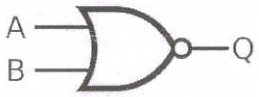
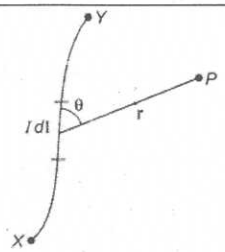
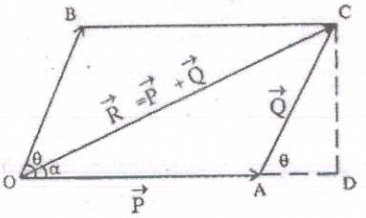
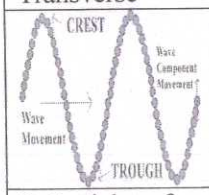
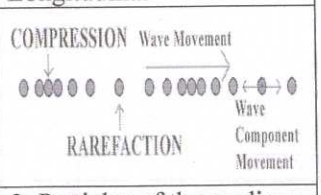
TED(10) 1016 A & TED(10)1016(B)

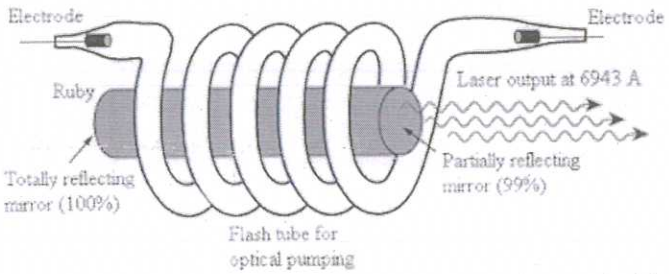
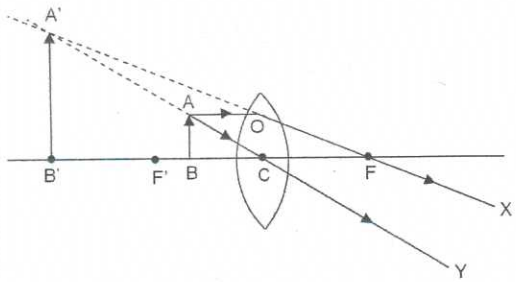
SCHEME OF VALUATION
(Scoring indicators)

Revision : 2010 — Course Code: 1016 A
Course Title : Applied Sciences II – Physics

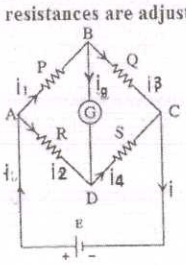
Qst No.	Scoring Indicator	Split up Score	Sub total	Total
I (i)	Part A Statement or Figure + Equation		2	4
I (ii)	<table><tr><td>A</td><td>B</td><td>Q</td></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table> 	1+1	2	
II (i)	PART B Pressure energy, Kinetic Energy and Potential energy. Statement of Bernoulli's theorem	2+2	4	16
II (ii)	Sound waves with frequency above audible limit (above 20 KHz). Applications: SONAR, Metal testing, ultrasound scanning, emulsion preparation, signaling, etc	2+2	4	
III (i)	For bubble $P=4S/r$ $S=Pr/4$ $=24 \times 4 \times 10^{-3}/4$ $=24 \times 10^{-3}$ N/m	2+2	4	
III (ii)	$S = I_g G / I - I_g$ $S = 2x10^{-3} \times 15 / 4 - 2x10^{-3}$ $S = 7.5x\ 10^{-3}$ ohm	4	4	
IV (i)	Magnetic Field Intensity is directly proportional to 1. Current in the conductor 2. Length of the conductor 3. Sine of the angle between the line joining midpoint of the conductor and the point considered, and 4. Inversely proportional to the square of the distance between the midpoint of the conductor and the point considered 	Points (1×4 =4)	4	
IV (ii)	**Derivation of resultant in magnitude and direction** Vectors OA and OB represent the forces P and Q in magnitude and direction acting at an angle θ. *Complete the parallelogram OACB.* *The diagonal OC is the resultant of P and Q.* Let OA = BC = P OB = AC = Q and	Mag Derivation (2) + Figure (1) + Dir derivation (1)	4	

IV (ii)	**Derivation of resultant in magnitude and direction** Vectors OA and OB represent the forces P and Q in magnitude and direction acting at an angle θ. *Complete the parallelogram OACB.* *The diagonal OC is the resultant of P and Q.* Let OA = BC = P OB = AC = Q and OC = R at an angle α with P.  **Magnitude of R** : Draw CD perpendicular to OA produced. *In Δ ADC, CD = Q Sinθ & AD = Q Cosθ* In Δ ODC, $OC^2 = OD^2 + CD^2$ $OC^2 = (OA+AD)^2 + CD^2 = OA^2+2.OA.AD + AC^2$ $R^2 = P^2 + 2PQ\,Cos\theta + Q^2$ **Direction of R :** In Δ ODC, $Tan\,\alpha = CD/OD = CD/(OA + AD)$ $= Q\,Sin\,\theta/(P + Q\,Cos\,\theta)$ or, $\alpha = Tan^{-1}[Q\,Sin\,\theta / (P + Q\,Cos\,\theta)]$	Mag Derivation (2) + Figure (1) + Dir derivation (1)	4	
V (i)	PART C Maximum Value = 15+ 10 = 25 N Minimum Value = 15 - 10 = 5 N	2×1.5=3	3	
V (ii)	$a_1v_1 = a_2v_2$ $\pi r_1^2 = \pi r_2^2$ $v_2 = v_1(r_1/r_2)^2 = (1/2)^2 = 0.25$ m/s		6	
V (iii)	Stoke's Formula A metallic sphere of radius 'r' and density 'ρ' is dropped into a column of highly viscous liquid of coefficient of viscosity 'η' and density 'σ'. The velocity of fall increases and reaches a maximum uniform value v_t called terminal velocity. Now the acceleration becomes zero. According to Stoke's formula, the viscous force $F = 6\pi r\eta v_t$ *Dynamic equilibrium is set up and* Viscous force = Effective weight $6\pi r\,\eta v_t$ = (weight of the body in air – up thrust) $= Mg - mg$ $= (M - m)g$ $= V(\rho - \sigma)g$ $6\pi r\eta v_t = \frac{4}{3}\pi r^3(\rho - \sigma)g$	6	6	15

	$\eta = \frac{2}{9}\frac{r^2(\rho-\sigma)g}{v_t}$			
VI (i)	Defined as Force per unit length of an imaginary line on a liquid surface, normal to the line and parallel to the surface. T = F/l. Unit is N/m	Definition (2) + Unit (1)	3	
VI (ii)	**Power of a couple :** Consider a shaft of radius R driven by an engine by a force F and F. **Moment of the couple = (one of the forces) x (perpendicular distance between the forces)** **C = F x 2 R = 2 F R** *When the shaft is rotated once by the couple then each force moves through a distance of 2 π R, (circumference)* Work done per revolution by the force, w = 2(F x 2πR) = 2 π . 2FR **w = 2 π C J** If the shaft makes N rotations in one second, Work done in 1 s = 2 π N C *joule/second* i.e. **Power, P = 2 π N C *J/s*** **= 2 π N C *watt***	Moment (2) + Work done (3) + Power (1)	6	
VI (iii)	 2. Particles of the medium vibrate perpendicular to the direction of propagation of the wave. 3. The waves travel in the form of crests and troughs. The distance between two consecutive crests or troughs is equal to the λ. 4. Waves can be polarized. 5. Ripples on water surfaces, heat waves, light waves, waves of the guitar string etc., are examples.	 2. Particles of the medium vibrate parallel to the direction of propagation of the wave. 3. The waves travel in the form of alternate regions of increased and decreased pressure called condensations and rarefactions. Distance between two consecutive condensations and rare factions are equal to the λ. 4. Waves can't be polarized. 5. Sound waves in air are examples	Any 3 differences (3) + Derivation (3) = 6	6	15

	RELATION BETWEEN v , v λ : Wave velocity, v = Distance travelled by the wave in 1 vibration/Time taken for 1 vibration v = Wavelength/ Period = λ / T v = v λ			
VII (a)	Force on a current carrying conductor placed in a magnetic field F = Bil Sinθ, when θ=90° F = Bil		3	15
VII (b)	 It is a 3 level solid state laser. Ruby crystal is Al_2O_3 embedded with chromium oxide, which gives red color. Ruby rod is energized through optical pumping xenon flash tube. This light excites chromium ions in the ground state E0 to metastable state E_1. When triggered atoms goes from E_0 to E_1 giving out the laser light of energy $E_1-E_0 = h\nu$ In optical cavity the laser light undergoes resonance	Diagram (3) + Explanation (3)	6	
VII (c)	 If an object is placed within focal length, f, of a convex lens an erect magnified virtual image will be formed in the same side of the image. This is the principle of simple microscope. Let u and v be the distance of object and image from the optic center. D is the least distance of distant vision. Magnification m=1+D/f.	Diagram (3) + Explanation (2) + formulae (1)	6	
VIII (a)	Highly monochromatic (single Color), Coherent (Same Phase), Intense (Focused), Directional (Low Divergence)	Any 3 (3×1=3)	3	15
VIII (b)	KE = Ø – $Ø_0$ = hc/λ – $Ø_0$ = $(6.625\times10^{-34}\times3\times10^{8} / 400\times10^{-9})$ – $2.5\times1.6\times10^{-19} = 6.63\times10^{-34}$J	Formulae (2) + calculation (3) + Unit (1)	6	

VIII (c)	The algebraic sum of electric currents at a junction in any electrical network is always zero. $\sum_k I = 0$. In any closed loop, the algebraic sum of the product of current and resistance in each part of the circuit is equal to the total emf in the circuit. $\Sigma V_k = E$ **WHEATSTONE'S BRIDGE** Wheatstone's Bridge is a network of four resistors used to measure an unknown resistance. Known resistances P,Q,R and unknown resistance S is connected with a battery and galvanometer as shown in tha figure. The resistances are adjusted for zero deflection in the galvanometer, $i_g = 0$ Applying Kirchoff's 1st law, (1) at junction B, $i_1 - i_g - i_3 = 0$ ie, $i_1 = i_3$ .....(1) (2) At junction D, $i_2 + i_g - i_4 = 0$ ie, $i_2 = i_4$ .....(2) Applying Kirchoff's 2nd law to the loop, (1) ABDA, $i_1P + i_g G - i_2 R = 0$ ie, $i_1P = i_2 R$.....(3) (2) BCDA, $i_3Q - i_4 S - i_g G = 0$ ie, $i_3Q = i_4S$.....(4) Eq: (3) / (4) = $\frac{i_1P}{i_3Q} = \frac{i_2R}{i_4S}$ *but, from* (1) & (2) $i_1 = i_3$ & $i_2 = i_4$ *ie,* $\frac{P}{Q} = \frac{R}{S}$ *This is the balancing condition of Wheatstone's Bridge or, unknown resistance* $S = (R \times Q) / P$	Laws (2) + W.Bridge diag (2) + Derivation (2)	6	



SCHEME OF VALUATION
(Scoring Indicators)

Revision:-2010 Course Code: TED(10)1016-B

Course Title :-APPLIED SCIENCE II

Qst. No.	Scoring Indicator	Split up score	Sub Total	Total
I	PART A			
1.	Homopolymer :- polymer made up of identical monomers	1		
	Copolymer:- ,, made of two or more different types of monomers	1		
2.	Any two advantages like high efficiency, reduced pollution etc	2x1	4	4
	PART B			
II a	Reaction just like galvanic cell, anodic and cathodic areas are developed during corrosion.	1		
	Different metals or different parts of metals act as anode and cathode			
	Anodic area is oxidized and corroded	1		
	Cathodic area is reduced and protected	1	4	
	Or give reactions	1		
b	Any 4 points of comparison between solid, liquid and gaseous fuels	4x1=	4	
III a	Heating of earth due to trapped IR radiations by gases like CO_2	2		
	Any two green house gases-CO_2, CH_4, water vapour etc	2x1	4	
b	Any four differences between physisorption and chemisorptions	4x1	4	
IV a	Composites are material system consisting of two or more constituents differing i form and composition, forming distinct phases.	1		
	It consists of two main constituents, a matrix phase which forms continuous phas and a dispersed phase consisting of reinforcing particles	1	4	
	On the basis of matrix composites are classified into three	1		
	1)metal matrix composites (MMC) 2) polymer matrix composites(PMC)			
	3) ceramic matrix composites (CMC)	1		
b	Any four uniqueness of carbon like tetra covalency, catenation, isomerism, strength of C-C bond, ability to form multiple bond withC and also with other elements…etc	4x1	4	16

	PART C			
V a.	Adsorption – The process of accumulation of particle on the surface of a body rather than in the bulk	2		
	Any two applications like use in gas mask, sugar purification, controlling humidity etc.	2x1	4	
b	Fused NaCl is electrolysed using 2 platinum electrodes			
	$NaCl \rightarrow Na^+ + Cl^-$ (or labelled figure)	1/2 1/2		
	Cathode $Na^+ + e \rightarrow Na$ (Reduction)			
	Anode $Cl^- \rightarrow Cl + e$.....(oxidation)	1	4	
	$Cl + Cl \rightarrow Cl_2$	1		
		1		
c	Series in which elements are arranged in the increasing order of standard reduction potential	2		
	Any two applications like, to know relative reactivity , identify anode and cathod calculate emf etc	2	4	
d	Chemically rust is hydrated ferric oxide or $Fe_2O_3 \times H_2O$	1		
	Any two conditions like presence of air, presence of water, presence of electroly etc	2x1	3	15
VI a	Parts of Daniel cell:- Oxidation half cell: Zn in ZnSO4 Reduction half cell: Cu in CuSO4 Salt bridge internally connecting them	1		
	Labelled Figure	1		
	At anode $Zn \rightarrow Zn^{2+} + 2e$	1/2	4	
	At cathode $Cu^{2+} + 2e \rightarrow Cu$	1/2		
	Over all $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$	1		
		1		
b	Sacrificial anode method or cathodic protection Underground pipe is connected to more reactive metal like Al, Mg, Zn etc	1		

	The reactive metal acts as anode and is oxidized and corroded	1	4	
	Pipe acts as cathode and is protected	1		
c	EMF=E^0 cathode –E^0 anode	1		
	0.8V- 0.34V=0.46V	1		
	Cu → Cu^{2+}+2 e^-(anode)	1	4	
	Ag^++ e^-→ Ag (cathode)	1		
d	Any three factors like temperature, pressure, nature of gas, nature of adsorbent et	3x1		15
VII a	PVC – vinyl chloride	1	3	
	Polythene-ethene	1		
	Bakelite-phenol and formaldehyde	1		
	Natural rubber-isoprene	1		
b	1) Cracking- It is the process of breaking up of less volatile bigger molecules hydrocarbons from petroleum into more volatile lower molecules of hydrocarbo by heating in the absence of air to a temperature at which the molecules break.	2	4	
	2) Calorific value- It can be defined as total quantity of heat liberated by the complete combustion of unit weight or unit volume of a fuel at specifi temperature & pressure	2	4	
c	Water gas-CO+H_2	1		
	Natural gas-methane	1		
	LPG-Mainly propene and butene	1		
	Producer gas-CO+N_2	1	4	
d	It is toxic in nature causing damage to fabrics, crops, rubber goods etc.	1		
	But it is important for the existence of the earth, because it absorbs most of the harmful ultraviolet (UV) radiations coming from the sun.	1		
	Thus if ozone layer in the atmosphere is depleted, then the harmful UV radiations would reach the earth causing damage to the plants , animals, human beings etc o cause the gradual destruction of life on the earth.	1	3	15
VIII a	Any four differences between thermoplastics and thermosetting plastics	4x1	4	
b	Improving properties of natural rubber by heating mainly with sulphur at 110-140^{0}C	2		
	Any two properties like increased strength, resistant to chemicals, resistance to temp , decreased conductivity etc	2x1	4	
c	1) aldehyde -CHO 2) amine -NH_2 3) alcohol -OH 4) ester -COO-	4x1		
d	Environment is polluted due to many reasons….. To protect the environment from pollution, chemical processes and products mus be designed to reduce or eliminate the use and generation of hazardous substance That is done by practicing green chemistry.	1 2	3	15