axis is inclined at 45^0 to HP. Draw its projections.	10	I,II	L2, L3	1.3.1
Q.6	Draw FV, TV and SV for all the given components by using first angle method of projection:  	20		L6	1.4.1
Q.7(a)	 	10	I,II	L2, L3	1.4.1

Draw the isometric projection for the object as shown below:

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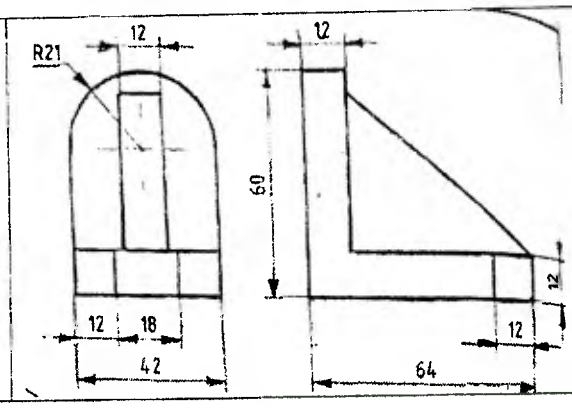
Q.7(b)	 Draw the isometric projection for the object as shown below:	10	I,II	L2, L3	1.4.1

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(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examination - November 2018 Examinations

SET-A

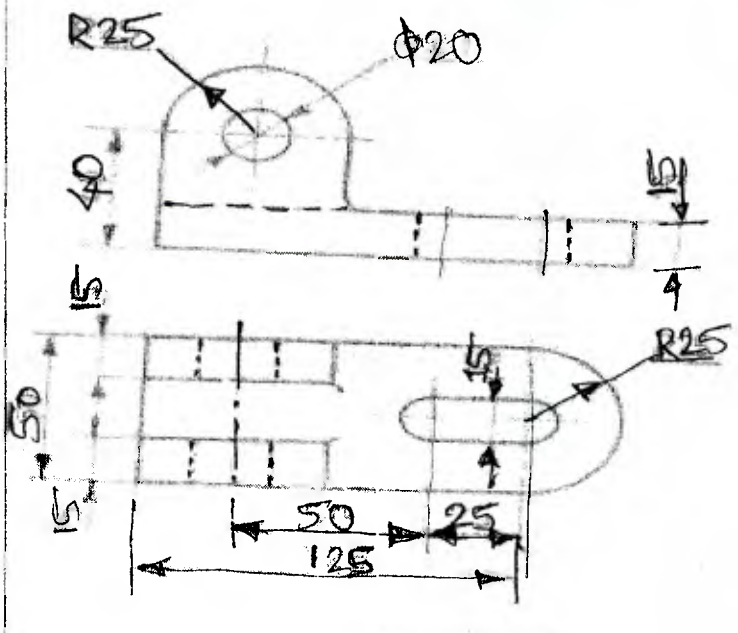
Program:Electrical Engineering | Duration: 03 hour

Course Code: ES-BT103 | Maximum Points:100 marks

Course Name:Engineering Graphics-I | Semester:**I**

Notes:.

1. Solve any five questions out of seven questions.
2. Draw neat schematic diagrams wherever is necessary.
3. Assume suitable data wherever necessary.
4. **Use <u>first angle</u> method of projection only**.
5. Save your work continuously.
6. Before leaving the examination hall, Upload the work in the folder provided on the server

Q. No.	Questions	Marks	CO	BL	PI
Q1 A	A square pyramid side of base 40mm and axis length 60mm has one of the side of base in the H.P. the axis of solid is inclined to the H.P. at an angle 30^0 and the T.V. of axis is inclined at an angle 45^0 with the V.P. draw the projections if apex nearer to the observer.	10	2	2	1.3.1
Q1 B	Draw an isometric view of the following using natural scale. 	10	1, 2	2	1.3.1

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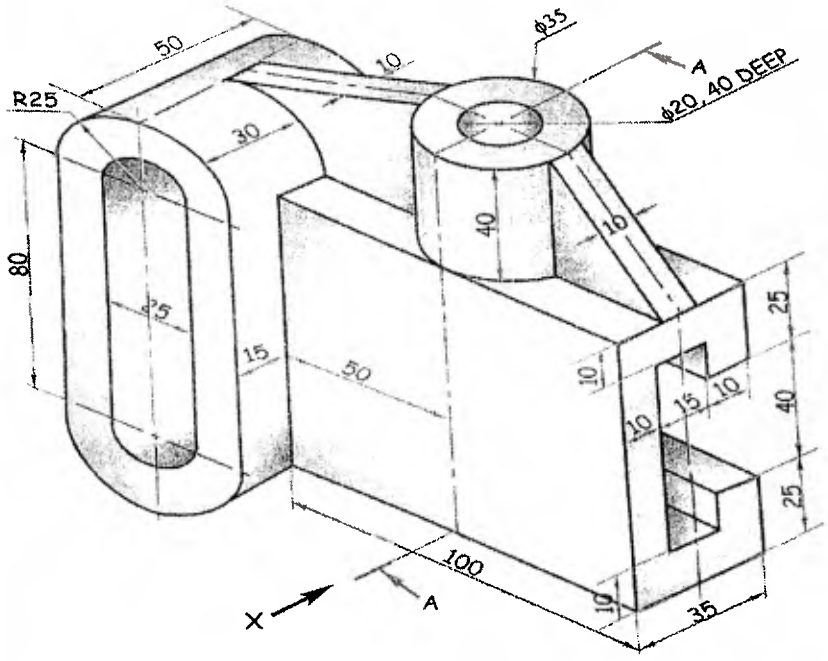
Q2 A	A line AB, 65 mm long, has its end A in the H.P. and 15mm in front of the V.P. the end B is in the third quadrant. The line is inclined at 30^0 to the H.P. and at 60^0 to the V.P. draw its projections.	10	1, 2	2	1.3.1
Q2 B	A pentagonal plate of side 30mm has one of the side in the V.P. and parallel to the H.P. the surface of a plate makes an angle 30^0 with the V.P. draw the projections.	10	1, 2	2	1.3.1
Q3 A	The F.V. and the T.V. of the line AB measures 50 mm and 60 mm respectively. The line is 70 mm long. Point A is 10 mm above the H.P. and 20 mm in front of the V.P. Draw the projections of line Ab and determine its inclination with the H.P.and V.P. assume the line to be in the first quadrant.also locate its traces.	10	1, 3	2	1.3.1
Q3 B	Circular lamina of diameter 60 mm is resting with one of its circumference point on V.P. Surface of the lamina is tilted to V.P. in such way that the front view is perfect ellipse of major and minor axis are 60 mm and 30 mm respectively. Draw the projection of lamina if the surface of the lamina having inclination 35^0 to H.P. also find the true inclination of the surface to the V.P.	10	2, 3	2	1.3.1
Q4 A	Construct one convolution of an involute of a circle of diameter 40 mm.drawtangent and normal at a point on the involute 90mm from the center of the circle.	10	1	2	1.3.1
Q4 B	A pentagonal pyramid has hight of 60 mm and the side of base 30 mm. the pyramid rest with one of the side of base on H.P. such that the triangular face containing that side is perpendicular to the H.P. and makes an angle of 30^0 with the V.P. draw its projections.	10	1, 2	2	1.3.1
Q5 A	Draw parabola having base length 100mm and axis height 60 by the rectangle method. Draw tangent and normal.	10	1, 2	2	1.3.1
Q5 B	Distance between the end projector of line AB are 70mm apart and A is 30mm below the H.P and 50mm behind the V.P. and B is 20mm above the H.P. and 65mm in front of the V.P. draw the projections of line AB and determine its true length and true inclination with the H.P. and the V.P.	10	1	2	1.3.1
Q6 A	Draw the following orthographic projection view of figure 1 1)FRONT VIEW 2) TOP VIEW 3) RHSV	20	1, 2,	2	1.3.1

	 **FIGURE-1**		3		
Q7 A	The end A of a straight line AB 90mm long, is in the second quadrant and 15 mm from both the H.P. and the V.P. end B is in the third quadrant. The line is inclined at 30^0 with the H.P.and the distance between the end projector measured parallel to the XY line is 60mm. draw its projections of line, find its inclination with the V.P. aslo locate its traces.	10	3	2	3.2 .3
Q7 B	Draw an isometric view of the following using natural scale.	10	3	2	1.3 .2

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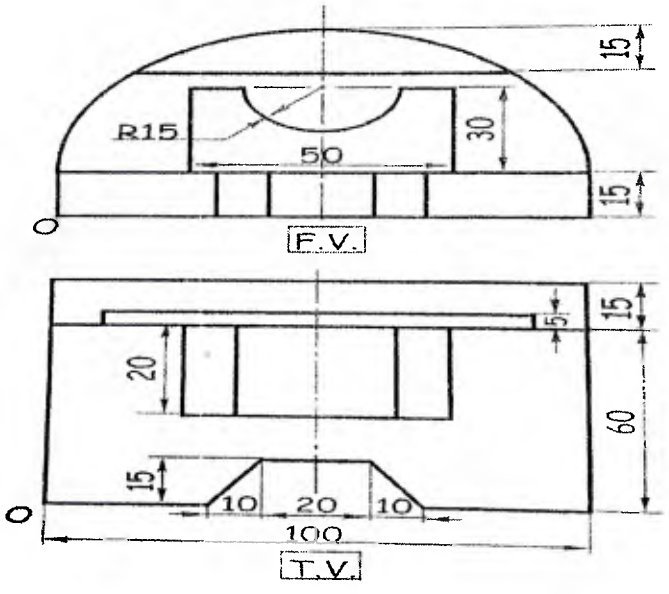

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Re-Examination – January 2019 Examinations

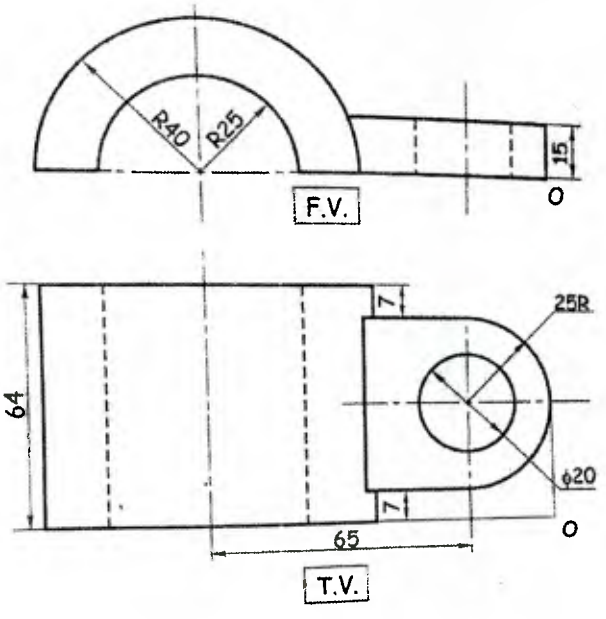
SET-B

Program:Electrical Engineering IC/M — Duration: 03 hour

Course Code: ES-BT103 — Maximum Points:100 marks

Course Name:Engineering Graphics-I — Semester:I

Notes:1. Questionnumber 01 is compulsory.
2. Solve any four questions out of remaining four main questions.
2. Draw neat schematic diagrams wherever is necessary, **highlight** important points.
3. Assume suitable data if necessary and mention it.
4. **Use first angle method of projection only**.

Q. No.	Questions	Marks	CO	BL	PI
Q1 A	A pentagonal pyramid of 30 mm edge of the base and 60mm axis height is lying on one of its triangular surface in the V.P. So that axis is inclined at an angle of 45° to the H.P. Draw its front view and top view.	10	1, 2	2	1.3.1
Q1 B	Draw an isometric view of the following using natural scale. 	10	1, 2, 3	2	1.3.1
Q2 A	The top view of a 75mm long line PQ measures 50 mm. P is 50 mm in front of the V.P. and 15mm below the H.P. Q is 15mm infront of the V.P. and is above	10	1,	2	1.3.1

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	the H.P.draw the front view of PQ and find its inclination with the H.P. and the V.P.		2		
Q2 B	A regular hexagonal plate of 25mm side has one of its corner in the H.P. the diagonal passing through that corner makes an angle 30° and 45° to the H.P. and the V.P. respectively. draw its projections.	10	1, 2	2	1.3.1
Q3 A	The plan of 100mm line PQ measure 80mm. Point P is 30 mm in front of V.P. and end Q 50mm above H.P. the end P is in fourth quadarant and end Q is in second quadrant.the line is inclined at 30° to V.P. draw its projections and find its inclinations with H.P.also locate its traces.	10	1, 2	2	1.3.1
Q3 B	Draw the projections of a regular hexagon of 25mm sides, having one of itsside in the H.P. and inclined at 60 to the V.P. and its surface making an angle of 45°with the H.P.	10	2, 3	2	1.3.1
Q4 A	Draw the involute of a regular pentagone of side 20 mm. draw tangent and normal at point on the involute 80mm from the center of the pentagone.	10	1	2	1.3.1
Q4 B	A square pyramid side of base 40mm and axis length 60mm has one of the side of base in the H.P. the axis of solid is inclined to the H.P. at an angle 30° and the T.V. of axis is inclined at an angle 45° with the V.P. draw the projections if apex away from the observer.	10	2, 3	2	1.3.1
Q5 A	A point is moving in a plane such that the sum of its distances from fixed points is always constant and is equal to 110 mm and the focal length is 80 mm. Draw an ellipse by the concentric circle method.	10	1, 2	2	1.3.1
Q5 B	The plan ab of a straight line AB is 140mm long and its makes an angle 45° with XY.the end A is in the V.P. and 85mm from the H.P. the end B is 20mm from the H.P. and the whole line in the fourth quadrant.draw the projections of the line and determine the true length and the inclination of line.	10	1	2	1.3.1
Q6	Draw the following orthographic projection view of figure 1}FRONT VIEW 2} TOP VIEW 3} LHSV	20	2, 3	2	1.3.1

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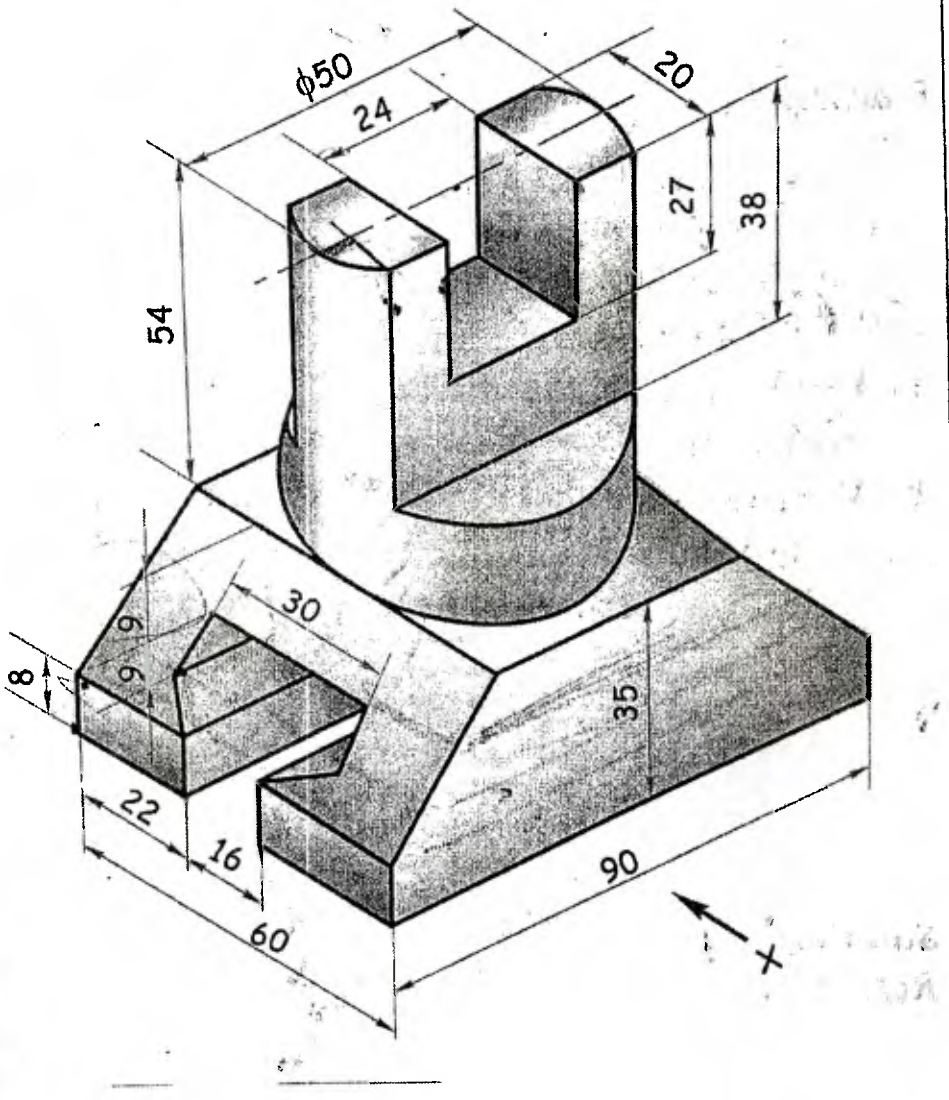
Re-Examination – January 2019 Examinations

					
Q7 A	A line 110mm long has its plan and elevation lengths 80 mm and 90 mm respectively.one end of line 'P' is in H.P. and other end 'Q' is in V.P. draw its projections.assume the line in the third quadrant. find inclination of the line with the H.P. and V.P. also locate its Traces.	10	3	2	3.2 .3
Q7 B	Draw an isometric view of the following using natural scale.	10	2 , 3	2	1.3 .2

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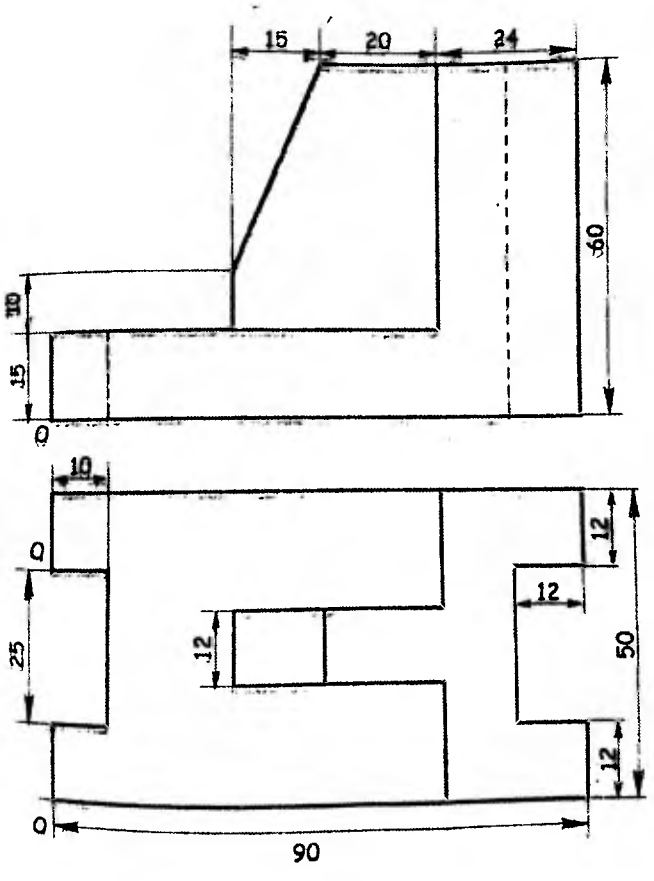

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End Semester Examination - November 2018 Examinations

SET-B

Program:Electrical Engineering | Duration: 03 hour

Course Code: ES-BT103 | Maximum Points:100 marks

Course Name:Engineering Graphics-I | Semester:**I**

Notes:.

1. Solve any five questions out of seven questions.
2. Draw neat schematic diagrams wherever is necessary.
3. Assume suitable data wherever necessary.
4. **Use <u>first angle</u> method of projection only.**
5. Save your work continuously.
6. Before leaving the examination hall, Upload the work in the folder provided on the server

Q. No.	Questions	Marks	CO	BL	PI
Q1 A	A square pyramid side of base 40mm and axis length 60mm has one of the side of base in the H.P. the axis of solid is inclined to the H.P. at an angle 30^0 and the T.V. of axis is inclined at an angle 45^0 with the V.P. draw the projections if apex away from the observer.	10	1,2	2	1.3.1
Q1 B	Draw an isometric view of the following using natural scale.	10	1,2,3	2	1.3.1

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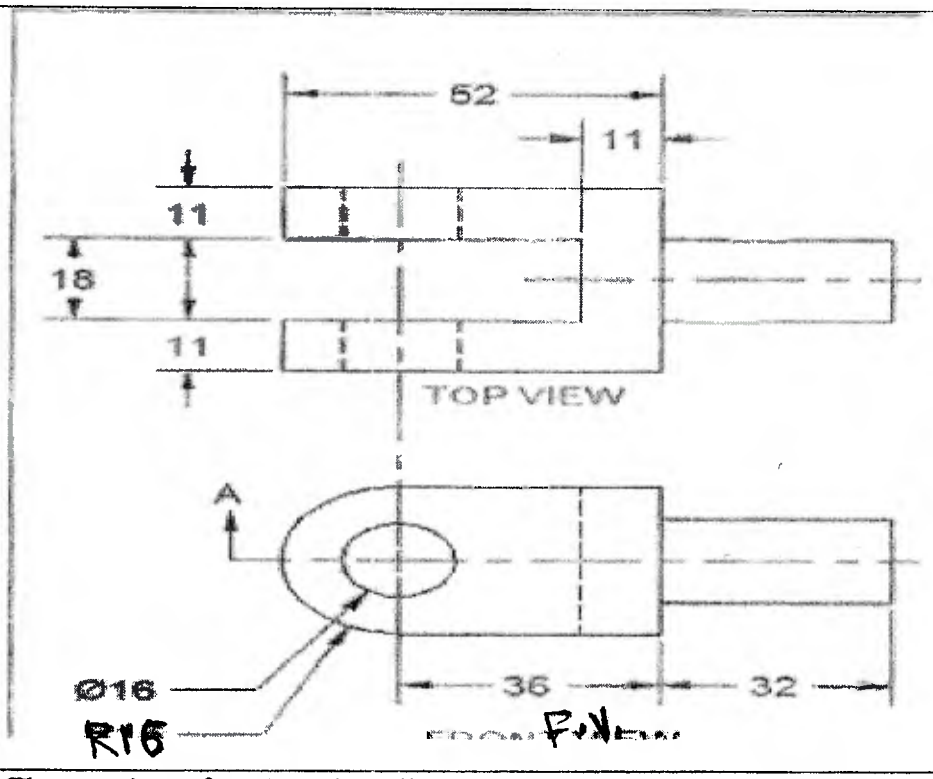
End Semester Examination - November 2018 Examinations

					
Q2 A	The top view of a 75mm long line PQ measures 50 mm. P is 50 mm in front of the V.P. and 15mm below the H.P. Q is 15mm infront of the V.P. and is above the H.P.draw the front view of PQ and find its inclination with the H.P. and the V.P.	10	1,2	2	1.3 .1
Q2 B	A pentagonal plane lamina of side 30 mm is resting on the H.P. on one of its corner so that the surface makes an angle of 60^0 with the H.P. if the side opposite to this corner makes an angle of 30^0 with the V.P. and is parallel to the H.P. draw the front and top views of a pentagon.	10	1,2	2	1.3 .1
Q3 A	The plan of 100mm line AB measure 70mm. point A is 10 mm below the H.P. and 60 mmm in front of the V.P. point B is above the H.P. and 15 mm in front of the V.P. draw the projections of line, determine its true inclination with the H.P. and the V.P. also locate its traces.	10	1,2	2	1.3 .1
Q3 B	Draw the projections of a regular hexagon of 25mm sides, having one of itsside in the H.P. and inclined at 60 to the V.P. and its surface making an angle of 45°with the H.P.	10	2,3	2	1.3 .1
Q4 A	Draw the involute of a regular pentagone of side 20 mm. draw tangent and normal at point on the involute 80mm from the center of the pentagone.	10	1	2	1.3 .1

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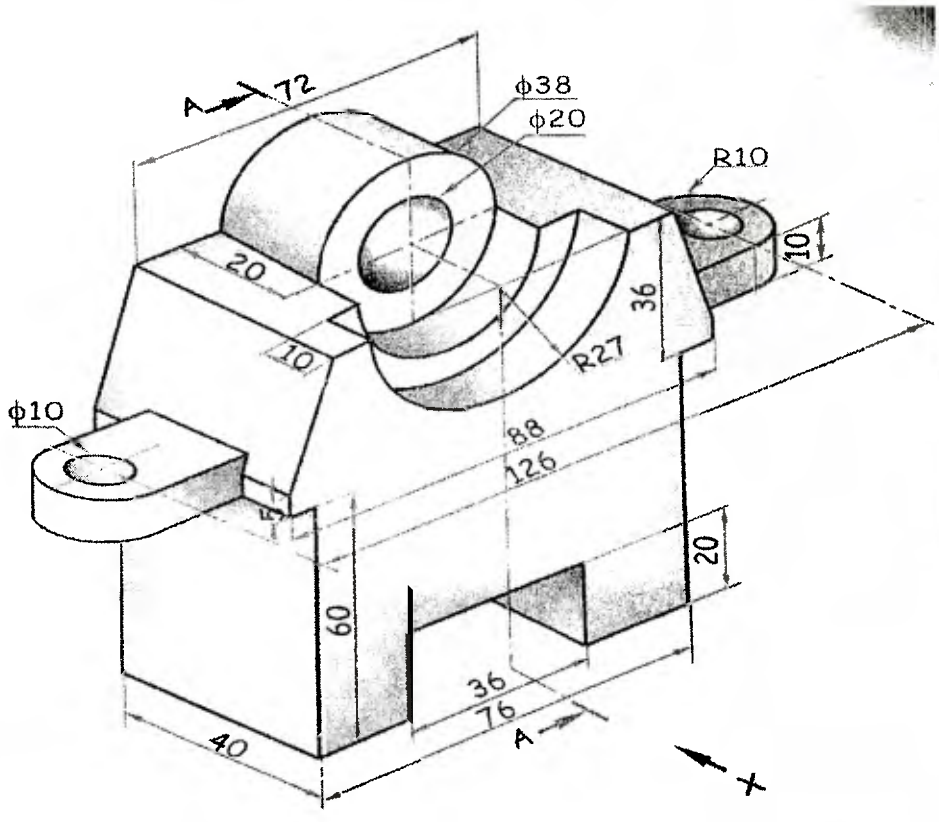
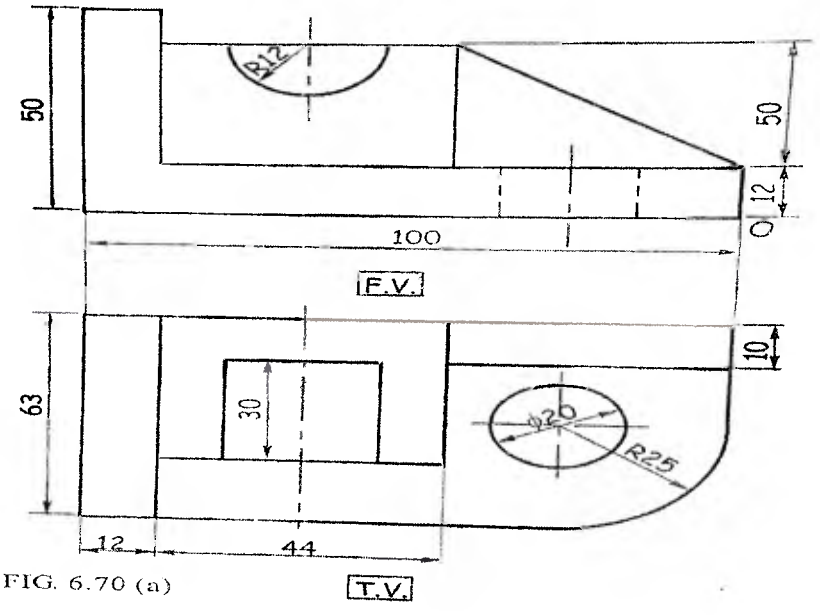
Q4 B	A pentagonal pyramid of 30 mm edge of the base and 60mm axis height is lying on one of its triangular surface in the V.P. So that axis is inclined at an angle of 45^0 to the H.P. Draw its front view and top view.	10	2,3	2	1.3 .1
Q5 A	Draw parabola having base length 100mm and axis height 60 if the axis makes 70^0 to the base. Draw tangent and normal.	10	1,2	2	1.3 .1
Q5 B	The plan ab of a straight line AB is 140mm long and its makes an angle 45^0 with XY.the end A is in the V.P. and 85mm from the H.P. the end B is 20mm from the H.P. and the whole line in the fourth quadrant.draw the projections of the line and determine the true length and the inclination of line.	10	1	2	1.3 .1
Q6	Draw the following orthographic projection view of figure 1)FRONT VIEW 2) TOP VIEW 3) LHSV 	20	2,3	2	1.3 .1

Q7 A	The distance between the end projectors of a line AB is 35mm. the line AB is 70mm long and is inclined at 30^0 to the H.P. the end point A is 10mm above the H.P. and 20mm in front of the V.P.draw the projections of line AB . also locate its traces.	10	3	2	3.2 .3
Q7 B	Draw an isometric view of the following using natural scale.  FIG. 6.70 (a)	10	2,3	2	1.3 .2

FE(C,E,M) I

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Re Examination Sem I - January 2019 Examinations

Program: FYBTech
Duration: 3 hrs
Course Code: BS-BT105
Maximum Points: 100
Course Name: Applied Physics-1
Semester: I **Re Examination Sem I**

Instructions: **January 2019**

1) Constants : h = 6.626e-34 J-s; e=1.602e-19 C; m_e=9.11e-31 kg; c=3e8ms^{-1}; Rest Mass of electron = 0.5MeV

2) Draw neat diagrams wherever necessary.

3) Attempt any **FIVE** questions.

Q.No.		Questions	Points	CO	BL	PI
1	a	Consider Compton effect. Write down the conservation equations for energy and momentum. "The electron even when is assumed at rest does not have the energy zero." Explain why. Show that the Compton shift is at most twice the Compton wavelength.	10	1	2	1.3
	b	Explain how Davisson-Germer experiment explains wave nature of particles.	10			
2	a	What is group velocity? Determine group velocity when the dispersion relation is $\omega=\sqrt{gk}$, g being a constant, and other symbols have their usual meaning.	10	2	3	2.6
	b	Determine the energy of photon with wavelength 5000 angstrom. What is its momentum?	10			
3	a	Explain how the wave function relates to the 'probability'. What do you mean by a normalized wave function? A particle confined between x=0 and x=L has the wave function $\psi(x)=A\sin(kx)$. Determine normalization constant A in terms of L.	10	3	5	3.4
	b	For the particle specified in **Q3 a,** show that the energy varies proportional to n^2 where n is a natural number.	10	3	5	3.4

4	a	How does Heisenberg's uncertainty principle relate to the wave nature of particles.	10	2	2	2.9
	b	How does Heisenberg's gamma ray microscope explain the uncertainty principle.	10	2	2	2.9
5	a	Explain formation of energy bands on the basis of band theory. How do you classify materials on the basis of **energy gap**. Distinguish between intrinsic and extrinsic semiconductors.	10	4	2	4.1
	b	With reference to a cubic structure (unit cell), answer the following questions: i. determine the atomic packing fraction for face centered cubic structure ii. draw the direction $[1\bar{2}\bar{3}]$ iii. draw the plane $(1\bar{2}\bar{3})$	10	5	2	5.1.8
6	a	Explain an experimental set up for Bragg's X-ray diffraction.	10	5	2	5.3.2
	b	Show that Wien's displacement law follows from Planck's distribution law for black body radiation.	10	1	3	1.1
7		i. An X-ray of wavelength 10 picometer is incident on a material with lattice separation d=5 angstrom. Determine the largest order that can be observed. ii. Determine the value of Compton wavelength using the fundamental constants. iii. Determine the momentum in units of c, for a 2MeV electron.	20	5 1 1	 2 2	5.4.2 1.3 1.3

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ODD SEMESTER RE-EXAM JANUARY 2019

Program: FYBTech **Duration: 3 Hrs.**

Course Code: BT105 **Maximum Points: 75**

Course Name: Applied Physics-I **Semester: I**

Notes: All questions are compulsory

Q.No.	Questions	Points	CO	BL	PI
1	Why do we observe alternate bright and dark circular rings in interference pattern of Newton's rings when viewed in reflected light? Show that the diameter of the n^{th} dark ring observed due to reflected light is proportional to the square-root of the ring number. In a Newton's rings experiment, the diameter of the 5^{th} dark ring was 0.336cm and that of the 15^{th} dark ring was 0.590cm. Calculate the radius of curvature of the plano-convex lens, if the wavelength of light used is $5890A^0$.	10	1	2	1.3
2	What is a grating and its grating element? Explain the experimental method of determination of wavelength of light using diffraction grating. Calculate the maximum order of diffraction maxima seen from a plane transmission grating having 5500 lines per cm if light of wavelength $5896A^0$ falls normally on it.	10	1	2	2.6
3	What is optical resonant cavity? Describe the role of an optical resonator in producing a laser beam with the help of a neat, labelled diagram. Describe 3 level pumping scheme with a diagram. **OR** What is holography? Explain construction and re-construction of a hologram with a suitable diagram.	10	2	2	3.4
4	Describe the construction of a He-Ne laser using a schematic diagram. Explain its working with energy level diagram. Mention any two important applications of it.	10	2	5	3.4
5	Derive the expression for the maximum angle that a light ray can make relative to the axis of a step-index optical fibre so that it can pass through the optical fibre. What is meant by Numerical Aperture?	10	2	3	2.9
6	Describe a fibre optical communication system with the help of a neat, labelled diagram. A glass clad optical fibre is made with core glass of refractive index 1.5 and the cladding is doped to give a fractional index difference of 0.0005. Find the	10	2	5	2.9

PTO

	refractive index of cladding, critical angle, acceptance angle and Numerical Aperture.				
7	How will you use a ferromagnetic rod to generate ultrasonic waves in a medium? Explain the working of the electric oscillator to generate the ultrasonic waves. Calculate the length of Nickel rod needed to produce ultrasonic waves of frequency 40kHz. **OR** How will you use a piezoelectric crystal to generate ultrasonic waves in a medium? Explain the working of the electric oscillator to generate the ultrasonic waves. Find the echo time of ultrasonic pulse travelling with a velocity 6×10^3 m/s in mild steel whose correct thickness displayed by gauge is 18mm.	10	3	3	4.1
8	Derive the Schrodinger's time dependent equation for matter waves. **OR** Show that the energies of a particle confined in a one-dimensional box of length L are quantized.	5	4	5	1.1

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