CHEMISTRY

Punjab Engineering College (Deemed to be University): CHANDIGARH
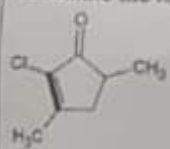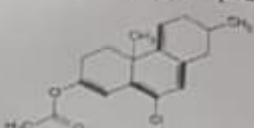### End-term Examination
March, 2021

Programme: B. Tech Ist year(ECE,CSE, Electrical)
Year/Semester: 2020-21 (1st semester)

Course Name: Applied Chemistry-I
Course Code: CH-1101

Maximum Marks: 50

Time allowed: 2.0 Hours

Notes: 1. Attempt all questions in the chronological order as in the question paper briefly.

S. No.				Marks
1	(a)	Calculate the λ_{max} for the following compounds as expected in UV-Vis spectral analysis?		[2]
	(b)	How does anisotropic effect cause chemical shift in NMR and give the spectral data for 2-propanone?		[3]
	(c)	Distinguish between the following compound based on IR spectral analysis: i) ethyl acetate and ethanoic acid ii) ethyl amine and ethyl alcohol		[2]
	(d)	Give two salient differences between TEM and SEM techniques?		[2]
2	(a)	Illustrate with an example the concept of kinetic and thermodynamic control in understanding reaction mechanism?		[2]
	(b)	Show the energy profile for an irreversible exothermic reaction?		[2]
	(c)	What is the stereochemical outcome in case of SN^1 and SN^2 reaction?		[2]
	(d)	Give two applications of computational chemistry and list two software used in understanding chemical structure?		[2]
3.	(a)	Why does Cu metal in d^9 electronic configuration with octahedral geometry do not exhibit? Jahn-Teller effect?		[3]
	(b)	Define the term "Dislocation" in the solid using a carpet analogy?		[2]
4.	(a)	Describe how nanomaterials can be classified based on dimensions with examples?		[2]
	(b)	Draw E-K diagram for direct bandgap and indirect band gap semiconductors? Based on the E-K diagram identify which one of these can be used in optoelectronic devices?		[3]
	(c)	Why does graphene have different electrical and chemical properties to that of graphite? Describe the synthesis of graphene using top down approach (any one method)?		[3]
	(d)	Give two examples of CRT, LED and OLED materials and their applications in optoelectronic devices?		[2]

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S. No.			Marks
5.	(a)	What are the conditions which make the polymer conducting? How do conducting polymers conduct electricity?	[4]
	(b)	How do you achieve stereospecific polymerization using Ziegler-Natta catalyst?	[3]
6.	(a)	The standard electrode potential of zinc ions is 0.76V. What will be the potential of a 2M solution at 300K?	[2]
	(b)	How does Lithium- ion battery work? What do you mean by energy density in batteries?	[3]
	(c)	What is the most common fuel source for fuel cells? How are they different from batteries	[3]
	(d)	A photo voltaic cell has an open circuit voltage of 0.6V & short circuit current is 0.7 Amp (i) Determine the maximum power from solar cell if fill factor is 0.75 (ii) Determine the current corresponding to max power if voltage is 0.42 volt (iii) The solar cell has a conversion of 15% whereas beam radiation is 800 w/m² determine the minimum area required of the solar cell if diffuse radiation is 5% of beam radiation?	[3]

MATHS

(CALCULUS AND ORDINARY DIFFERENTIAL EQUATIONS)

SID. 20104076

PUNJAB ENGINEERING COLLEGE
(Deemed to be University)
End Term Examination

Programme: B.E. (CSE, ECE, EE)
Course Name: Calculus and Ordinary Differential Equations
Maximum Marks: 50

Year/Semester: 20211
Course Code: MA1101
Time allowed: 2 Hours

NOTE

- All questions are compulsory
- The candidates before starting to write the solutions, should check the question paper for any discrepancy and also ensure that they have been delivered the question paper of right course code.

S. No.	Questions	Marks
1.	Check whether the following series is convergent or divergent. Give reasons in support of your answer. $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{\log n}{n}$	4
2.	Find the radius and interval of convergence of the series, $\sum_{n=1}^{\infty}\frac{(-1)^{n+1}(x-2)^n}{n\,2^n}$ For what value of x the series converges (i) absolutely (ii) conditionally?	6
3.	Find $\lim\limits_{(x,y)\to(0,0)}\frac{xy}{\lvert xy \rvert}$, if it exists.	4
4.	(a) Show that if we substitute polar coordinate $x = r\cos\theta$ and $y = r\sin\theta$ in a differentiable function $w = f(x,y)$, then $\frac{\partial w}{\partial r} = f_x \cos\theta + f_y \sin\theta$ and $\frac{1}{r}\frac{\partial w}{\partial \theta} = -f_x\sin\theta + f_y\cos\theta$ (b) Show that $f_x^2 + f_y^2 = (\frac{\partial w}{\partial r})^2 + \frac{1}{r^2}(\frac{\partial w}{\partial \theta})^2$.	4
5.	Find the absolute maxima and minima of the function $f(x,y) = x^2 + xy + y^2 - 6x$ on the rectangular plate $0 \le x \le 5$, $-3 \le y \le 3$.	6
6.	Sketch the region of integration and evaluate its area given by integral $$\int_0^2\int_{x^2-4}^0 dy\,dx + \int_0^4\int_0^{\sqrt{x}} dy\,dx$$	6
7.	Find the volume of the region that lies under the paraboloid $z = x^2 + y^2$ and above the triangle enclosed by the lines $y = x, x = 0, x + y = 2$ in the xy-plane.	6
8.	Solve the differential equation. $\sin xy\,(y\,dx + x\,dy) = 0$; $y(1) = \pi$.	4
9.	Find the general solution of the differential equation by the methods of variation of parameters. $(x^2 D^2 + xD - 4I)y = \frac{1}{x^2}$.	6
10.	Find a general solution of the ODE: $(D^4 - 5D^2 + 4I)y = 40\cos 2x$.	4

Rabia Jannat

ENGINEERING DRAWING

Punjab Engineering College, Chandigarh
End Term Examination

Programme: **B.Tech. (CSE,EE, ECE)**

Course Name: **Engineering drawing using CAD software**

Maximum Marks: 100

Year/Semester: 2021I

Course Code: **ES-1201**

Time allowed: 2 Hours

Note:

- **All questions are compulsory**
- **The candidates, before starting to write the solutions, should please check the question paper for any discrepancy, and ensure that they have been delivered paper of right course code.**

Q1. A point P is 40 mm below HP, in third quadrant, and its shortest distance from XY line is 55 mm. Draw its front and top view. (10)

Q2. Projectors drawn through HT and VT of a line AB are 80mm apart and those drawn through its ends A and B are 50 mm apart. HT (H) is located 45 mm behind the VP and VT (V') 70 mm below the HP. The end A of the line lies in the HP. Draw the projection of the line and determine its TL, Θ and $\emptyset$. (20)

Q3. A right regular pentagon ABCDE of 40 mm side, has its corner A on HP. The plane of the pentagon makes an angle of 35^0 with the HP. Draw its projection keeping its corner point C 70 mm in front of VP. (15)

Q4. A hexagonal prism, edge of base 25 mm and height 56 mm, rests on one of its base edges in HP such that its axis is parallel to VP. Draw the projection of the solid when its base makes an angle of 45^0 with HP. (20)

Q5. A right regular hexagonal pyramid, edge of base 25 mm and height 55 mm rests on its base on HP, with one of its base edges parallel to VP. A section plane perpendicular to VP and inclined to HP at 30^0, cuts the pyramid and passes through the centre of its axis, Draw its front view and sectional top view. Find the true shape of the section. (15)

Q6. A cube of 30 mm edge is placed centrally on top of a cylindrical block of diameter 52 mm and 20 mm height. Draw the isometric drawing of the solid. (20)

or

Q7. Draw orthographic projections (Front and Top view only) of the Figure shown below.